

AN EXPERIMENTAL STUDY OF THREE DIFFERENT PATTERNS
OF STUDENT PARTICIPATION IN A GENERAL-EDUCATION
SCIENCE COURSE FOR COLLEGE FRESHMEN

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CHAPTER I

INTRODUCTION

A. The Need for the Study

The goals of the educative process have been long established.¹ These goals have also been clearly stated.² There is, however, less clarity and less uniformity in the study of the patterns of instruction by which it is anticipated that the goals can be achieved. There is a continuing need for careful study in this area. There is need to discover new ways and to evaluate both these new ways and also those methods already in common use. This study is concerned with the comparative effectiveness in reaching set goals of achievement when the learner participates both in goal-setting and in the learning processes involved in the course-content selection. This situation is compared with so-called learning situations when planning has been done by the teacher and the learner is largely a passive receiver.

1. The Problem of Instruction

A review of the literature concerned with education shows that major emphasis has usually been placed on the ways of presenting subject matter. The method of study has usually been that of analysis in an attempt to locate the problem, followed by proposals to alter the method of presentation, without much concern for the processes by which such changes are

¹W. S. Monroe, Editor, "Method of Teaching" Encyclopedia of Educational Research. New York: Macmillan Co., 1952, p. 751.

²Ibid., "General Education," pp. 489-90.

expected to work. In the larger area of method, within which presentation of material is seen as one aspect of many methods, the term "impart" is frequently used. This term suggests that the basic assumption is that a "body of knowledge" somewhere is to be transferred to the learner, presumably by word of mouth or by the printed word. There is a good deal of evidence that learning does not take place in this way.

Different approaches have been used by various research workers. Perhaps the most common method which has been used might be called the philosophical approach. This method usually consists of considerations of the relative worth of items of fact usually taught, and, in terms of what one generation thinks would be good for another, of thinking out ways by which such learning can be transferred to the minds of the learner. Often whole methodologies have been put forth without once submitting them to a test of fact.

A second method appears to rest upon a procedure in which the teacher works by inspiration, in a kind of trial and error method, and, "after the fact," constructs a methodology to account for what appears to have happened to the learners.

A third, and more recently developed, method involves the careful planning and thoughtful analysis of the first approach; an establishment of experimental situations, controlling as many factors as possible, and a comparison of the products of the experimental group with the products of the control group. Even with all this careful planning, studies were often made without any challenging of the basic assumptions or any clarification of facts as opposed to opinion.

The history of method also shows that progress in improving instruction has been slow. It was not until this century that progress in

improving instruction has advanced beyond the ordinary course of events. These more recent developments have come about through the endeavors of educators who applied the scientific approach to the areas of psychology and education. Despite this fact, it cannot yet be stated that actual processes of instruction are significantly different from or substantially better than the instruction of earlier periods. Current publications in this field are not generally consistent with our present knowledge of how individuals learn and how their learning may be guided. Instruction can be improved when teaching procedures are rooted in an experimental approach to learning.¹

2. Significant Development

The most significant developments in method during this century have been made in the elementary school grades and have involved the theory and practice of teaching in certain subject fields. Recognizing these evidences of progress in selected areas, it is well established that instruction has been and is a neglected aspect of American education. It is evident, however, that we are now on the verge of a sharp change in educational thought and practice. This change gives promise of a new technique for teaching. Teaching procedures which consist mainly of assign-study-recite are based on the concept that learning is essentially a matter of memorizing. Instruction then consists of defining the content to be learned (the assignment) and of checking up to determine the amount of learning that has occurred (the recitation). The student's "studying his lesson" may train him in the process of memorizing, but is not very fruitful if that is its sole purpose.

¹Nelson B. Henry, Editor, "Learning and Instruction," The Forty-Ninth Yearbook of the National Society for the Study of Education: Part I, The University of Chicago Press, 1950, pp. 4-5.

Recent studies of the learning process lead to defining learning as change in behavior. This point of view largely excludes the older notion of transfer of fact from one head to the other. Instruction, then, is a poor tool for our purpose, and we shall need to lay it down, as a carpenter lays down his hammer, which was useful when he was "driving things in," but no use for cutting a board. Using this conception, guidance is the proper tool since the learner is the only one who can change his behaving. A change in one's behavior means any change in his action.

Research in learning can make definite contributions to the area of educational objectives, to educational theory in the organization of the content and activities that make up educative experiences, and to the determination of how specific aspects of behavior are best learned.¹

3. Method Courses Inadequate

Few of the standard texts in the field of general education methods approach the problems of instruction from the point of view of a modern concept of learning. In some instances these publications might well be called books about methods rather than guides or manuals to train teachers to perform their role as instructors with art and skill. Seldom in the educational training of the teacher are the relationships between psychology of learning and method of teaching made explicit and concrete. The teacher who is held responsible for the training of other teachers is often a person who has learned to perform with a certain degree of efficiency in the teaching process. His methods course is composed of certain teaching experiences organized into a teaching content. Such contribution that he is able to make to the teacher's training must be theoretical; yet

¹Ibid., pp. 7-8.

his specific contribution to the teaching procedure is untested.¹

4. Problem of College Teaching

The problem of college teaching is receiving greater attention. In recent years there has been great dissatisfaction with the practice teaching offered in colleges. It has been under careful study for some time. As it became evident that words were not as adequate as had been thought, it followed that investigators became skeptical of the usefulness of the lecture-note-taking method of learning. There is an increasing demand for greater student participation with a decreasing attempt to cover all aspects of every field of study.

To become increasingly self-reliant, the students must be given as much freedom of choice as they can assume, freedom concerning how to approach the subject matter, how to evaluate it, and within reason, what material should be studied within the confines of the course. In addition to the question of freedom of choice on the part of the student is the parallel question: what kind of direction or leadership should be exercised by the teacher.²

5. Teaching General Education Courses

There is a rapidly growing demand for systematic improvement of instruction in general education courses. Early in the developmental stages of the general education movement, it was the usual practice to divide a survey course among two or three instructors, each assigned only to course materials relating to his specialty. This factor along with the related circumstances is considered the greatest single obstacle retarding progress in the development of general education courses today. This procedure makes a difficult situation for the instructors and an unfortunate circumstance for the students. In fact, there is no improvement shown over the

¹Ibid., p. 6.

²Richard H. Thornton, Editor, "Teaching College Students," What the Colleges are Doing, New York: Ginn and Co., No. 100, Fall, 1954, p. 4.

traditional plan, since the subject-matter areas composing the various courses are still being taught as isolated subjects. An increasing emphasis on functional integration of course material reveals the need for instructors each of whom can administer the entire course.

Method studies in general education courses have been limited. Previous research in general education has sought to determine the effectiveness of the entire program as a teaching method without necessarily revealing the identity, contribution, or relative method-value of the individual courses.

In many of the general education programs the course material is basic and required for subsequent work in certain fields. It is necessary in such instances to determine to what extent certain basic information is learned and how it can be learned best.

6. A New Approach to the Problem of Instruction

The problem of instruction is now conceived to be concerned with how to guide, direct, and evaluate the experiences of the learner who is in the process of attaining socially approved behavior patterns. It becomes the duty of the school to appraise the needs of society and to define the kinds of behavior required of the learner for effective living. The school also has the duty to select the curriculum content and the activities designed to give such experiences required for the attainment of the desired standards of behavior.¹

The instructional and activity programs organized to encourage maximum interaction of students with them will result in the formation of new behavior patterns which must be evaluated in terms of the original objectives

¹Nelson B. Henry, Editor, Op. Cit., pp. 1-11.

and repatterned if the results are undesirable. It may be generally stated that the methods employed in the process of education should consist of those procedures by which learning is most wisely guided or directed.

A first consideration in initiating an attack on the instructional problem should be to review educational principles pertaining to the nature of objectives, the organization of content and activities, the guidance of learning experiences, and the evaluation of the educational product. This investigator is primarily concerned with the principles related to the guidance of the learning experiences as they can be derived from the study of how individuals learn.

7. A Local Problem in General Education

The general education approach emphasizes flexibility in the classroom in order to include student participation in preparing and presenting to his class the subject-matter content. In this way, the students determine to a large measure what should be learned and how. It is theorized that through this experience of active participation the students, in addition to mastering the subject matter, will show evidence of behavioral changes including those involving personal and social adjustments based on individual needs. Many educators seem to doubt the extent of subject-matter competency acquired by students who are subjected to this approach. It is not surprising that educators who have observed the lack of control of subject matter shown by students who had no investment in the procedure should anticipate an even smaller effort on the part of the learner who was not coerced. Without the experience of how students learn under their own direction, these educators have nothing with which to understand the freer way.

The course which the author has used for his research is a course in the Bio-Social Development of the Individual. This is a course in the general education program of Alabama State College. It has been developed as a basic course for several subsequent courses. The entire staff is concerned with the degree of control of the students in the general education courses. This general concern made such a study as this one seem extremely necessary. Since competency can be judged only in terms of what the student can do with what he knows, the participation approach appeared to be an appropriate one to use. It was the author's assumption that the control of subject matter would be increased rather than decreased under this plan. It is this hypothesis on which the study is based.

B. Statement of the Problem

1. Definition of the Problem

The purpose of this investigation is to determine whether or not those students who are given an opportunity to help plan the content and procedure for a freshman course in the general education program at Alabama State College--The Bio-Social Development of the Individual--differ in certain achievements and outcomes from those students for whom the course content and procedure are prescribed. The study will seek to determine the existence of a relationship between the pattern of instruction and the achievement of the students in this basic college course for freshmen. This study will try to discover whether there are significant differences in the outcome with respect to student participation between students whose class meetings are designed by Pattern A, by Pattern B, or by Pattern C. The general problem is to search for a relationship between the method of teaching and the student's achievement, and to determine to what extent, if any, a student's participation influences his achievement. The question

is: Do those students who are permitted to participate in the production, preparation, and presentation of course material for class discussion differ in selected measurable achievements from those who do not so participate?

2. Basic Theory and Hypothesis

a. Theory: Student class-participation is positively related to subject-matter mastery. The more students participate in class the more knowledge and understanding they will have of the subject-matter content.

b. Hypothesis: Students who participate more in class will give evidence of more knowledge and understanding of the course content by scoring significantly higher on the:

- (1) Inventory Test I administered near the beginning of the fall quarter and again near the end of the spring quarter;
- (2) Inventory Test II administered near the beginning of the fall quarter and again near the end of the spring quarter;
- (3) Fall Quarter Final Examination administered at the end of the fall quarter and again at the end of the spring quarter;
- (4) Winter Quarter Final Examination administered at the end of the winter quarter and again at the end of the spring quarter;
- (5) Biology Test administered at the end of the spring quarter;
- (6) Psychology Test administered at the end of the spring quarter;
- (7) Interpretation Test administered at the end of the spring quarter;
- (8) Misconception Test administered at the end of the spring quarter.
- (9) Spring Quarter Final Examination administered at the end of the spring quarter.

3. Limitations

There will be no attempt in this study to measure changes in social behavior. There are studies, however, that have been designed to measure such changes, examples of which are reviewed in Chapter II.

CHAPTER II

REVIEW OF RELATED STUDIES

A. The General Trend in Method Studies

Research in college teaching relating to instructional procedures has been in process since 1920, within which time productions of experimental studies and questionnaire investigations have been carried on. Many of the investigators have been teachers in the areas of psychology, education, and science, and generally the studies have developed directly from classroom problems. It is observed that these earlier studies primarily emphasized subject-matter mastery.

A summary of the results of a survey by Cole in 1937 based on ten selected studies states:

In so far as mere mastery of elementary subject matter is concerned the lecture method is as good as any other. The results are sometimes almost identical for lectures and discussion groups, sometimes slightly in favor of the discussion classes, and often appreciably in favor of the lecture classes.¹

Studies completed more recently have differed considerably in procedure due to the utilization of non-directive technique and group dynamics. These recent studies show an appreciable trend in comparing personality changes attributed to the differences in teaching methods. The trend in method research tends in a direction away from subject-matter mastery and toward behavioral changes as a measure of educational outcomes.

B. Method Studies Involving Psychology Classes

¹Luella Cole, The Background for College Teaching, New York: Farrar and Rhinehart, 1940, pp. 324-325.

1. A Three-Method Study by McKeachie¹

Three methods of teaching a general psychology class were studied in which 661 students were included. The large lecture sections met once a week and the smaller (30 to 35) quiz sections, twice a week. The three methods used were discussion, study-tutorial, and recitation. In the discussion method, the instructor served as chairman, summarizer, stimulator, and informant. The study-tutorial method allowed the instructor to give individual help to those who requested it. In the recitation method, the instructor summarized the lecture and allowed a question-answer exchange between himself and the students. The performance of the students on the final examination was significantly better for the recitation sections when compared with the study-tutorial sections at the five percent level. There were no significant differences between the performance of students in the recitation and discussion sections, or discussion and study-tutorial sections.

The students at the end of the semester ranked the recitation method highest of the three methods according to preference; however, each student only experienced one of the three methods. The validity of their responses could only be judged by asking how well an individual can be expected to compare an experienced method with a described one.

The three methods employed in this study were designed to reveal significant differences involving anxiety in the classroom, student preferences for various teaching methods, and subject-matter mastery.

2. A Two-Method Study by Smith and Johnson²

¹W. J. McKeachie, "Anxiety in the College Classroom," Journal of Educational Research, 1951, Vol. 45, pp. 153-160.

²H. C. Smith and D. M. Johnson, "An Experimental Evaluation of Education of Democratic Leadership in the Classroom," Psychological Monographs, 1953.

The two methods of teaching a general psychology course used in this study were the democratic and the lecture-discussion. In the democratic method, the teacher included in the course only such content material as was necessary to meet the needs expressed by the group. The teacher could only give assistance in expressing and clarifying needs, and evaluating ideas. He was not in any way to limit the areas for discussion. The teacher was helpful in giving needed information related to the discussion, summarizing and adding to the discussion, and becoming more of a member and less of a leader. The lecture-discussion method provided control classes in which the teacher did most of the talking. The decisions as to the number and kinds of tests as well as the order of topics were made by the democratic groups and imposed upon the lecture-discussion group. This group was allowed, according to its interest, to supplement prescribed material and to discuss any of it. Sixty-two students were used for the two methods, and the two groups were matched in accordance with their results on a democratic attitude test and a pre-test of psychological information.

The results of this study did not show a difference between the two methods when tested by these four hypotheses; yet, there was a difference in the results between the two instructors:

- a. Students like democratic classes better than traditional classes.
- b. Students accept decisions that they have made more readily than those made and imposed upon them by an instructor.
- c. The development of democratic attitudes is greater in a democratic class than in a traditional class.
- d. Students learn more in a democratic class.

It was found that students who scored higher on the pre-test of course

content also showed greater gain in democratic attitudes. Those students scoring lower on pre-test of course content showed greater gain in subject matter mastery. No relationship was found between gain in subject-matter mastery and the amount of participation in class discussion, attitude toward the class, and initial democratic-attitude score.

3. A Two-Method Study by Asch¹

Four classes in general psychology, composed of male veterans with a mean age of 21 who had completed one semester of general psychology, were used in this study to test the effectiveness of non-directive teaching. The same textbooks were used for all four classes.

The 23 students composing the experimental class were assigned specific chapters to read in the texts and to write a weekly paper relating their reactions to their reading in general for the course. They were informed that there would be no examination or grade given on this reading. No examination of any kind was given during the semester, except the final examination which was necessary for research purposes and did not affect their semester grade. In fact, the semester grade was determined prior to the final examination, and the students involved were so informed. The students asked about the necessity of studying for the final examination at which the instructor assured them that they were privileged to do as they wish.

The 101 students in the three control classes were given the same assigned reading as the experimental class but were subjected to three examinations and a final on the reading, and were required to write a term paper.

¹M. J. Asch, "Nondirective Teaching in Psychology: An Experimental Study," Psychological Monographs, 1951, Vol. 65, No. 4 (Whole No. 321).

The experimental class was told that the instructor would assign grades based on individual conferences which permitted each student to propose and defend his own grade. The students in the experimental class were free to discuss any subject that claimed their attention during the class period, and the instructor served merely to clarify, summarize, or objectify student remarks. The instructor assured them that at no time would he give opinionated information. The circular arrangement in the classroom included the students and the instructor.

The four classes were matched for aptitude and for scholastic achievement. The American Council on Education Psychological Examination and the Ohio State Scholastic Aptitude Test were used to measure aptitude, and the grade-point average was used to indicate scholastic achievement.

The final examination was composed of an objective section and an essay. The objective part included true-false and multiple-choice items, while the essay involved illustrative definitions of four concepts.

The experimental group showed significant inferiority to the control groups on both the objective and on the essay parts of the final examination at the one-tenth percent and the five percent levels respectively. However, the proportion of experimental students reporting that the course was helpful in learning the subject matter was significantly greater at the one percent level. Evidently, the subject-matter mastery referred to here does not include the content of the final examination. The number of students reporting that the course helped them to know themselves better was significantly greater for the experimental groups.

The difference in motivation for the final examination between the experimental and control groups was not considered in the finding. The control students knew early in the semester that a final examination would

be required and that their performance on it would influence the course grade. The experimental students were not informed until one week before the time of the examination and were told that it would not be used in determining the course grade.

It was observed that the individual evaluation of the course by the students suggests that non-directive teaching encourages greater outside reading, stimulates thinking about basic conceptual material, and makes for more independent decisions based on the knowledge of many individuals rather than on authority only.¹

The Minnesota Multiphasic Personality Inventory was administered at the beginning and again at the end of the semester to assess the emotional outcomes of the discussion procedures. It was found that seventy-three percent of the experimental students showed improved adjustment while only twenty-three percent of the control students showed similar improvement, significant at the one percent level of confidence. One is led to believe that the results may well be due largely to the relief of anxiety over grades by the experimental students.

Changes in social attitudes were assessed by the use of an adaptation of the Bogardus Social Distance Scale with which an effort was made to measure tolerance at the beginning and at the end of the semester. The increase in tolerance was not significantly different for the experimental and control groups. It was concluded, however, that the non-directive learning experience has definite potentialities for improving social attitudes, far exceeding a more formal and intellectualized classroom situation.

The findings may be summarized thus:

The discussion class proved inferior on the final examination

¹Ibid., p. 12.

which they had not anticipated taking and to which presumably they did not assign much importance. However, certain other intellectual values associated primarily with independent thinking were achieved by the non-directive method. Significant emotional values were achieved by the discussion method and possibly certain subtle social values as well.¹

A related study reports that a non-directive class showed a reduction in the students' feelings of self-consciousness and shyness and an increase in their willingness to face up to their problems.² They were relieved of their guilty feelings over sex and were stimulated to gain parental independence. Students who preferred the non-directive method read on their own forty-five percent more in the assigned text than those expressing a preference for a combination of non-directive and directive methods, and two hundred and twenty percent more than those preferring the directive method for the first three-week period. It was shown that half of those preferring the directive method had done no outside reading at the end of the three-week period; none had read more than one book. Those students preferring the non-directive method were found to have read at least one item, and forty percent had read more than one.

It was found that those students who preferred the directive method were poorly adjusted to the classroom situation and reported more adjustment problems than those students who preferred the non-directive method. However, differences in age, sex, and degree of emotional and social maturity were not considered in this study.

¹Harry Ruja, "Experimenting with Discussion in College Teaching: A Survey of Recent Research," Educational Administration and Supervision, Vol. 39, Oct., 1953, Num. 6, p. 327.

²M. Schwebel and M. J. Asch, "Research Possibilities in Non-directive Teaching," Journal of Educational Psychology, 1948, Vol. 39, pp. 359-369.

4. A Two-Method Study by Faw¹

One hundred and two psychology students were divided into three groups in order to study student and instructor centered class discussion.

Two non-directive discussion sessions per week were provided for the students in group 1. Two instructor-directed discussion sessions per week were provided for the students in group 2, in which the instructor posed the problems, asked the questions, answered his own questions if no answers were forthcoming from the class, and answered any questions any student felt called upon to ask. The two methods were alternated for the students in group 3. Two lectures per week were attended by all students of the three groups.

Three objective examinations were administered during the semester. It was shown that the performance of students in the student-centered section was significantly better than that of the instructor-centered section at the five percent level of significance based on the results of the three examinations combined.

A greater number of students said that they enjoyed the student-centered discussion sessions, receiving from them greater social and emotional values. They also expressed a feeling of inferiority in subject-matter mastery which, however, was not substantiated by objective results.

5. A Two-Method Study by Husband²

A two-year period furnished an opportunity to study two teaching methods selected on the basis of class size in a regular psychology course.

¹V. Faw, "A Psychotherapeutic Method of Teaching Psychology," American Psychologist, 1949, Vol. 4, pp. 104-109.

²R. W. Husband, "A Statistical Comparison of the Efficacy of Large Lecture Versus Smaller Recitation Sections upon Achievement in General Psychology," Journal of Psychology, 1951, Vol. 31, pp. 297-300.

The large classes had a mean of about 200, and the smaller classes, a mean of about 50. The twelve classes, six of each, contained about 1700 students. All twelve classes were given the same assignments and examinations. The lecture method was used almost exclusively in the larger classes while the discussion method was primarily used in the smaller classes.

The difference between the two methods was not significant; yet, the lecture classes performed at a slight higher level for five quarters and tied the sixth and final quarter. The difference, however, was accounted for by the careful preparation of the lectures and the inspiration gained by lecturing to a large class.

6. A Two-Method Study by Bovard¹

The performance of a group-centered class was compared with a leader-centered class in elementary psychology. Each class was composed of roughly twenty-five students who were matched in intelligence by the Otis test, grade-point average, college status, proportion of veterans, and distribution of sexes. Both classes had the same instructor and were given the same assignments and examinations. The proportions of lectures, discussions, and psychodrama were approximately equal for both classes. The variable was the amount of interaction taking place among the students in each class. Interaction was encouraged in the group-centered class. The instructor arranged the seats in a circular fashion which allowed students to answer questions easily and provided opportunities for class decisions involving administrative problems, such as the time of examination, the length of the lectures, and role of the teacher. The instructor was assigned the role of instigator and resource person by the group.

¹E. W. Bovard, Jr., "The Psychology of Classroom Interaction," Journal of Educational Research, 1951, Vol. 45, pp. 215-224.

Interaction was restricted in the leader-centered class to the teacher-student. The group was not given the opportunity to make final decisions. The teacher assigned himself the role of group leader.

It was noted by an observer that the differentiation set up by the experimenter was a practical realization. He found that the proportions of remarks directed to group members other than the teacher were .61 and .10 respectively in the group-centered and leader-centered classes, a difference significant at better than the one percent level of confidence.

The group-centered class showed social and emotional gains. Its members exhibited less restraint and more wholesome fellowship. They initiated the organization of a number of social functions, and manifested more favorable feelings toward one another and toward the class. They showed a greater variation among them than was found among members of the leader-centered class.¹

A typescript of a transcribed class discussion was evaluated by two clinical psychologists for each class. Both classes viewed the film, The Feeling of Rejection, and each member developed an answer to the question, "What made the girl what she was?" The psychologists made these statements:

This group (leader-centered) is insecure, aggressive, and formalistic. Little insight is shown by (most) members into the underlying dynamics.

This group (group-centered) is sensitive to expression of feelings, types of mechanism used to deal with conflicts and the varied and interrelated aspects of behavior of the 'heroine' . . . the marked degree of interaction and spontaneity of the group . . . less frightened by the film and could take it more seriously and less defensively than the other.²

¹E. W. Bovard, Jr., "The Experimental Production of Inter-Personal Affect," Journal of Abnormal and Social Psychology, 1951, Vol. 46, pp. 521-528.

²E. W. Bovard, Jr., "Clinical Insight as a Function of Group Process," Journal of Abnormal and Social Psychology, 1952, Vol. 47, pp. 534-539.

It was found that the group-centered class was significantly superior to the leader-centered class as measured by their responses to feelings portrayed in the film and by their identification with persons represented at the one percent level.

7. A Two-Method Study by Gibb and Gibb¹

In conducting an elementary psychology course, the experimenters used what they termed 'participative action' methods. The most distinguishing feature was embodied in the extensive use of the 'buzz' session. The larger groups were broken down into smaller ones for the purpose of energetic discussion of an issue during a short period, allowing greater participation in discussion than in the usual discussion method.

No formal lectures on course content were given to the experimental sections, of approximately eighty students, during the school year. Instead, the instructor, whose role was constantly diminishing in the activities of the group, including the making of decisions, "gave training in role playing, group goal setting, problem centering, distributive leadership, evolution of individual performance by intra-group ratings, process observing group selection, evaluation, and revision of class activities." The groups were kept informed of the results of ratings and class evaluation.

The control class was composed of another section of the course matched roughly with the experimental section as to sex, age, college major, and expectation as to teaching method, and was selected at random from ten of the sections taught by the traditional lecture-discussion method.

¹Lorraine M. Gibb, and J. R. Gibb, "The Effects of the Use of 'Participative Action' Groups in a Course in General Psychology," American Psychologist, Vol. 7, p. 247 (Abstract).

It was found that the gains made by the experimental group were significant (P not given) in "role flexibility, self-insight, leadership and likability ratings and group membership skill." It was also found that these gains caused no apparent loss of subject-matter mastery as measured by the traditional objective and essay examinations.

C. Method Study Involving Psychology and Philosophy Classes

8. A Two-Method Study by Ruja¹

The two methods, discussion and lecture, were studied with two classes in philosophy and two in general psychology for two semesters, alternating the method each semester in such way that both methods would be represented. The examinations and assignments were identical for both classes of each course. Comparability of the groups was established on scholastic aptitude, reactions to the instructor, and emotional adjustment. The scholastic aptitude was kept constant by an analysis of covariance. A standardized rating scale with known reliability and validity was used to determine the reactions of students to instructor. The names-known technique involved listing the names of fellow students each student knew at the end of the semester, indicating those known before entering this class. The Bell Adjustment Inventory was administered both at the beginning and at the end of each of the two semesters to measure the changes in emotional adjustment.

It was found that the difference between the two methods was not significant. However, when the performance levels of the two groups were compared, it was shown that the scores made by the psychology-discussion students were slightly lower than the scores made by the psychology-lecture

¹H. Ruja, Outcomes of Lecture and Discussion Procedures in College Teaching, Unpublished M.A. Thesis, San Diego State College, 1952.

students on subject-matter content. The Bell Adjustment Inventory showed that the difference between the two groups in adjustment gains was not significant; although, the gains made by the lecture sections were slightly higher than the gains made by the discussion sections in psychology.

There was no significant difference between the two psychology groups in rating the instructor, but the philosophy-discussion sections rated the instructor slightly more favorable than the lecture sections. The discussion groups showed a greater acquaintance with members of the class than the lecture groups by rating higher on the names-known technique.

It was found that the psychology-lecture method was superior at the one percent level to the psychology-discussion method for teaching course content, but there was no difference between the philosophy-discussion methods. However, differences in age, sex, and subject-matter were not allowed for in this study. This finding was significant at the one percent level and was based on the performance of the students on the course examinations for a lecture class composed of students significantly older and longer in college at the one-tenth percent level and a greater proportion of men at the two percent level than the corresponding discussion class.

D. Method Study Involving Social Relations

9. A Two-Method Study by Wispe'¹

Eight sections of approximately twenty students each of an elementary class in Social Relations served to demonstrate directive and permissive methods of teaching. All eight sections were taught by graduate students, using the directive method with four and the permissive method with the remaining four. A three-week trial period was provided for the teachers

¹L. G. Wispe', "Evaluating Section Teaching Methods in the Introductory Course," Journal of Educational Research, 1951, Vol. 45, pp. 161-186.

as a means of determining their natural preference prior to their assignment, during which time they received some specialized training. One meeting per week was scheduled for each class for a semester. The students in each section were matched with the students in each of the other sections on the basis of a pre-test of the subject matter to be taught in the course, scholastic aptitude (measure used not specified), college status, the proportion of graduates of private preparatory schools, and size.

The directive method was defined as highly structured and subject-matter centered. The permissive method was defined operationally: the instructor does not define the problem to be discussed, asks open-ended questions, is informal in his manner, commends students frequently, and invites them to report personal experiences; the students volunteer information, laugh a great deal, and participate extensively in the discussion. An observer for each of the types of classes described the activities as an instrument for scoring interaction by which the significance of differences between the two methods can be determined.

A projective test was administered to all eight sections at the end of the semester. A questionnaire was also administered designed to obtain from the students their attitudes toward college in general, teachers, students, and the specific class. The final examination, partly objective, was the same for all students.

The directive method was found to be favored as indicated by the reactions of students. Twenty-five percent of the entire group equally distributed between the two methods expressed satisfaction with the method experienced. Twenty-five percent, of which two-thirds were exposed to the directive method, preferred to have experienced more permissiveness. They expressed a feeling of tenseness, of not being free to recite, and of

hostility toward the instructor. The one-third who were in permissive sections expressed a feeling of relaxation and of being free to recite, directing their hostility toward non-personal objects.

Fifty percent of entire group preferred more direction, of which two-thirds were in permissive sections who reported that they felt relaxed and free to recite, while the remaining one-third did not, and expressed hostility toward the class, the instructor, and themselves, and showed perceptual rigidity.

It was shown that the majority of the students preferred the directive sections significant at the five percent level. Since these sections were well-structured, the class activities helped in preparing for the examinations, yet the permissive sections were enjoyed more.

It was concluded that when a high degree of stress is placed on passing the final examination designed to measure subject-matter mastery, the permissive type of instruction is not likely to succeed. If, however, the total development of the individual instead of the mere subject-matter mastery is the educational objective, then permissive teaching will achieve better results.

10. A One-Method Study by Berrien and his Associates¹

The case-method of teaching, dealing with a new kind of course in human relations, has been studied. A series of true lengthy cases which exhibited problems in human relations composed the textbook for this course. The cases were factually reported, allowing the students opportunities for making inferences. The description of each case may run to six or ten single-spaced pages.

¹F. K. Berrien, "Attempts to Measure Attitudinal Change as a Consequence of Permissive Discussion," American Psychologist, 1950, Vol. 5, pp. 246-247 (Abstract).

The procedure followed in the classroom permitted the student discussion to be guided but not directed by the instructor. The instructor could reflect and restate student comments but could not judge their validity. Reading assignments and short lectures were given to acquaint students with basic principles underlying human relations involving specific cases.

Each student wrote a paper giving interpretations of cases on which they were graded. The evaluation of the papers involved the amount of factual support of their interpretations and the internal consistency of their reasoning. Cases that had been read but not previously discussed were analyzed for the final examination, which were evaluated the same as other cases interpreted.

The control groups followed a pattern which did not permit student discussion of the cases but emphasized the instructor-centered procedure.

The gains exhibited by the experimental groups over the control groups have not been consistent in critical thinking as measured by the Watson-Glaser test, or in the aspects of personality adjustment as measured by the Rosenzweig P - F Test (2).

E. Summary

The ten studies reviewed in this chapter demonstrate to a large extent the research in the area of college teaching. Some of these studies convey an impression of being more carefully controlled than others, and thus manifest the enthusiasm, zeal, and skill of the investigators. Represented also are those numbered among the diffused and undisciplined whose procedures were inadequately defined and comparisons ambiguously expressed. The questionable research procedures were largely derived from the implied non-importance of differences in subject matter, instructors, students, and

social climate involving the method of study. Recognition of the many variables in this complex area is necessary in order to define, isolate, and control them. Generally, it is observed that most studies of methods are limited to short-term results of isolated patterns which could be extended to include long-run effects leading to continued studies of combination patterns.

It is difficult to compare and pool the results of these studies due to the lack of consensus in procedures and in patterns being contrasted. There is indicated, however, the complexity of the research including the magnitude of the work necessary to identify the most effective procedures in college teaching. It can be generally concluded that the teaching methods allowing greater student participation in the classroom are usually shown to be equivalent or superior in effectiveness to those in which student participation is limited.

CHAPTER III
DESIGN OF THE STUDY

A. Introduction

This study, as stated in Chapter I, was designed to compare the results of a classroom method which involves extensive participation of students in guiding their own learning with the results of alternative methods which involve lesser degrees of participation of students in planning and carrying on their own learning activities. The specific question to which an answer was sought may be stated as follows: What are the differences, if any, between the achievements on specified tests of selected groups of students in a given course where each group has been taught by a different method?

B. General Plan

1. Introduction

Since three methods were to be compared, three groups of freshman students were selected, one group for each of the three patterns of instruction. The classroom procedures to be used were to represent three distinct patterns of instruction which might be described in terms of three points on a continuum: a largely prescriptive method toward one end, a largely flexible method toward the other end, and a third method holding a position toward the center where prescription and flexibility are more nearly equal.

2. Selecting Groups -- Comparability

All freshman students (15 sections) were grouped into classes of

30 - 35 based on their selections of majors or minors as previously indicated following a week of course orientation. The several biology instructors were rotated among these groups during course orientation in order to equalize the opportunity for all the students (approximately 500) to have similar initial experience prior to selection of the three experimental groups. The procedure of rotating the instructors was designed to minimize the variability of experience in the course-orientation process.

Since the students' selection of majors and/or minors determined their assignments to sections, it could not be assumed that the groups would be comparable in intelligence and other relevant factors. Thus, during the orientation week certain basic data were obtained on all freshmen by the use of standardized tests (Reading, English Usage, Intelligence, Personality Adjustment).

The results on the reading test were used to select as experimental groups those three sections whose mean score were equal or most nearly equal. Within the first three weeks of the fall quarter additional data were obtained on the experimental students by the use of other standardized tests, High School Essentials, Vocational Interest, Course Inventory Tests, and other devices such as the autobiography. Scores on all these initial tests were to be used to determine the degree of comparability of the three experimental groups. These scores were also to be used to determine the degree to which the three experimental groups taken together were representative of the entire freshman class.

3. Selecting and Constructing Instruments for Measuring Achievement

The achievement of students in this course was to be determined by the manifestation of their increased knowledge and understanding of the course content as evidenced by the results on certain tests administered

periodically during the three quarters. Since achievement tests appropriate for this course were not available commercially except in the separate subject-matter areas, it was necessary to construct some tests locally. These tests were designed primarily to measure the students' knowledge and understanding by recall and recognition of basic facts and principles included in the course content.

a. Course Examinations¹

Academic achievement in this course was judged primarily on the basis of scores on the three objective final examinations. The first examination was given at the end of the fall quarter, the second at the end of the winter quarter, and the third at the end of the spring quarter. The fall and winter quarterly final examinations were also administered a second time at the end of the spring quarter. Coverage in these examinations was retroactive in that each of the three tests sampled all of the material covered up to that time in the course. All tests consisted of multiple-choice questions of the best-answer type.

As will be explained in Chapter IV, the staff is composed of several members, each representing a specific area of contribution. The quarterly final examinations are compiled of test-items submitted by the individual staff members covering specific subject-matter content. The investigator alone was responsible for preparing the test-items for the fall and winter final examinations administered to the three experimental groups. For the spring final all staff members as usual submitted questions covering their respective areas of specialization. These questions were then revised by a staff committee. The test was administered to all sections of the

¹See Appendix A.

freshman class, including the three experimental groups.

b. Test on Misconceptions¹

One of the objectives of the course is to promote modification of the students' everyday thinking about matters related to the course material. When this is accomplished, a given misconception about human behavior should be corrected or eliminated in the student's thinking even if this specific misconception has not been discussed. Hence, a test was selected to measure the students' knowledge and understanding of the scientific approach and ability to use it in evaluating the validity of commonly accepted statements. This test, composed of a list of fallacies, and designated by a code name to conceal its nature, was administered at the end of the spring quarter.

c. Test on Interpretation²

Freshman students in general-education science are not expected to bring to it a wide range of scientific knowledge. Most of them will not go into advanced work in scientific fields and will therefore lose contact with science beyond their individual experiences involving science in (1) meeting certain situations in daily living, and (2) reading accounts of scientific developments in popular periodicals (newspapers and magazines). It seemed feasible, therefore, to determine to what extent the methods differed in developing the students' ability to read, interpret, and evaluate popular accounts of scientific developments. This reasoning was based on a concept that the ability of students to make practical application of science knowledge and to understand the scientific approach and procedure can be evaluated by their measured reactions to science materials

¹See Appendix A.

²See Appendix A.

written in popular periodicals. A suitable excerpt was selected from which test items were prepared designed to compare the methods in developing students' attitudes: (1) to apply scientific knowledge, skills and principles; (2) to read and evaluate scientific developments; and (3) to understand the scientific approach.

d. Biology Test¹

Since this course gives nine quarter-hours of credit for biology, it seemed advisable to determine to what extent the methods varied in preparing students for advanced work in the field of biology. A standardized test (Cooperative Biology Test) was used for this purpose. This test is designed to measure knowledge, understanding, interpretation, and application of biological facts and principles contained in a general course in biology.

It is to be emphasized that all freshmen at Alabama State College take this integrated course. Some of these students will later major in biology or related fields. It is important that the course provide an adequate background of biological information for these students. The work should, therefore, include the equivalent of a year of general biology.

e. Psychology Test²

This course includes material designed to parallel the introductory psychology course generally offered to freshman students. Since the psychology included in this course is basic information and is a prerequisite for further study in the field, it is fitting that the methods be compared in preparing students to do advanced study in psychology. The examination prepared for this purpose included certain facts and principles covering

¹See Appendix B.

²See Appendix A.

human behavior.

f. Inventory Tests (I and II)¹

Course Inventory Tests, described in Chapter IV, were administered at the beginning of the school year and again near the end of the spring quarter to determine variation among the three groups in knowledge gains.

h. Planning Procedures for Statistical Analysis of Data

Measures of central tendency and certain other statistics were to be used to compare the three groups, and the t-test was to be used to determine significance of differences among the three groups on the criterion measures.

C. Description of the Population

As stated earlier, all freshman at Alabama State College were assigned to designated sections of the Bio-Social Development of the Individual, a three quarter course continuing through the entire school year of 1954-55. The sample of three sections of students used in this study was drawn from a population consisting of all beginning freshmen at Alabama State College in the fall quarter of 1954. The experimental groups were composed of the students in these three selected sections. Students remained members of the designated sections to which they were assigned throughout the three consecutive quarters and completed the course at the end of the spring quarter of 1955.

D. Description of the Three Methods

It is to be emphasized that the degree of student participation in class constituted the main variable for this study. The methods were designed to hold reasonably constant among the three groups certain

¹See Appendix A.

related factors such as instructor, general subject-matter content, and evaluative procedures. The same instructor met each of the three sections on the same scheduled pattern and was equally available for office conferences. A conscious attempt was made by the instructor to manifest equal interest and enthusiasm for each of the three methods. The same textbooks were available and the same course-related films were viewed each week in a designated film period by all three groups. The same major projects were developed, and an individual folder was kept by the instructor of work completed by each student in the three groups. The same final examinations were administered by the instructor to all students of the three groups at the same examination periods.

No reliable methods were available for establishing comparability of students in the different groups with respect to such important factors as motivation, purpose, and interest in the field of study. Uncontrolled factors such as these were assumed to be distributed at random among the three experimental groups.

1. Class-Recitation Method (Pattern A)

This method prescribed a detailed outline of major and minor topics in sequence with references including all supplementary reading material which allowed minimum flexibility in content and procedure. The basic subject matter composing the course material used in this method had been previously produced and presented by the individual consultation students and discussed by the group-discussion students. This course material included the minor topics in sequence, with references and supplementary reading material. This method was instructor-centered. Each meeting the instructor presented a short lecture and then proceeded with a recitation-drill period on the fundamentals. Quizzes were frequently given from a

list of questions prepared by students in other sections of the course and revised by the instructor. The instructor called upon students to answer these questions and graded them accordingly. In summary, the assignment-study-recitation-drill procedure was used.

2. Group-Discussion Method (Pattern B)

This method prescribed an outline in sequence on major and minor topics and suggested the content for discussion including references and supplementary reading material. The group-discussion section was conducted on the basis of the assumption that merely telling the student or even having him read about a topic is not sufficient. This method emphasized the concept that students must formulate and discover relationships themselves. Instead of drilling on fundamentals, this method was designed to encourage students to clear-up their misconceptions through group discussions and to integrate the concepts of the course by applying these concepts to problems of everyday living.

The instructor continuously sought to create and to maintain an atmosphere in which the students would feel free to expose their misconceptions and in turn correct them. The students were encouraged to report any difficulties developing from the assignments. They were also encouraged to use the basic concepts of the course in making interpretations of incidents occurring in their daily living. There was an attempt to establish a need to work together which provided an opportunity for the students to learn from one another as well as from the instructor. This method also provided an opportunity for students to develop a feeling that a working knowledge and understanding of the course content are experienced through the actual participation in group discussions.

3. Individual-Consultation Method (Pattern C)

This method prescribed an outline in sequence of major topics only, allowing flexibility in minor topics, content, procedure, and supplementary material. This method emphasized an individualized approach with the student, placing his own work within the framework of the course. The class work was relatively undirected as compared with the class-recitation method. The instructor did not conduct the class formally, but was available to the students for consultation throughout the class periods. The students, individually and occasionally in small groups, utilized the class periods for consultation. The instructor endeavored to help the student to find the answers to his questions rather than answering them himself. Collaboration between students during class periods was discouraged.

According to the previous descriptions it is observed that the three types of teaching techniques employed represented different degrees of directed work versus non-directed work, and group work versus individual work. The three patterns representing the three points on a scale or continuum which extends from a highly structured course to a relatively unstructured course present the problem to identify the point that tends to allow maximum learning.

CHAPTER IV

OUTLINE OF CURRICULAR PROGRAM AND DESCRIPTION OF THREE GROUPS OF STUDENTS INVOLVED IN STUDY

A. General Education Program

The first two years at Alabama State College emphasize a broad pattern of general education courses designed for students to learn more about themselves as individuals and the world-society in which they live. The freshman year centers attention upon problems in the development of the individual, while the sophomore year centers attention upon problems and resources of state, region, and nation. The general education program includes: (1) general education core courses; (2) service-skill courses; and (3) elective, special interest courses. The major effort is made to organize the instructional program around major areas of living. The student is guided in developing sound scholarship and a cultural background necessary to meet the problems in the major areas of living. Those areas which present problems of immediate concern to the student are to be emphasized in the first year. These are individual and social development, home and family life, recreational and creative development. While all phases of the first year's work are planned to help the student solve his problems on a sound basis, the two courses designed specifically for this purpose are: (1) Bio-Social Development and (2) the Arts.

This integrated-core-general-education approach on the junior college level came about as a result of an intensive study conducted by the Alabama State Department of Education, beginning in 1939-40. All of the state

teachers colleges participated in this study. It was at this time that a core-program for the elementary and secondary schools in Alabama was initiated. This college, then a teachers college, concurrently with the other teachers colleges of the state has developed a program extending the core-program into the college years.

B. The Framework of Course

This freshman course, The Bio-Social Development of the Individual (Science 131-2-3), as operated at Alabama State College is an integration of biology, sociology, psychology, and health, and extends through all three quarters of the school year. Each freshman student is assigned to a section according to his interest as manifested in his choice of a free elective in a desired area of concentration. Each regular section thus formed is composed of a group of students (30 - 35) who have initially chosen the same major area of study, thus giving an opportunity for all of its members to share similar experiences throughout the freshman year.

A staff composed of a representative from each of the four subject-matter areas mentioned above and from the audio-visual field is assigned to work with designated sections, the biology representative serving as chairman. Each chairman has the guidance responsibility for each student in the sections assigned and is available to each of these sections four of the eight hours a week. The remaining four hours allow one hour each for the other staff members to be available to each section assigned per week, meeting in groups of two sections for one-hour periods. The schedule provides for eight hours a week including a two-hour laboratory, two one-hour conferences, two one-hour discussions, one one-hour integration period.

This course, one of three integrated courses required of freshman

students, is designed to motivate through a study of the human organism, deriving and solving problems selected from actual life activities as experienced by the students. Each student is expected to acquire the usual amount of biology, sociology, psychology, and health generally required in the freshman year by studying himself as a biological, sociological, and psychological being, and the degree of efficiency involving the combined operation of these three factors determines his health. A major purpose of this course is to foster insight into the relationships of subject-matter areas and their combined importance in understanding more clearly the human being as an organism and his relations to all living organisms and to the universe of which he is a part. The student learns that the human organism operates as a whole. The subject-matter needed must be selected from a number of different disciplines to cover adequately the organization, maintenance, perpetuation, and behavior of the individual, all of which concurrently interact in producing and interpreting human life experiences.

C. Admission and Placement Test Results

The first week of the fall quarter is designated as Freshman Orientation Week during which time the beginning freshmen are allowed an opportunity to become acquainted with the campus facilities, staff, and with fellow-students. This period allots specific time to administer certain standardized tests, the results of which are used to some extent in making section assignments. These tests administered under the supervision of the college testing director include reading, English usage, intellectual aptitude, personality and social adjustment, and general achievement.

1. The Iowa Silent Reading Tests administered to beginning freshmen during the opening week of school as a part of the admission and placement

processes. This battery of tests is designed to measure rate and speed of comprehension, directed reading, word meaning, paragraph comprehension, sentence meaning, location of information, including alphabetizing, and use of index.

Table I shows the distribution of total scores on this test made by each of the three experimental groups, A, B, and C. This table also shows the scores made by a random sample of 284 students selected from the entire freshman class (approximately 500 students). It will be observed that the mean scores for the three experimental groups are, respectively, 162.5, 165.3, and 165.5. The mean for the large sample (284 students) from the entire population is 163.3. The three experimental groups combined have a mean score of 164.6 which is 1.3 points higher than the population sample.

Median scores for each of the groups, as shown in Table I, are slightly lower than the means. The three experimental groups have medians of 160.8, 162.5, and 163.9, respectively. The median for the combined experimental groups is 162.5 as compared with 162.6 for the population sample.

As would be expected the standard deviation of scores for the population sample (284 cases) is somewhat larger than standard deviations of scores for the smaller experimental groups. For the larger sample this is 17.1 and for the experimental groups, 15.2, 14.9, and 15.9 respectively. Table I thus shows that the three experimental groups do not differ markedly from each other or from the larger population sample with respect to performance on the reading test.

2. Table II shows the distribution of total scores on the California Capacity Questionnaire made by each of the experimental groups A, B, and C. It will be observed that the mean scores for the three experimental

TABLE I

SCORES ON IOWA SILENT READING TESTS FOR THREE EXPERIMENTAL
GROUPS AND FOR RANDOM SAMPLE OF ENTIRE FRESHMAN CLASS

Score	Number of Students				
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.	Sample Tot. Pop.
210 - 214	0	0	0	0	1
205 - 209	0	0	0	0	0
200 - 204	0	0	1	1	3
195 - 199	1	0	0	1	7
190 - 194	1	2	1	4	8
185 - 189	0	3	0	3	16
180 - 184	0	1	2	3	21
175 - 179	2	1	2	5	15
170 - 174	0	3	3	6	21
165 - 169	3	3	1	7	32
160 - 164	3	4	4	11	37
155 - 159	3	7	1	11	22
150 - 154	2	4	2	8	37
145 - 149	1	0	3	4	23
140 - 144	3	1	2	6	17
135 - 139	0	0	0	0	16
130 - 134	0	0	0	0	5
125 - 129	0	1	0	1	1
120 - 124	0	0	0	0	1
115 - 119	0	0	0	0	1
Total	19	30	22	71	284
Mean	162.5	165.3	165.5	164.6	163.3
Median	160.8	162.5	163.9	162.5	162.6
S. D.	15.2	14.9	15.9	15.5	17.1

TABLE II

SCORES ON CALIFORNIA CAPACITY QUESTIONNAIRE FOR THREE
EXPERIMENTAL GROUPS

Score (I.Q.)	Number of Students			
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.
124 - 126	0	1	2	3
121 - 123	0	0	0	0
118 - 120	0	0	1	1
115 - 117	0	0	0	0
112 - 114	3	1	2	6
109 - 111	0	1	0	1
106 - 108	2	2	7	11
103 - 105	1	2	2	5
100 - 102	1	4	0	5
97 - 99	4	3	2	9
94 - 96	2	8	0	10
91 - 93	0	2	1	3
88 - 90	3	2	2	7
85 - 87	3	1	1	5
82 - 84	0	0	0	0
79 - 81	0	2	2	4
76 - 78	0	1	0	1
Total	19	30	22	71
Mean	98.7	97.6	103.4	99.7
Median	98.1	96.7	106.4	98.8
S. D.	9.1	9.8	12.5	10.8

groups are, respectively, 98.7, 97.6, and 103.4. The three experimental groups combined have a mean score of 99.7.

Median scores for Groups A and B, as shown in Table II, are slightly lower than the means. The median score for Group C is shown to be a little higher than the mean. The three experimental groups have medians of 98.1, 96.7, and 106.4, respectively. The median score for the combined experimental groups is 98.8.

The standard deviations of scores for the three experimental groups are 9.1, 9.8, and 12.5, respectively. The standard deviation for the combined experimental groups is 10.8.

Table II also shows that the three experimental groups do not differ markedly from each other with respect to their performance on the test of mental capacity. It will be seen, however, that the scores for Group C are somewhat higher than the scores for groups A and B.

3. Table III shows the distribution of scores on the Otis Quick-Scoring Mental Ability Tests made by each of the experimental groups, A, B, and C. It will be observed that the mean scores for the three experimental groups are, respectively, 99.0, 99.1, and 103.7. The three experimental groups combined have a mean score of 100.2.

Median scores for groups A and C, as shown in Table III, are slightly lower than the means. The median score for Group B is slightly higher than the mean. The three experimental groups have medians of 96.6, 100.5, and 103.0, respectively. The median for the combined experimental groups is 99.7.

The standard deviations of scores for the three experimental groups are 8.2, 10.0, and 10.8, respectively. The standard deviation for the combined experimental groups is 9.7. Group A is shown to have the lowest

TABLE III

SCORES ON OTIS QUICK-SCORING MENTAL ABILITY TESTS FOR
THREE EXPERIMENTAL GROUPS

Scores (I.Q.)	Number of Students			
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.
121 - 123	1	0	0	1
118 - 120	0	1	2	3
115 - 117	0	2	0	2
112 - 114	1	0	4	5
109 - 111	0	0	3	3
106 - 108	1	5	1	7
103 - 105	1	2	1	4
100 - 102	3	6	1	10
97 - 99	2	1	2	5
94 - 96	4	4	2	10
91 - 93	4	3	1	8
88 - 90	2	2	3	7
85 - 87	0	0	2	2
82 - 84	0	2	0	2
79 - 81	0	2	0	2
	19	30	22	71
Mean	99.0	99.1	103.7	100.2
Median	96.6	100.5	103.0	99.7
S. D.	8.2	10.0	10.8	9.7

standard deviation, Group C, the highest.

Table III also shows that the three experimental groups do not differ markedly from each other with respect to performance on the mental ability test. It is observed however that the scores made by Group C are slightly higher than the scores made by Group A or Group B.

4. Table IV shows the distribution of total standard scores on the Essential High School Content Battery made by each of the experimental groups, A, B, and C. This battery is designed for use as a survey-type instrument covering four basic areas of high school achievement: mathematics, science, social studies, and English. It is designed for students in the senior high school grades and for beginning college freshmen.

It will be observed that the mean scores for the three experimental groups are 113, 116, and 119, respectively. The three experimental groups combined have a mean score of 116.

Median scores for groups B and C are slightly lower than the means. The median score for Group A is the same as the mean. The experimental groups (A, B, C) have medians of 113, 114, and 113, respectively. The median for the combined experimental groups is 114.

The standard deviations of scores for the three experimental groups are 8.1, 9.0, and 10.4, respectively. The standard deviation for the combined experimental groups is 9.6.

Table IV also shows that the three experimental groups do not differ markedly from each other with respect to performance on the high school achievement test, and again Group C made the highest scores.

D. Course-Inventory Test Results

The three experimental groups were selected, based on the results of the admission and placement tests previously indicated, and assigned to

TABLE IV

SCORES ON ESSENTIAL HIGH SCHOOL CONTENT BATTERY FOR
THREE EXPERIMENTAL GROUPS

	Number of Students			
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.
139 - 141	0	0	1	1
136 - 138	0	1	1	2
133 - 135	1	0	1	2
130 - 132	0	2	1	3
127 - 129	0	1	1	2
124 - 126	0	1	3	4
121 - 123	2	2	1	5
118 - 120	2	5	2	9
115 - 117	3	1	1	5
112 - 114	2	5	3	10
109 - 111	2	6	4	12
106 - 108	2	0	2	4
103 - 105	2	5	0	7
100 - 102	3	1	1	5
Total	19	30	22	71
Mean	113.0	116.0	119.0	116.0
Median	113.0	114.0	113.0	114.0
S. D.	8.1	9.0	10.4	9.6

the investigator who administered two course-inventory tests. The test-items composing these two tests were drawn at random from the three quarterly final examinations used the previous year.

5. Table V shows the distribution of scores on Inventory Test I made by each of the experimental groups, A, B, and C. It will be observed that the mean scores for the three groups are, respectively, 27.6, 33.9, and 30.2. The three groups combined have a mean score of 31.0.

Median scores, as shown in Table V, are practically the same as the means for each of the three experimental groups. The three medians are 26.7, 34.0, and 30.0, respectively. The median for the combined experimental groups is 31.1.

The standard deviations of scores for the three groups are 7.6, 8.4, and 8.4, respectively. The standard deviation for the combined experimental groups is 8.2.

Table V also shows that the three experimental groups do not differ markedly from each other with respect to performance on the Inventory Test I.

6. Table VI shows the distribution of scores on Inventory Test II made by each of the experimental groups, A, B, and C. It will be observed that the mean scores for the three groups are, respectively, 41.7, 44.5, and 44.7. The three groups combined have a mean score of 43.9.

Median score for Group A is slightly higher than the mean while the median scores for Group B and Group C are slightly lower than the mean, as shown in Table VI. The three experimental groups have medians of 43.0, 43.6, and 42.7, respectively. The median for the combined experimental groups is 43.1.

The standard deviations of scores for the experimental groups are 8.1,

TABLE V

SCORES ON INVENTORY TEST I FOR THREE EXPERIMENTAL GROUPS

Score	Number of Students			
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.
70 - 73	0	0	0	0
66 - 69	0	0	0	0
62 - 65	0	0	0	0
58 - 61	0	0	0	0
54 - 57	0	0	0	0
50 - 53	0	0	0	0
46 - 49	0	1	2	3
42 - 45	0	6	0	6
38 - 41	2	5	1	8
34 - 37	2	3	4	9
30 - 33	5	4	4	13
26 - 29	1	4	3	8
22 - 25	3	4	4	11
18 - 21	4	3	3	10
14 - 17	2	0	1	3
Total	19	30	22	71
Mean	27.6	33.9	30.2	31.0
Median	26.7	34.0	30.0	31.1
S. D.	7.6	8.4	8.4	8.2

TABLE VI

SCORES ON INVENTORY TEST II FOR THREE EXPERIMENTAL GROUPS

Score	Number of Students			
	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.
70 - 73	0	1	0	1
66 - 69	0	0	0	0
62 - 65	0	2	1	3
58 - 61	0	0	4	4
54 - 57	1	0	0	1
50 - 53	2	6	1	9
46 - 49	2	3	0	5
42 - 45	6	5	6	17
38 - 41	3	5	4	12
34 - 37	1	5	5	11
30 - 33	2	2	0	4
26 - 29	1	0	0	1
22 - 25	1	1	1	3
18 - 21	0	0	0	0
14 - 17	0	0	0	0
Total	19	30	22	71
Mean	41.7	44.5	44.7	43.9
Median	43.0	43.6	42.7	43.1
S. D.	8.1	10.2	10.1	9.8

10.2, and 10.1, respectively. The standard deviation for the combined group is 9.8.

Table VI also shows that the three experimental groups do not differ markedly from each other with respect to performance on Inventory Test II.

E. Other Characteristics of Experimental Groups

Data to be presented in the remainder of this chapter deal with (a) age and sex distributions, (b) accreditation status of high schools from which the students were graduated, and (c) classification of students with respect to place of residence.

7. Table VII shows the age distribution by groups and by sex within each group. The median age for Group A was 18.5 with veterans included and 18.3 without veterans. The median age for Group B was 18.1 without veterans, since there were no veterans in Group B. The median age for Group C was 18.3 with veterans and 18.2 without veterans. The median age for the experimental groups combined was 18.3 with veterans included and 18.2 without veterans. Group A shows a male median age of 21.5 with veterans included and 18.5 without veterans, and a female median age of 18.1. Group B shows a male median age of 18.3 and a female median age of 18.1. Group C shows a male median age of 19.0 with veterans included and of 18.5 without veterans.

8. Table VIII presents information concerning the accreditation status of high schools from which members of each of the three experimental groups were graduated. The data show that a substantial majority of the students came from accredited high schools, and there were some members in each group from non-accredited schools. Group C had a somewhat smaller proportion of students from schools accredited by the Southern Association and by the State Department than did Group A and Group B. Group C had the

TABLE VII

AGE-SEX DISTRIBUTION FOR EXPERIMENTAL GROUPS, SHOWING MEDIAN AGE FOR EACH DISTRIBUTION WITH VETERANS INCLUDED AND VETERANS NOT INCLUDED

Age	Number of Students											
	Group A			Group B			Group C			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
30	0	0	0	0	0	0	1	0	1	1	0	1
29	0	0	0	0	0	0	1	0	1	1	0	1
28	0	0	0	0	0	0	0	0	0	0	0	0
27	1	0	1	0	0	0	0	0	0	1	0	1
26	0	0	0	0	0	0	0	0	0	0	0	0
25	1	0	1	0	0	0	0	0	0	1	0	1
24	1	0	1	0	0	0	0	0	0	1	0	1
23	0	0	0	0	0	0	0	0	0	0	0	0
22	1	0	1	0	0	0	0	0	0	1	0	1
21	0	0	0	0	0	0	1	0	1	1	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	4	4	0	0	0	0	4	4
18	3	7	10	2	10	12	3	8	11	8	25	33
17	0	3	3	1	10	11	0	5	5	1	18	19
16	0	2	2	0	3	3	0	3	3	0	8	8
Total	7	12	19	3	27	30	6	16	22	16	55	71

Median

WV		18.5	-----		18.3		18.3
WOV		18.3		18.1	18.2		18.2
WV	21.5		-----		19.0		18.9
WOV	18.5		18.3		18.5		18.4
WV		-----		-----	-----		-----
		18.1		18.1	18.0		18.1

TABLE VIII

NUMBER OF STUDENTS GRADUATED FROM ACCREDITED
AND FROM NON-ACCREDITED HIGH SCHOOLS

Accreditation Status of High Schools*	Number of Students			
	Group A	Group B	Group C	Total
I	8	9	4	21
II	6	13	8	27
III	3	6	6	15
IV	2	2	4	8
Total	19	30	22	71

- *I Accredited by Southern Association and State Department
- II Accredited by State Department only
- III Not accredited by Southern Association or State Department
- IV Schools in states other than Alabama

largest number of students graduated from out-of-state schools. The eight out-of-state students came from Michigan, New York, South Carolina, and Tennessee.

9. Table IX summarizes certain information about the place of residence of students in each of the three groups. It will be seen that during the academic year 31 out of the total of 71 students were "day students" residing in the city of Montgomery (about two-thirds of these lived at home and one-third roomed in the city). Thirty-five out of the 71 lived in the dormitory and five commuted daily from outside the city.

The lower part of Table IX shows that 44 students (about 62 percent) came from urban homes and 27 (about 38 per cent) from rural homes. A substantial majority of students in groups A and C were from urban homes while Group B had the same number from urban and rural homes respectively.

F. Summary

The general education program emphasizes the development of ability to apply knowledge in solving problems of daily living. This general education course is required for freshmen who are grouped by sections according to their indicated majors. Each section is met on a weekly scheduled pattern by staff members responsible for the different subject matter areas of the course. Certain initial tests are administered during orientation week, the results of which may be used to modify section assignments.

The three experimental groups composing the experimental sample were initially selected on the basis of results on the reading test. The experimental sample was shown to be closely comparable to the population sample with respect to performance on the reading test. The three experimental groups were shown to be comparable, in general, although Group C

TABLE IX

CLASSIFICATION OF STUDENTS WITH RESPECT TO (a) PLACE OF RESIDENCE
DURING ACADEMIC YEAR AND (b) URBAN OR RURAL HOME BACKGROUND

Residence		Number of Students			
		Group A	Group B	Group C	Total
Academic Year	City	9	14	8	31
	Dormi- tory	9	13	13	35
	Com- mute	1	3	1	5
Total		19	30	22	71 (71)
Home	Urban	12	15	17	44
	Rural	7	15	5	27
		19	30	22	71

showed a slight superiority over the other two groups on the aptitude tests and on the high school content battery.

CHAPTER V

FINDINGS

A. Introduction

As stated in Chapter III, the general plan of this study included the giving of certain tests to three experimental groups of students at the beginning of a designated period of instruction and at the end of the period of instruction. Certain other tests were administered only at the end of the period of instruction. This chapter presents results of these tests and analyses of differences among the groups in average achievement.

In the presentation of results the tests are divided into two groups. The first group is composed of tests administered twice--once near the beginning and again near the end of designated periods. The second group is composed of tests administered near the end of the course only. The four tests administered twice were the Inventory Tests I and II, and the fall quarter and the winter quarter final examinations. The five tests administered only once were the biology, psychology, interpretation, and misconception tests, and the spring quarter final examination.

B. Summaries of Results of Tests Administered Twice

Inventory Test I and Inventory Test II were administered near the beginning of the fall quarter in September, 1954 and again near the end of the spring quarter in May, 1955. The two tests were administered a week apart both times. The fall quarter final examination was administered near the end of the fall quarter in November, 1954 and again near the end of the

spring quarter. The winter quarter final examination was administered near the end of the winter quarter in February, 1955 and again near the end of the spring quarter. Tables X through XII and XIV show the differences between initial test and final test means and the significance of differences between mean gains for the three experimental groups on each of the four tests. Table XIII also shows an analysis of covariance of the initial and final scores on the fall quarter final examination for the three experimental groups.

1. Inventory Test I. Table X shows the mean scores for the first and second administration of this test for each of the three experimental groups. This table also gives the mean gains for each group. It is shown

TABLE X

MEAN SCORES AND SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS
FOR EACH OF THREE GROUPS OF STUDENTS ON INVENTORY TEST I
ADMINISTERED TWICE

Group	N	Mean Scores			Level of Significance of t
		Initial	Final	Diff. ¹	
A	19	27.6	46.2	18.6	.1 percent
B	30	33.9	51.8	17.9	.1 percent
C	22	30.2	49.5	19.3	.1 percent

1. Differences among the three groups with respect to mean gains were not significant at the five percent level.

that Group A (the class-recitation group¹) had an initial test mean of 27.6 and a final test mean of 46.2, giving a mean gain of 18.6. Group B (the group-discussion group) had an initial test mean of 33.9 and a final test mean of 51.8, giving a mean gain of 17.9. Group C (the individual-

¹As explained in Chapter III, the class-recitation method included minimum student participation and the individual-consultation method employed maximum participation.

consultation group) had an initial test mean of 30.2 and a final test mean of 49.5, giving a mean gain of 19.3. The t-test showed that the gain made by each group on this test was significant at the one-tenth percent level. Further application of the t-test was made to determine the significance of differences between each of the three pairs of mean gains (A and B, A and C, B and C). None of these differences was found to be significant at the five percent level.

It is also noted in Table X that Group B showed the highest mean for both the initial and the final test and the lowest mean gain of the three groups. Group A showed the lowest mean for both the initial and final test. Group C which was about midway between the other groups on both the initial and final tests had the highest mean gain.

2. Inventory Test II. Table XI shows the mean scores for the first and second administrations of this test for each of the three experimental groups, and the mean gains for each group. Group A had an initial test

TABLE XI

MEAN SCORES AND SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS FOR EACH OF THREE GROUPS OF STUDENTS ON INVENTORY TEST II ADMINISTERED TWICE

Group	N				Level of Significance of t
		Initial	Final	Diff.	
A	19	41.7	44.8	3.1	N.S. ¹
B	30	44.5	46.4	1.9	N.S.
C	22	44.7	45.3	0.6	N.S.

1. None of the gains proved to be significant at the five percent level

mean of 41.7 and a final test mean of 44.8, giving a mean gain of 3.1. Group B had an initial test mean of 44.5 and a final test mean of 46.4,

giving a mean gain of 1.9. Group C had an initial test mean of 44.7 and a final test mean 45.3, giving a mean gain of 0.6. It is observed that the gain made by each of the groups was not significant at the five percent level. Group A showed the greatest gain. For this group the gain was significant at the 10 percent level but not at the five percent level. Groups B and C showed somewhat smaller gains and neither was significant at the ten percent level. The largest difference in gains was found between groups A and C, while the differences between groups A and B, and groups B and C were smaller. Application of the t-test to determine the significance of these differences among the three groups with respect to mean gains showed that none of the differences was significant at the five percent level.

It may be stated that the three groups do not differ significantly in subject-matter mastery of course content as evidenced by the results on Inventory Tests I and II. However, there is shown a lower performance level held consistently by Group A.

3. Fall Quarter Final Examination. Table XII shows the mean scores for the first and second administrations of this test for each of the three experimental groups. Group A had an initial test mean of 125.5 and a final

TABLE XII

MEAN SCORES AND SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS FOR EACH OF THREE GROUPS OF STUDENTS ON THE FALL QUARTER FINAL EXAMINATION ADMINISTERED TWICE

Group	N	Mean Scores			Level of Significance of t
		Initial	Final	Diff. ¹	
A	19	125.5	136.6	11.1	5 percent
B	30	138.3	146.3	8.0	.1 percent
C	22	137.7	146.4	8.7	1 percent

1. Differences among the three groups with respect to mean gains were not significant at the five percent level

test mean of 136.6, giving a mean gain of 11.1. Group B had an initial test mean of 138.3 and a final test mean of 146.3, giving a mean gain of 8.0. Group C had an initial test mean of 137.7 and a final test mean of 146.4, giving a mean gain of 8.7. It is observed that the gain made by Group A was significant at the five percent level. The gain made by Group B was significant at the one-tenth percent level, and the gain made by Group C was significant at the one percent level. Application of the t-test to determine the significance of these differences among the three groups with respect to mean gains showed that none of the differences was significant at the five percent level.

It will be seen that Group A which made the highest gain had lower scores on both the initial and final tests than either of the other two groups.

A more rigorous analysis of scores on the first and second administrations of the fall quarter final examinations was made by performing an analysis of covariance. This is a more precise method of testing for significance of differences between gains since the statistical procedures include "correcting" or "adjusting" for initial differences among the groups with respect to performance on the test. Results of the covariance analysis are shown in Table XIII. It will be seen here that the F ratio was not statistically significant. It is evident there that the three groups did not differ significantly in mean gains.

On the basis of the evidence presented thus far showing performances of the three groups of students on three different tests, each of which was given twice, it would appear that merely increasing student participation in the classroom did not result in a corresponding increase in knowledge and in understanding of facts included in the course.

TABLE XIII

ANALYSIS OF COVARIANCE OF SCORES ON FALL QUARTER FINAL EXAMINATION GIVEN TO THREE GROUPS OF STUDENTS AT THE END OF THE FALL QUARTER AND AT THE END OF THE SPRING QUARTER

Source of Variance	d.f	Sum of Squares		Sum of Products	df	Sum of Squares	Adjusted "y"	
		x	y	xy			Mean Square	F
Between Groups (Methods)	2	2,406.3	1,281.6	1,815.28	2	-55.71	-27.86	(N.S.)
Within Groups	68	48,478.6	45,293.7	38,723.80	67	11,301.9	211.36	
Total	70	50,884.9	46,575.3	40,539.08	69	11,306.19		

4. Winter Quarter Final Examination. Table XIV shows the mean scores for the first and second administrations of this test for each of the three experimental groups. The most striking fact shown here is that

TABLE XIV

MEAN SCORES AND SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS FOR EACH OF THREE GROUPS OF STUDENTS ON THE WINTER QUARTER FINAL EXAMINATION ADMINISTERED TWICE

Group	N	Mean Scores			Level of Significance of t
		Initial	Final	Diff.	
A	19	100.8	89.7	-11.1	1 percent
B	30	106.7	102.7	-4.0	1 percent
C	22	107.7	104.1	-3.6	1 percent

all three groups made lower scores the second time they took the test than they did the first time. The final test mean for Group A was 11.1 points lower than the initial test mean. The average "loss" for the other two groups was 4.0 and 3.6, respectively. Table XIV also shows that in the case of each group the difference between initial and final test means was statistically significant. No adequate explanation can be offered for this apparent inconsistency with the results on the two inventory tests and the fall quarter examination described earlier in this chapter. It may be that the nature of the subject matter included in the winter quarter final examination was such that the "rate of forgetting" was disproportionately high. This is not offered, however, as a highly plausible explanation.

In making inter-group comparisons with respect to differences between initial and final mean scores it was found that the difference in "loss" between Group A and Group C was significant at the five percent level.

In summary, results on the four tests that were administered twice

show that for Group A the means on both initial and final tests were somewhat lower than the means for the other two groups. Analyses of gains (or losses) showed that in general there were no significant differences among the three groups. The one exception to this was the case of a statistically significant difference between losses shown for Groups A and C on the winter quarter final examination.

C. Analyses of Results of Tests Administered Once

The biology test, psychology test, interpretation test, misconception test, and the spring quarter final examination were administered near the end of the spring quarter only. Tables IV through XXI show the results of these tests. Table XXI the last of the tables of test results shows the means and the standard deviations of scores for each of the experimental groups, for the experimental groups combined, and for the larger population sample on the spring quarter final examination.

5. Biology Test. Table XV shows the mean score on this test for each of the three experimental groups. It will be seen that the mean for

TABLE XV

MEAN SCORES FOR EACH OF THREE GROUPS ON BIOLOGY TEST AND SIGNIFICANCE OF DIFFERENCES BETWEEN PAIRS OF GROUP MEANS

Group	N	Mean Score	Difference Between Group Means	Level of Significance of t
A	19	49.2	(A & B) 1.4	N.S.
B	30	50.6	(B & C) 1.7	N.S.
C	22	52.3	(C & A) 3.1	N.S.

Group A was 49.2, for Group B was 50.6, and for Group C was 52.3. The differences between the respective pairs of group means were as follows: A and B, 1.4; B and C, 1.7; C and A, 3.1. Application of the t-test

showed that none of these differences was significant at the five percent level. It will be noted again that the mean scores for groups B and C were somewhat higher than the mean score for Group A. It will also be recalled that groups B and C made somewhat higher scores on the initial aptitude tests than did Group A.

6. Psychology Test. Table XVI shows the mean scores on this test for the three groups. The mean for Group A was 54.2, for Group B, 55.9,

TABLE XVI

MEAN SCORES FOR EACH OF THREE GROUPS ON PSYCHOLOGY TEST AND SIGNIFICANCE OF DIFFERENCES BETWEEN PAIRS OF GROUP MEANS

Group	N	Mean Score	Difference Between Group Means	Level of Significance of t
A	19	54.2	(A & B) 1.7	N.S.
B	30	55.9	(B & C) 2.8	N.S.
C	22	58.7	(C & A) 4.5	N.S.

and for Group C, 58.7. The differences between the respective pairs of group means were as follows: A and B, 1.7; B and C, 2.8; C and A, 4.5. The t-test showed that none of these differences was significant at the five percent level. The magnitude of differences required for statistical significance at the five percent level would be of the order of six to eight points as compared with the obtained differences of 1.7 to 4.5.

7. Interpretation Test. Table XVII shows the mean scores on this test for the three groups. It is observed that the mean was 34.2 for Group A, 36.0 for Group B, and 40.9 for Group C. The difference between means for groups A and B was 1.8. For groups B and C the difference was 4.9 and for groups C and A the difference was 6.7. The t-test was again applied to determine the statistical significance of differences. None

TABLE XVII

MEAN SCORES FOR EACH OF THREE GROUPS ON INTERPRETATION TEST
AND SIGNIFICANCE OF DIFFERENCE BETWEEN PAIRS OF GROUP MEANS

Group	N	Mean Score	Difference between Group Means	Level of Significance of t
A	19	34.2	(A & B) 1.8	N.S.
B	30	36.0	(B & C) 4.9	N.S.
C	22	40.9	(C & A) 6.7	N.S.

of the differences was found to be significant at the five percent level. The magnitude of differences required for significance at this level of confidence would be eight to nine points as compared with the obtained differences of 1.8 to 6.7.

8. Misconception Test. The results on this test are shown in Table XVIII. The mean was 40.7 for Group A, 42.9 for Group B, and 44.1 for

TABLE XVIII

MEAN SCORES FOR EACH OF THREE GROUPS ON MISCONCEPTION TEST AND
SIGNIFICANCE OF DIFFERENCES BETWEEN PAIRS OF GROUP MEANS

Group	N	Mean Score	Difference between Group Means	Level of Significance of t
A	19	40.7	(A & B) 2.2	N.S.
B	30	42.9	(B & C) 1.2	N.S.
C	22	44.1	(C & A) 3.4	N.S.

Group C. Differences between the respective pairs of means were: A and B, 2.2; B and C, 1.2; C and A, 3.4. None of the obtained differences was significant at the five percent level. The size of differences required for significance at this level was four to five points.

9. Spring Quarter Final Examination. Table XIX shows the mean scores on this test for each of the three experimental groups. It may be seen

TABLE XIX

MEAN SCORES FOR EACH OF THREE GROUPS ON SPRING QUARTER FINAL EXAMINATION AND SIGNIFICANCE OF DIFFERENCES BETWEEN PAIRS OF GROUP MEANS

Group	N	Mean Score	Difference between Group Means	Level of Significance of t
A	19	135.0	(A & B) 9.6	N.S.
B	30	144.6	(B & C) 0.2	N.S.
C	22	144.4	(C & A) 9.4	N.S.

that the mean was 135.0 for Group A, 144.6 for Group B, and 144.4 for Group C. Since an analysis of variance was performed on the results for this test (see Table XX), the chief reason for presenting the data in Table XIX is to make possible direct comparisons of mean scores for the three groups. Although the differences between pairs of groups range from 0.2 up to 9.6 score points, none was significant at the five percent level. This finding was, of course, confirmed by the analysis of variance results shown in Table XX.

It will be observed in Table XX that although the "between groups" variance is somewhat larger than the "within groups" variance, the F ratio is not significant at the five percent level.

TABLE XX

ANALYSIS OF VARIANCE OF SCORES ON THE SPRING QUARTER FINAL EXAMINATION GIVEN TO THREE GROUPS OF STUDENTS

Source of Variance	d.f.	Sum of Squares	Variance (Mean Square)	F
Between Groups	2	1,433.8	716.7	1.20 (n.s.)
Within Groups	68	40,471.7	595.2	
Total	70	41,905.5		

The purpose of Table XXI is to make possible comparisons of the experimental groups and the larger population sample, referred to in Chapter IV, with respect to performance on the spring quarter final examination administered to students in all sections of this course. The data presented

TABLE XXI

MEAN SCORE AND STANDARD DEVIATION OF SCORES FOR EACH OF THREE EXPERIMENTAL GROUPS, FOR THE THREE GROUPS COMBINED, AND FOR THE POPULATION SAMPLE ON THE SPRING QUARTER FINAL EXAMINATION

	Exp. Group A	Exp. Group B	Exp. Group C	Total Exp. Gr.	Pop. Sample
Mean	135.0	144.6	144.4	141.9	132.7
S.D.	21.1	23.0	28.8	24.6	28.1
N	19	30	22	71	284

here are the means and standard deviations of scores for each of the three experimental groups, for the experimental groups combined, and for the larger population sample. It will be seen that the test mean for the population sample was 132.7, and for the experimental groups combined was 141.9.

The difference between the group means for the combined experimental groups (141.9) and the large population sample (132.7) was 9.2. This difference was statistically significant at the one percent level. The mean for each of the three experimental groups was higher than the population sample mean. However, only in the case of Group B was this difference statistically significant (five percent level or beyond).

As pointed out in connection with Tables XIX and XX, none of the differences between the respective pairs of means for the three experimental groups (A and B, B and C, C and A) was statistically significant.

D. Summary

Results of the nine tests as presented in this chapter show that

Group A (maximum student participation) achieved at a slightly higher level, in general, than the other two groups. The differences in achievement were not statistically significant. It is possible that certain learnings, not measured by the tests, may have been achieved more effectively by one method than by another. As far as knowledge of subject matter is concerned no one of the three methods was found to be distinctly superior to the other two.

CHAPTER VI
SUMMARY AND CONCLUSIONS

A. Summary

1. Introduction and Purpose

This investigation grew out of a continuing study of a general-education course in science for college freshmen that has been under way for several years. The central purpose of the investigation was to determine whether teaching methods which include a high degree of student participation in planning and evaluating learning activities in this course produce more or less mastery of subject matter than methods which include relatively little student participation in planning and evaluation. To state the question more precisely: do students who have a large share in planning and directing their own learning activities make higher or lower scores on subject matter tests than students who have relatively little share in planning for their own learning in the classroom?

2. Plan of the Study

The general plan and design of the study consisted of (a) the development of three different "methods" of instruction--one representing a high degree of student participation, another representing a moderate degree of student participation, and the third representing relatively little student participation; (b) the selection of three groups of beginning freshmen, each to be taught by one of the three methods for a school year (three quarters); (c) the selection and construction of tests to be used

as measures of achievement of each of the three experimental groups of students; (d) the application of appropriate statistical procedures for evaluating observed differences among the three groups of students in their achievement on designated tests.

The study was conducted during the three quarters of the school year 1954-55. In September 1954, the three experimental groups were selected, the selection being based on performance on the Iowa Reading Test. Comparability of the three groups was further established by additional data obtained from other tests. The three groups according to these measures were shown to be comparable to each other and were representative of the entire freshman class.

The author of this report was assigned to teach all three experimental sections. The three groups were designated as class-recitation (Group A), group-discussion (Group B), and individual-consultation (Group C). In teaching these three classes, a minimum amount of student participation was used with Group A and a maximum of student participation with Group C.

Various tests designed to measure subject-matter mastery by recognition and recall were selected or constructed and administered at designated intervals. Some of these tests were administered twice with a period of instruction intervening between the first and second testing. Other tests administered only at the end of the course including the Spring Quarter Final Examination.

3. Findings

It seems appropriate to preface the summary of findings by a restatement of certain limitations in purpose and design of the study. For example, the investigation did not include systematic evaluation of such

goals as ability to perceive and to formulate a problem, initiative and independence in using sources of information, growing curiosity about the field of study, etc. The evaluative measures used were confined, in the main, to recognition and recall of verbal statements of factual information and verbal statements of principles. Interpretations and conclusions based on the findings must therefore be confined to these limited aspects of purposes of the course in Bio-Social Development.

All three experimental groups acquired a substantial amount of information in the respective fields of study represented in the course. The test results presented in Chapter V show that Group C (maximum student participation) achieved, in general, at a slightly higher level than the other two groups. The differences, however, were not statistically significant. The general pattern of test scores shows also that Group A (minimum student participation) achieved at a somewhat lower level than Group B or Group C. This relatively lower level of performance for Group A (which was not statistically significant) might be accounted for by the fact that this group made somewhat lower scores on the general aptitude tests than did the other groups. In any event, the evidence does not indicate that any one of the three groups learned significantly more than another as far as knowledge of subject matter in the course is concerned.

A more detailed summary is presented below showing initially stated hypotheses and parallel findings.

Hypothesis: Students who participate more in class will give evidence of more knowledge and understanding of the course content by scoring significantly higher on the:

- (1) Inventory Test I administered near the beginning of the fall quarter and again near the end of the spring quarter.

(Finding: Differences were not statistically significant.)

- (2) Inventory Test II administered near the beginning of the fall quarter and again near the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (3) Fall Quarter Final Examination administered at the end of the fall quarter and again at the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (4) Winter Quarter Final Examination administered at the end of the winter quarter and again at the end of the spring quarter

(Finding: One of the possible comparisons showed a statistically significant difference in favor of "student participation.")

- (5) Biology Test administered at the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (6) Psychology Test administered at the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (7) Interpretation Test administered at the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (8) Misconception Test administered at the end of the spring quarter

(Finding: Differences were not statistically significant.)

- (9) Spring quarter final examination administered at the end of the spring quarter

(Finding: Differences were not statistically significant.)

B. Conclusions

The central hypothesis in this study was found to be false--namely, the hypothesis that extensive student participation would be accompanied by distinctly superior achievement in "subject matter," as compared with achievement of students who participated relatively little in planning and evaluating their own work. Had the hypothesis been stated the other way around--for example, "The lecture-assignment-recitation method will result

in more subject matter learning than the student participation method," this, too, was found to be false.

Although the experimental group employing maximum student participation made slightly higher scores than the other groups on most of the tests, these differences, in most instances, did not even approach the level of statistical significance.

The three methods seemed to produce approximately equal results in:

1. developing a knowledge and understanding of course content over the period of the entire course,
2. developing a knowledge and understanding of course content over quarterly divisions of the course,
3. developing a knowledge and understanding of course content as a background of basic information for advanced study in related subject fields,
4. developing ability to understand and interpret scientific information written in popular periodicals,
5. developing an ability to apply the scientific approach in judging statements commonly accepted as facts.

It would appear, therefore, that when the goal of instruction is sharply limited to subject matter content, alone, there is no reason to choose any one of the three methods over the other two.

The instructor (author of this report) who taught all three experimental classes gained certain impressions concerning other types of outcomes not evaluated in this investigation. Direct observation of the students over a period of one academic year led to these tentative conclusions:

1. The consultation group (Group C) ranked highest of the three groups in developing self-reliance--individual thinking and acting. The recitation group (Group A) ranked lowest in this quality, while the discussion group (Group B) ranked in between the consultation group and the recitation group.
2. The discussion group ranked highest of the three groups in developing ability to work together in problem-solving.

3. The recitation group showed more of a tendency than the other groups to accept as "authoritative" any information given them.

These tentative conclusions would perhaps be more appropriately designated as "reasonable hypothesis" and should be subjected to more rigorous study.

C. Recommendations Concerning Course in Bio-Social Development

The results of this study have shown that provision for extensive student participation in the selection and development of areas of work undertaken in the course yields a level of "subject matter" achievement at least equal to the level achieved by the other methods used. Responsible student participation appears to encourage and to make possible important types of learning in addition to knowledge of the subject. With these reasons in mind certain recommendations are made here relating to future development of this course. The general plan of the course should provide for:

1. Maximum student participation including major responsibility for the topical selections, sequential development, group discussion, and class presentation of the basic course material
2. One instructor to teach all subject areas of the course for the sections assigned to him
3. An integrated text with work book containing material based on actual problems of daily living
4. Students to survey the scope of course material early in the school year in order to develop individual plans for periodic evaluation based on accomplishment
5. Student-evaluation of class contributions by fellow-students
6. A browsing room in which samples of completed projects and other reference materials may be filed for observation
7. Initial data on each student to include a course inventory test and a general achievement test
8. Standardization of several forms of a course examination composed of three major parts corresponding to the three quarterly examinations

9. Common major projects to be completed quarterly by all sections
10. A defined procedure for evaluating student progress and for assigning final quarterly grades

As these recommendations are put into effect, they should, of course, be subjected to continuous appraisal by the staff responsible for teaching the course, and by the students who take it.

APPENDIX A

Samples of Locally Constructed Tests Used

Inventory Test I

Inventory Test II

Fall Quarter Final Examination

Winter Quarter Final Examination

Psychology Test

Interpretation Test

Misconception Test

Spring Quarter Final Examination

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Inventory Test I

Science 131-132-133, F. O. 1954

DIRECTIONS: Select the number of the correct answer for each item and mark the corresponding number on the answer sheet.

1. Primitive man constructed the spirit theory in an attempt to (1) establish religion, (2) cover up his ignorance of causes, (3) find a cause for all phenomena, (4) explain human nature.
2. Similar to primitive man's beliefs in spirits is modern man's belief in (1) religion, (2) ghosts, (3) henotheism, (4) good and bad luck.
3. The human nature theory is (1) a sound scientific hypothesis, (2) non-scientific, fatalistic and destructive, (3) should be accepted by all students of psychology.
4. The cases of feral children (1) help us to understand human nature, (2) help us to understand human behavior, (3) add nothing to our understanding of human nature of behavior.
5. The ego is the (1) body, (2) soul, (3) self, (4) mind of man.
6. Human behavior is intimately related to some condition (1) existing inside the organism, (2) existing outside of the organism, (3) both 1 and 2, (4) neither 1 nor 2.
7. Wants and desires are (1) based on needs and drives, (2) requirements of the "self," (3) both 1 and 2, (4) neither 1 nor 2.
8. We can describe needs in terms of their (1) goals, (2) source, (3) energy, (4) affect.
9. The reduction of need tension is experienced as (1) pleasant, (2) unpleasant, (3) pleasant but unsatisfactory, (4) unpleasant but satisfactory.
10. Human behavior may be explained in terms of (1) the spirit theory, (2) will theory, (3) human nature theory, (4) needs and drives of the organism.
11. Culture which enters into the individual's thought concept through the arousal of his emotions is known as (1) material culture, (2) incorporeal, (3) non-material.

12. The general social process which consists of dissociative tendencies inseparably connected with efforts on the part of persons to obtain an identical objective is known as (1) evolution, (2) conflict, (3) competition.
13. The ways of the folk which explain the ways of doing things current in a particular group is known as (1) customs, (2) folkways, (3) mores.
14. A person whose attention is directed mainly inward and reflects only upon himself is known as an extrovert, (2) introvert, (3) self-centered.
15. Social groups which provide for face to face contact generally in small groups for intimate wholesomeness is known as (1) a social group, (2) a primary group, (3) a secondary group.
16. The first historic act that distinguished man from other animals was (1) his beginning to think, (2) his beginning to work, (3) his beginning to store up food for difficult times, (4) his beginning to live together.
17. Speech, art, mythology, war, religious practices, family and social organization are traits of (1) a cultural complex, (2) cultural area, (3) universal cultural pattern.
18. The second period of the economic development of the human race in which man tried to secure food was known as one of the following stages: (1) Domestication of animals, (2) hunting and fishing, (3) agricultural.
19. The fifth period of the economic development of the human race in which man made an effort to secure food was known as one of the following stages: (1) domestic or putting-out system, (2) manufacturing, (3) agricultural.
20. Poverty is a state of an economic condition which is caused because the person or persons are (1) economically poor, (2) have no steady job or income, (3) have an inadequate income or unwise expenditure.
21. An individual should study health to: (1) make good grades in Bio-Social, (2) increase his appreciation for art and literature, (3) establish well-fixed health habits.
22. One specific factor responsible for health progress was: (1) the establishment of chemistry as a science, (2) the discovery of the basic causes of diseases, (3) the establishment of the World Health Organization.
23. Infectious diseases are caused by: (1) microbes, (2) chemicals, (3) antibiotics.

Inventory Test I

Sc. 131-2-3

24. Robert Koch's Postulates were demonstrations that proved (1) the Germ Theory, (2) the theory of spontaneous generation, (3) the value of chemotherapy.
25. Communicable diseases refer to those diseases usually transmitted from one person to another, (1) naturally in our everyday coming and going, (2) through direct contact, (3) through mosquitoes.
26. An epidemic disease is usually characterized by (1) a small number of cases, (2) a large number of cases, (3) a sudden increase in the number of cases, (4) a few cases spread throughout the world.
27. Tuberculosis is (1) due to colds, (2) inherited, (3) due to degeneration of body, (4) contracted by germs.
28. Rheumatic fever is essentially a disease of the lining membrane of (1) large intestine, (2) liver, (3) heart, (4) stomach.
29. Anemia is an abnormality in which there is a reduction in (1) red corpuscles, (2) excretion, (3) white corpuscles, (4) lymph.
30. Arteriosclerosis is the (1) rupturing of arteries, (2) stretching of arteries, (3) hardening of arteries, (4) softening of arteries.
31. The test measuring susceptibility to diphtheria was perfected by (1) Dick, (2) Schick, (3) Jenner, (4) Koch, (5) Pasteur.
32. The Germ Theory of disease teaches that diseases are caused by (1) the will of God, (2) bacteria, (3) odorous air, (4) night air, (5) heat, cold, dampness and dryness.
33. The state of one's health is influenced by (1) what one reads, (2) what one knows, (3) what one does, (4) what one thinks, (5) what one expects to do.
34. The Hippocratic Theory of disease taught that disease was caused by (1) the gods, (2) an imbalance of the four humors, (3) demons, (4) odors from decaying materials, (5) wrath of the gods.
35. The film that portrayed the lymphatic system as the second line of defense against diseases was (1) How The Body Defends Its Organs Against Microbes, (2) Body Defenses Against Diseases, (3) Bacteria Are Dangerous.
36. The Film, "Nervous System," illustrated and described the strength of a nerve impulse as being due to: (1) the condition of the nerve that carries the impulse, (2) psychological factors, (3) the strength of the stimulus.
37. The Film, "Heart and Circulation," portrayed all blood entering the heart through the (1) capillaries, (2) veins and arteries, (3) veins.

Inventory Test I

Sc. 131-2-3

38. The exact title of the film that portrayed the exchange of gases during breathing was (1) Mechanics of Breathing, (2) Mechanisms of Breathing, (3) The Respiratory System.
39. Cancer is a (1) malignant tumor, (2) normal growth of cells, (3) a disease caused by germs.
40. The major function of the bladder is (1) excretion, (2) storage, (3) urination.
41. The parathyroid gland secretes hormones that control the concentration of (1) calcium in the blood, (2) sugar in the blood, (3) blood in the body.
42. The first line of defense against diseases is (1) the lymphatic system, (2) blood, (3) skin and mucuous membrane.
43. During mating sperm are deposited in the (1) ovary of the female, (2) uterus of the female, (3) vagina of the female.
44. The simplest major group of plants is the Thallophytes having no true (1) roots nor stems, (2) stems nor leaves, (3) roots, stems nor leaves.
45. The Algae and Fungi are Thallophytes which differ in their (1) methods of reproduction, (2) phyla classification, (3) growth processes, (4) methods of food-getting.
46. The Thallophytes may differ since all do not (1) contain cytoplasm, (2) possess the power of movement, (3) have a definite number of cells, (4) reproduce.
47. The spermatophytes differ since all (1) are not seed-bearing, (2) do not contain chlorophyll, (3) do not contain one seed leaf in the embryo, (4) do not possess the three major parts.
48. Invertebrates are animals with (1) an endoskeleton, (2) exoskeleton, (3) no vertebral column, (4) a vertebral column.
49. A membrane which separates the nucleus from the cytoplasm is (1) the cell wall, (2) plasma membrane, (3) nuclear membrane, (4) the cell membrane.
50. A dark spherical body within the nucleus (1) granules, (2) chromatin, (3) nucleolus, (4) chromosome.
51. Protoplasm outside of the nucleus is called (1) nucleoplasm, (2) endoplasm, (3) cytoplasm, (4) ectoplasm.
52. All cells are completely encircled and enclosed by a (1) plasma membrane, (2) cell wall, (3) cellulose.

Inventory Test I

Sc. 131-2-3

53. Osmosis and absorption are (1) vital, (2) non-vital, (3) vital and non-vital properties of protoplasm.
54. The region of the chest consists of (1) six lumbar, (2) twelve thoracic, (3) seven cervical, (4) five sacral vertebrae.
55. The skeleton of the leg consists of one upper leg or thigh bone, (1) Tibia, (2) Ulna, (3) Radius, (4) Femur, (5) Fibula.
56. The bones in the lower leg are called (1) radius and tibia, (2) tibia and ulna, (3) fibula and radius, (4) femur and radius, (5) fibula and tibia.
57. The largest bone in the body is the (1) hyoid, (2) navicular, (3) fibula, (4) femur, (5) calcaneus.
58. The two major divisions of the skeletal system are (1) pectoral girdle, and axial skeleton, (2) pelvis (hip) girdle and appendicular skeleton, (3) appendicular skeleton and pectoral girdle, (4) axial and appendicular skeletons.
59. The nervous system is composed of two divisions: (1) central and autonomic, (2) central and peripheral, (3) autonomic and peripheral, (4) sympathetic and parasympathetic.
60. Nerve cells are called (1) axons, (2) dendrites, (3) cell bodies, (4) neurons.
61. The nerve cells which carry impulses over the nerve trunks from the central nervous system to the effectors are called (1) sensory neurons, (2) motor neurons, (3) connector neurons, (4) associative neurons.
62. The right and left halves of the cerebrum: (1) cerebral fissures, (2) cerebral convolutions, (3) cerebral cortices, (4) cerebral hemispheres.
63. The visual area of the cerebrum is located in (1) occipital lobe, (2) parietal lobe, (3) temporal lobe, (4) frontal lobe.
64. The smallest blood vessels are called (1) valves, (2) arteries, (3) capillaries, (4) veins, (5) venules.
65. When the blood goes through the small intestine it picks up (1) oxygen, (2) nitrogen, (3) food, (4) fats, (5) insulin.
66. The red blood cells supply the body tissues with (1) oxygen, (2) plasma, (3) cells, (4) sugar, (5) fats.
67. The blood is kept from flowing backwards in the veins by (1) force, (2) the heart, (3) the valves, (4) diaphragm, (5) lungs.

Inventory Test I

Sc. 131-2-3

68. The bright redness of blood is due to the presence of (1) carbon dioxide, (2) proteins, (3) fats, (4) water, (5) oxygen.
69. Blood is carried from the heart to the lungs by the (1) aorta, (2) pulmonary arteries, (3) inferior vena cava, (4) pulmonary veins, (5) right ventricle.
70. In the portal circulation the blood from the stomach, pancreas, spleen and small intestine goes through the portal vein to the (1) lungs, (2) kidneys, (3) heart, (4) liver, (5) spleen.
71. Fluids lost in the tissues from the blood stream are returned by the (1) respiratory system, (2) circulatory system, (3) lymphatic system, (4) muscular system, (5) digestive system.
72. The blood from the upper part of the body returns to the heart through the (1) aorta, (2) inferior vena cava, (3) abdominal artery, (4) superior vena cava.
73. The valve between the right auricle and the right ventricle is the (1) bicuspid valve, (2) tricuspid valve, (3) venous valve, (4) semi-lunar valve.
74. The chief energy-producing foods are (1) carbohydrates, (2) proteins, (3) proteins and fats, (4) carbohydrates and fats, (5) liver extracts.
75. The passage through which food passes while being digested or absorbed is the (1) esophagus, (2) fundus, (3) colon, (4) rectum, (5) alimentary canal.
76. The semi-liquid food found in the small intestine is known as (1) fatty acids, (2) glycogen, (3) amino acids, (4) chyme, (5) monosaccharides.
77. A tube carrying food from the throat to the stomach is called the (1) trachea, (2) colon, (3) pharynx, (4) esophagus, (5) alimentary canal.
78. Animal starch is known as (1) glycogen, (2) renin, (3) pepsin, (4) erepsin, (5) mucin.
79. The chief organ of respiration is the (1) thorax, (2) diaphragm, (3) larynx, (4) lungs, (5) trachea.
80. Internal respiration involves the blood and the (1) tissues, (2) heart, (3) kidneys, (4) lungs.
81. A cavity encircling the lungs holding a fluid to prevent friction and irritation of the tissues in breathing is the (1) air sac, (2) lung sac, (3) bronchi, (4) plural cavity, (5) pericardium.

Inventory Test I

Sc. 131-2-3

82. The trachea is commonly known as the (1) larynx, (2) windpipe, (3) voice box, (4) pharynx.
83. Stimulation of the breathing center is brought about by a gas known to be (1) oxygen, (2) chlorine, (3) nitrogen, (4) carbon dioxide.
84. The chief secretion from the skin is (1) water, (2) oil, (3) urine, (4) sweat, (5) bile.
85. The chief product excreted by the kidneys is (1) water, (2) carbon dioxide, (3) nitrogen, (4) urine, (5) urea.
86. The chief substance excreted by the skin is carried there by the (1) digestive system, (2) circulatory system, (3) excretory system, (4) lymphatic system, (5) respiratory system.
87. The lungs eliminate from the blood (1) oxygen only, (2) carbon dioxide only, (3) water only, (4) carbon dioxide and water, (5) none of these.
88. Man can live without one kidney (1) about a year, (2) several years, (3) indefinitely, (4) no time at all, (5) a few days.
89. The primary sex organ in the male reproductive system is the (1) penis, (2) vas deferens, (3) testes, (4) prostate, (5) scrotum.
90. After sperm cells are mature they pass to the storage place through the (1) uterus, (2) urethra, (3) vas deferens, (4) prostate, (5) prepuce.
91. Generally in the female after puberty an egg matures every (1) 8 days, (2) 18 days, (3) 28 days, (4) 38 days, (5) 48 days.
92. Sperm cells start maturing in the male at (1) 21 years of age, (2) 12 years of age, (3) puberty, (4) birth, (5) conception.
93. One of the following does not belong in the female reproductive system (1) ovaries, (2) uterus, (3) fallopian tubes, (4) urethra, (5) cervix.
94. The thyroid gland is located (1) at the base of the brain, (2) at the base of the neck, (3) on each side of each kidney, (4) on each side of each gonad.
95. The pituitary gland is located at the (1) upper portion of the heart, (2) lower portion of the heart, (3) base of the brain, (4) mid-section of the head.
96. Estrogen is a hormone produced in the (1) testes, (2) ovaries, (3) kidneys, (4) liver.

Inventory Test I

Sc. 131-2-3

97. The hormone secreted by the thyroid is called (1) insulin, (2) thyroxin, (3) cortin, (4) adrenalin.
98. The medullary part of the adrenal glands secretes a hormone known as (1) cortin, (2) insulin, (3) adrenalin, (4) sympathin.
99. The liver and the kidney are similar since both may be considered as organs of (1) digestion, (2) storage, (3) secretion, (4) excretion.
100. The unit of function in the kidney is called (1) Malpighian corpuscle, (2) Bowman's capsule, (3) uriniferous tubule, (4) nephron, (5) glomerulus.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Inventory Test II

Science 131-132-133, F. Q. 1954

DIRECTIONS: Select the number of the correct answer for each item and mark the corresponding number on the answer sheet.

1. According to the "Spirit Theory," all phenomena were caused by (1) the action of man's soul, (2) witch doctors, (3) unseen spirits, (4) bad spirits.
2. One of the chief difficulties with the spirit theory was that it (1) did not explain human behavior, (2) prohibited future predictions, (3) forced man to be constantly on his guard against unseen forces.
3. It is human nature to (1) want to fight, (2) be jealous, (3) want to marry, (4) none of these, (5) all of these.
4. One "becomes human" as a result of (1) natural inborn tendencies over which he has no control, (2) social and cultural influences of his environment, (3) a combination of 1 and 2, (4) neither 1 nor 2.
5. The super-ego represents (1) exaggerated societal influences, (2) exaggerated parental authority, (3) a modification of the spirit theory, (4) neither of the above.
6. Psychoanalysis is a science of (1) spirits, (2) the "will," (3) human nature, (4) human conduct.
7. Drives are (1) conditions of tension in the body, (2) attempts of the body to maintain equilibrium, (3) culturally imposed, (4) requirements of the "self."
8. In the body, the greater the tension (1) the greater the amount of energy available, (2) the lesser the amount of energy available, (3) has no affect on the energy available, (4) has an indirect affect on the energy available.
9. During the kinetic stage of need activity, the behavior is always (1) a means to an end, (2) the end in itself, (3) it may be both 1 and 2, (4) it may be either 1 or 2.
10. The phrase "need for sex" implies (1) the necessity for sexual relations, (2) the desirability of sexual relations, (3) the requirements of the body for some type of sex expression, (4) neither of the above, (5) all of the above.

Inventory Test II

Sc. 131-2-3

11. The universal cultural pattern may be defined as (1) one which covers the entire world, (2) covers the known universe wherever man is found, (3) it is restricted to some specific geographical boundary.
12. Culture which enters into the individual's thought concept by the arousal of his emotions through ceremonial activities is (1) non-material culture, (2) material culture, (3) incorporeal culture.
13. The experience of singling out one dominating or distinguishing feature of culture of an organized social and political group is known as (1) a cultural pattern, (2) ethos, (3) folkways.
14. An exaggerated form of behavior of local incidence and relatively brief duration is known as a (1) fashion, (2) craze, (3) fad.
15. The moral standards of a group which are considered conducive to or indispensable to group welfare are known as (1) conventions, (2) taboos, (3) mores.
16. Material culture consist of (1) those intangible creations of man, (2) those tangible creations of man, (3) both the tangible and the intangible creations of man, (4) neither the tangible nor the intangible creations of man.
17. Conflict is (1) a mutually destructive relationship of individuals or groups, (2) a clash of interest of value and efforts, (3) the objective in the defeat or annihilation of the opposing person or group.
18. The first period of the economic development of the human race in which man tried to secure food was known as one of the following stages: (1) Domestication of animals, (2) hunting and fishing, (3) agricultural.
19. The fourth period of the economic development of the human race in which man made an effort to secure food was known as one of the following stages: (1) agricultural, (2) manufacturing, (3) domestic or putting-out system.
20. The other revolution which took place at the same time of the industrial revolution which caused the Industrial Revolution to be a success was (1) the French Revolution, (2) Agricultural Revolution, (3) Transportation Revolution.
21. Health refers to those qualities of life that enable an individual or groups of individuals to: (1) live free from disease, (2) have adequate medical facilities, (3) live most and serve best.

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22. A fundamental principle in any program for healthful living involves: (1) being well-groomed, (2) have periodic blood tests, (3) obtaining or having a thorough knowledge of the anatomy and physiology of the body.
23. Chemotherapy was introduced by: (1) Joseph Lister, (2) Paul Ehrlich, (3) Robert Koch.
24. Micro-organisms were discovered (1) by Leeuwenhoek, (2) by Harvey, (3) in the 13th century, (4) in the 14th century.
25. Bacteria are (1) one-celled animals, (2) one-celled plants, (3) multi-cellular plants, (4) microscopic animals.
26. Venereal diseases are usually spread through (1) an intermediate host, (2) indirect contact, (3) direct contact.
27. A communicable disease transmitted by metazoa is (1) diabetes, (2) hook-worm infestation, (3) heart disease, (4) calcification.
28. The largest cause of death in the U. S. is due to disease of (1) nervous system, (2) respiratory system, (3) excretory system, (4) circulatory system.
29. Immunity acquired by injections of ready made antibodies is called (1) inherited, (2) passive, (3) artificial, (4) natural.
30. The inflammation of the double membrane surrounding each lung is called (1) pleurisy, (2) appendicitis, (3) laryngitis, (4) tonsillitis.
31. The Germ Theory of Disease was discovered by (1) Jenner, (2) Lister, (3) Hippocrates, (4) Pasteur and Koch, (5) Dick.
32. Good health means (1) freedom from disease, (2) soundness in body, (3) soundness in mind and in body, (4) a state of mind that enables the individual to attain his greatest amount of happiness, (5) a state of physical strength that enables the individual to endure the greatest amount of hardwork.
33. When a new drug is perfected in medicine for treatment of a disease it means that (1) such treatment will be immediately available to everyone, (2) that all physicians will become skilled in using the treatment, (3) that use of the treatment will be in proportion as it is proven on humans and as physicians learn to execute the treatment, (4) that pharmaceutical companies will begin immediate manufacture of these drugs, (5) that all physicians will be forced to use the drug.
34. The Demonic Theory of Disease taught that disease was caused by (1) the will of God, (2) bacteria, (3) bad odors and damp air, (4) demons or sin within the patient's body, (5) night air.

Inventory Test II

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35. The Film, "Animal Life," portrayed: (1) the skin as the first line of defense against diseases, (2) reproduction among various animals, (3) general characteristics of various animals.
36. The Film, "Nervous System," portrayed nerve impulses as (1) the reactions of atoms with molecules, (2) emotional disturbances, (3) the reaction of positive and negative electrical charges.
37. The Film, "Heart and Circulation," portrayed all blood leaving the heart through (1) veins, (2) arteries, (3) veins and arteries.
38. The finger-like projections called villi are located: (1) on the tongue, (2) on the hands, (3) in the stomach, (4) in the small intestine.
39. Drowning is due to (1) water in the lungs, (2) lack of oxygen, (3) lack of carbon dioxide.
40. The Film, "Work of the Kidney," proved that (1) all rats have four kidneys, (2) some rats have four kidneys, (3) a rat can live a normal life with one kidney.
41. Endocrine glands (1) stimulate sex organs, (2) produce hormones, (3) produce goiter.
42. Tuberculosis is caused by (1) kissing, (2) germs, (3) lack of resistance.
43. The female sex cell is the (1) ovum, (2) ovary, (3) uterus.
44. The adrenal glands are located (1) at the base of the brain, (2) imbedded in the thyroid gland, (3) just above the kidneys.
45. The Thallophytes may differ since (1) all do not live on living substances, (2) reproduce asexually, (3) grow by intussusception, (4) carry on the process of metabolism.
46. The Thallophytes may differ since all are not (1) composed of protoplasm, (2) living organisms, (3) plants, (4) unicellular.
47. The Spermatophytes differ from the Pteridophytes in the (1) metabolic processes, (2) food-getting, (3) reproductive processes, (4) principle bodily parts.
48. The Amoeba and Bacterium are alike since both are (1) plants, (2) animals, (3) unicellular, (4) multicellular.
49. Birds and mammals are alike since both (1) have their bodies covered with hair, (2) are oviparous, (3) viviparous, (4) are warm-blooded.

Inventory Test II

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50. The innermost dark staining portion of the cell (1) nucleolus, (2) nucleus, (3) chromatin, (4) mitochondria.
51. Indirect cell division (1) meiosis, (2) mitosis, (3) amitosis, (4) metabolism.
52. The cells vary considerably in (1) size, (2) size and shape, (3) size, shape and function.
53. A cell wall is typical of (1) animal cells, (2) plant cells, (3) animal and plant cells.
54. Irritability, surface tension and diffusion are (1) vital, (2) non-vital, (3) vital and non-vital properties of protoplasm.
55. The forearm bones are called (1) tibia and fibula, (2) femur and humerus, (3) metacarpals, (4) ulna and radius.
56. The skeleton of the hand comprises (1) 14 carpals, 8 metacarpals and 5 phalanges, (2) 8 carpals, 5 metacarpals and 14 phalanges, (3) 6 carpals, 7 metacarpals and 10 phalanges.
57. The kneecap is known as the (1) lacrimal, (2) sternum, (3) patella, (4) tibia.
58. The muscles separating the thoracic cavity from the abdominal cavity (1) the skeletal, (2) the visceral, (3) the smooth, (4) the diaphragm.
59. The muscles attached directly to the bones are (1) visceral, (2) smooth, (3) striped, (4) branching muscles.
60. The chief function of the central nervous system is (1) conduction, (2) integration, (3) neither, (4) both.
61. The nerve cells which carry impulses over the nerve trunks from the central nervous system to the effectors are called (1) sensory neurons, (2) motor neurons, (3) connector neurons, (4) central neurons.
62. The lower part of the brain that lies under the cerebrum and cerebellum and continues directly into the spinal cord (1) cerebrum, (2) cerebellum, (3) pons, (4) thalamus, (5) medulla.
63. An area of the cerebral cortex which directly receives nervous impulses from one of the senses (1) sensory area, (2) motor area, (3) primary sensory area, (4) prefrontal area, (5) association area.
64. The fissure that divides the cerebrum into hemispheres, (1) Parieto-occipital, (2) Sylvius, (3) Rolando, (4) Longitudinal.

Inventory Test II

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65. When the blood goes through the lungs it takes on a supply of (1) oxygen, (2) carbon-dioxide, (3) water, (4) sugar, (5) nitrogen.
66. The solid objects in the blood are the (1) blood plasma, (2) blood sugars, (3) blood corpuscles, (4) blood protein, (5) blood fibers.
67. Arteries carry blood (1) to the heart, (2) through the heart, (3) to the veins, (4) from the heart, (5) around the heart.
68. Blood plasma is about (1) 50% water, (2) 60% water, (3) 75% water, (4) 90% water, (5) 100% water.
69. Blood is carried from the heart to the lungs by the (1) aorta, (2) pulmonary arteries, (3) inferior vena cava, (4) pulmonary veins, (5) right ventricle.
70. Blood leaving the left ventricle going to all parts of the body leaves through the (1) Aorta, (2) pulmonary artery, (3) inferior vena cava, (4) pulmonary veins, (5) right ventricle.
71. Blood returning to the heart from the lungs enters the (1) right auricle, (2) right ventricle, (3) left ventricle, (4) left auricle, (5) liver.
72. Blood from the lower part of the body is carried back to the heart through the (1) pulmonary veins, (2) inferior vena cava, (3) aorta, (4) abdominal artery, (5) renal vein.
73. Blood is carried from the kidneys to the inferior vena cava by the (1) renal veins, (2) renal arteries, (3) pulmonary veins, (4) pulmonary arteries.
74. Red blood cells are manufactures in the (1) lungs, (2) liver, (3) kidneys, (4) bones, (5) blood.
75. Originally there were only three vitamins recognized--vitamins A, B, and C, the original A subdivided into (1) A, G, K, (2) A, D, and E, (3) A, E, K, (4) B1, B2, and B3, (5) K, C, and G.
76. A ring-like muscle able to contract and shut off the opening from the esophagus to the stomach is known as the (1) voluntary sphineter, (2) cardiac spineter, (3) involuntary spineter, (4) pyloric sphineter.
77. Amino acids, (2) diastase, (3) monosaccharides maltose, (4) glucose, (5) fatty acids form in the digestion of fats.
78. A substance also formed by the digestion of fats is known as (1) proteoses, (2) peptones, (3) glycogen, (4) glycerol, (5) monosaccharides.
79. The sublingual gland is located (1) above the tongue, (2) beneath the tongue, (3) behind the jaw, (4) beneath the jaw.

Inventory Test II

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80. External respiration involves the blood and the (1) tissues, (2) heart, (3) kidneys, (4) lungs.
81. The formula $KClO_3 + MnO_2 + \text{heat}$ is a method used to liberate (1) chlorine, (2) potassium, (3) carbon dioxide, (4) oxygen, (5) nitrogen.
82. The membrane immediately covering the lungs is called the (1) parietal pleura, (2) visceral pleura, (3) alveoli, (4) air sacs, (5) capillaries.
83. Rate and depth of breathing are controlled largely by a center in the brain known as the (1) cerebrum, (2) cerebellum, (3) medulla, (4) pons, (5) mid brain.
84. Breathing is chiefly carried on through a passage or organ known as the (1) skin, (2) mouth, (3) nose, (4) buccal centers.
85. The chief substance excreted by the lungs is (1) water, (2) oxygen, (3) carbon dioxide, (4) ammonia, (5) nitrogen.
86. Substances excreted by the kidneys is carried there by the (1) digestive tract, (2) sweat glands, (3) blood, (4) portal vein.
87. The kidneys take urine from the blood (1) at various intervals, (2) continuously, (3) while at rest, (4) during exercise only, (5) after drinking water.
88. The blood is not a vital factor in excretion through the (1) skin, (2) digestive tract, (3) lungs, (4) kidneys.
89. The most burdensome task placed upon the kidneys comes as a result of eating lots of (1) sugar, (2) starch, (3) potatoes, (4) fruits, (5) meats.
90. After sperm cells are mature in the male they are stored in the (1) testis, (2) seminal vesicles, (3) scrotum, (4) prostate, (5) prepuce.
91. Sperm cells are produced in the (1) scrotum, (2) testes, (3) vas deferens, (4) penis, (5) prostate.
92. Gonads in an organism refer to (1) testes, (2) ovaries, (3) eggs, (4) sperms, (5) ovaries and testes.
93. One of the following does not belong in the male reproductive system (1) testes, (2) hymen, (3) vas deferens, (4) urethra, (5) prostate gland.
94. When the sperm cells leave the testicle the next place is the (1) vas deferens, (2) seminal vesicles, (3) prostate, (4) urethra, (5) epididymis.

Inventory Test II

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95. The parathyroid glands regulate (1) calcium metabolism, (2) basal metabolism, (3) fat metabolism, (4) growth hormones.
96. Adrenal glands are located on each (1) kidney, (2) lung, (3) gland, (4) thyroid lobe.
97. Prolactin is a hormone produced by the (1) pituitary gland, (2) thymus gland, (3) pineal gland, (4) glands of Langerhans.
98. One part of the adrenal glands, the cortex, produces a hormone known as (1) cortin, (2) acetylcholine, (3) sympathin, (4) adrenalin.
99. The Islands of Langerhans are located in the (1) neck of the bladder, (2) pyloric sphincter, (3) stomach, (4) pancreas.
100. The blood vessel leading into the Bowman's capsule is larger than the one leading out which causes (1) the blood to flow more swiftly, (2) the blood to increase its pressure, (3) the blood to retain its soluble substance, (4) the blood to oxide more readily.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Fall Quarter Final Examination

Science 131, F. Q. 1954

DIRECTIONS: Select the number of the correct answer for each item and mark the corresponding number on the answer sheet.

1. The problems that concern the freshman according to his course of study deal with the development of the (1) individual, (2) college morals, (3) social standards.
2. The colleges in Alabama that have developed a core-program (integrated courses) are (1) Mechanical Colleges, (2) Technical Colleges, (3) Teachers Colleges.
3. Bio-Social is based upon individual initiative and individual (1) differences, (2) habits, (3) beliefs.
4. Learning may be defined as any change of (1) behavior, (2) opinion, (3) attitude.
5. We learn through the sense of sight approximately (1) 25%, (2) 50%, (3) 75% of what we know.
6. We learn through the sense of hearing approximately (1) 10%, (2) 13%, (3) 20% of what we know.
7. Alabama has been under three foreign governments (1) French, English, Spanish, (2) Confederate, Colonial, British, (3) Federal, Cherokee, Muskogee.
8. Biology may be defined as the science of (1) plants, (2) animals, (3) life.
9. Health runs through Bio-Social during (1) one quarter's work, (2) two quarter's work, (3) three quarter's work.
10. The first quarter's work in Bio-Social is heavily (1) biological, (2) psychological, (3) sociological.
11. Psychology is generally defined as the science of (1) the soul, (2) the mind, (3) behavior.
12. Bio-Social helps one to make (1) a living, (2) an adjustment to society, (3) a preparation for life's work.

13. The best manner of learning is by (1) listening, (2) doing, (3) seeing.
14. The project-activities have as their specific purpose the development of definite (1) habits of learning, (2) patterns of learning, (3) skills and techniques for learning.
15. The problems that concern the sophomore according to his course of study deal with the state (1) region and nation, (2) county and city, (3) urban and rural areas.
16. Two major groups into which organisms may be classified are (1) organic and inorganic, (2) living and non-living, (3) plants and animals.
17. Plant and animal cells generally have this structure in common (1) cell wall, (2) chloroplast, (3) nucleus.
18. Bacteria and amoebae are alike in that they are (1) plants, (2) animals, (3) unicellular, (4) multicellular.
19. The cell wall is characteristic of the (1) animal cells, (2) plant cells, (3) plant and animal cells.
20. The thallophytes may differ since all do not contain (1) cell walls, (2) cytoplasm, (3) chlorophyll, (4) protoplasm.
21. The Thallophytes may also differ since all do not (1) contain living substances, (2) reproduce asexually, (3) grow by intussusception, (4) carry on the process of metabolism.
22. Algae and Fungi are Thallophytes that differ in their (1) methods of reproduction, (2) phyla classification, (3) growth processes, (4) methods of food-getting.
23. Fungi may differ among themselves since some (1) contain chlorophyll, (2) manufacture their own food, (3) live on dead matter.
24. The Thallophytes may differ among themselves since all are not (1) composed of protoplasm, (2) organisms, (3) plants, (4) unicellular.
25. The Thallophytes may differ among themselves since all do not (1) contain cytoplasm, (2) possess the power of movement, (3) have a definite number of cells, (4) reproduce.
26. A plant having true roots, stems and leaves and reproduce by alternation of generation is a (1) Protococcus, (2) Bacterium, (3) Fern.
27. The Spermatophytes differ from the Pteridophytes in (1) metabolic processes, (2) food-getting, (3) reproductive processes.

28. The Spermatophytes differ among themselves since all (1) are not seed-bearing, (2) do not contain chlorophyll, (3) do not contain one-seed leaf in the embryo.
29. The simplest major group of plants is the Thallophytes having no true roots, (1) nor stems, (2) nor leaves, (3) stems nor leaves.
30. The Amoeba is a (1) one-cell plant, (2) one-cell animal, (3) metazoa.
31. Invertebrates are animals with (1) an endoskeleton, (2) exoskeleton, (3) a vertebral column, (4) no vertebral column.
32. The Vertebrates differ from the prevertebrates by possessing a (1) notochord, (2) axial endoskeleton, (3) nervous system.
33. Birds and mammals are alike since both (1) have their bodies covered with hair, (2) are oviparous, (3) are viviparous, (4) are warm-blooded.
34. The following words are directly related to the reproduction of the cell except (1) meiosis, (2) mitosis, (3) amitosis, (4) necrosis.
35. A membrane which separates the nucleus from the cytoplasm is (1) cell membrane, (2) plasma membrane, (3) nuclear membrane.
36. A dark-staining portion of the cell (1) cytoplasm, (2) centrosome, (3) nucleus, (4) centrioles.
37. Method of cell reproduction in which the nuclear material undergoes a complicated re-arrangement (1) anabolism, (2) katabolism, (3) mitosis, (4) amitosis.
38. Indirect cell division (1) meiosis, (2) mitosis, (3) amitosis.
39. Protoplasm outside of the nucleus is called (1) nucleoplasm, (2) endoplasm, (3) cytoplasm, (4) ectoplasm.
40. A living cell is a unit of (1) structure, (2) function, (3) structure and function.
41. Cells vary considerably in (1) size, (2) size and shape, (3) size, shape, and function.
42. The protoplasm which forms the controlling center directing cellular activity is known as (1) nucleoplasm, (2) cytoplasm, (3) endoplasm, (4) ectoplasm.
43. Osmosis and absorption are (1) vital, (2) non-vital, (3) vital and non-vital properties of protoplasm.
44. Metabolism and reproduction are (1) vital, (2) non-vital, (3) vital and non-vital properties of protoplasm.

45. Irritability, surface tension and diffusion are (1) vital, (2) non-vital, (3) vital and non-vital properties of protoplasm.
46. The skull comprises some 22 bones (1) 22 cranial, (2) 8 cranial and 14 facial, (3) 14 cranial and 8 facial, (4) 22 facial.
47. The whole vertebral column consists of (1) 22 bones, (2) 33 bones, (3) 44 bones, (4) less than 22 bones (in children).
48. The neck region of the vertebral column consists of (1) 7 cervical, (2) 12 thoracic, (3) 5 lumbar, (4) 5 sacral, (5) 4 coccygeal.
49. The bony remnant of the tail consists of (1) 7 cervical, (2) 12 thoracic, (3) 5 lumbar, (4) 5 sacral, (5) 4 coccygeal.
50. The chest region consists of (1) 7 cervical, (2) 12 thoracic, (3) 5 lumbar, (4) 5 sacral, (5) 4 coccygeal vertebrae.
51. The skeleton of the hand comprises (1) 8 carpals, 5 metacarpals and 14 phalanges, (2) 5 carpals, 14 metacarpals and 8 phalanges, (3) 14 carpals, 8 metacarpals and 5 phalanges.
52. The skeleton of the leg consists of one upper leg or thigh bone (1) tibia, (2) fibular, (3) femur, (4) clavicle, (5) scapula.
53. The two lower leg bones are (1) femur and fibula, (2) fibula and tibia, (3) Femur and tibia, (4) ulna and radius.
54. The bone of the upper arm is called (1) radius, (2) ulna, (3) humerus, (4) tarsal, (5) metatarsal.
55. The lower arm bones are called (1) tibia and fibula, (2) ulna and radius, (3) femur and humerus, (4) carpals, (5) metacarpals.
56. The radius and ulna compose the bones of the (1) upper arm, (2) lower arm, (3) phalanges, (4) thigh, (5) hip.
57. The tibia and fibular compose the bones of the (1) upper leg, (2) lower leg, (3) thigh, (4) phalanges.
58. The kneecap is known as the (1) scapula, (2) clavicle, (3) hyoid, (4) patella, (5) pubis.
59. The bones of the fingers and thumb are known as (1) carpals, (2) metacarpals, (3) upper phalanges, (4) lower phalanges.
60. Comparing the number of bones found in children with the number found in adults, it is true that (1) children have the same number of bones as adults, (2) children have more bones than adults, (3) children have fewer bones than adults.

61. The nervous system is composed of two divisions (1) central and autonomic, (2) central and peripheral, (3) autonomic and peripheral, (4) sympathetic and parasympathetic.
62. The central nervous system is composed of two divisions (1) brain and brain nerves, (2) brain and spinal cord, (3) brain and spinal nerves, (4) spinal cord and spinal nerves.
63. The chief function of the central nervous system is (1) conduction, (2) integration, (3) neither.
64. Nerve cells are called (1) axons, (2) dendrites, (3) cell bodies.
65. The nerve cells which transmit impulses from the sense organs over the nerve trunks to the central nervous system are called (1) sensory neurons, (2) motor neurons, (3) connector neurons.
66. The nerve cells which carry impulses over the nerve trunks from the central nervous system to the effectors are called (1) sensory neurons, (2) motor neurons, (3) connector neurons.
67. The nerve cells which carry impulses between points within the central nervous system are called (1) sensory neurons, (2) motor neurons, (3) connector.
68. The sensory area of the brain is separated from the motor area by a deeper fissure known as (1) Fissure of Sylvius, (2) Fissure of Rolando, (3) Longitudinal Fissure.
69. The lower part of the brain that lies under the cerebrum and cerebellum and continues directly into the spinal cord (1) cerebrum, (2) cerebellum, (3) pons, (4) medulla oblongata.
70. The right and left halves of the cerebrum (1) cerebral fissures, (2) cerebral convolutions, (3) cerebral hemispheres.
71. A layer of gray matter which extends over the entire surface of the cerebrum (1) cerebral cortex, (2) cerebellar cortex, (3) cerebral fissures, (4) cerebral convolutions.
72. The visual area of the cerebrum is located in (1) occipital lobe, (2) parietal lobe, (3) temporal lobe, (4) frontal lobe.
73. An area of the cerebral cortex which directly receives nervous impulses from one of the senses (1) sensory area, (2) motor area, (3) association area.
74. The auditory area of cerebrum is located in (1) occipital lobe, (2) parietal lobe, (3) temporal lobe, (4) frontal lobe.

75. The fissure that divides the cerebrum into hemispheres (1) parieto-occipital, (2) Sylvius, (3) Rolando, (4) Longitudinal.
76. The smallest blood vessels are called (1) valves, (2) arteries, (3) capillaries, (4) veins, (5) venules.
77. The great transporting medium of the body is the (1) respiratory, (2) circulatory system, (3) digestive system, (4) endocrine system.
78. The liquid portion of the blood is known as (1) lymph, (2) water, (3) fluid, (4) plasma, (5) sugar.
79. One function of the white blood cells is to (1) carry food, (2) fight red cells, (3) fight bacteria, (4) carry oxygen.
80. Veins carry blood (1) to the heart, (2) from the heart, (3) through the heart, (4) through the lungs.
81. The heart serves as a (1) valve, (2) pump, (3) tube, (4) reservoir.
82. The heart is enclosed by (1) the lungs, (2) diaphragm, (3) pericardium, (4) pleura, (5) meninges.
83. Blood is carried from the lungs to the heart by the (1) aorta, (2) pulmonary artery, (3) pulmonary veins, (4) inferior vena cava.
84. In the portal circulation the blood from the stomach, pancreas, spleen and small intestine goes through the portal vein to the (1) lungs, (2) liver, (3) kidneys, (4) heart.
85. Blood returning from all parts of the body to the heart enters the (1) left auricle, (2) right auricle, (3) left ventricle.
86. The valves that keep the blood from flowing back into the heart as it leaves in pulmonary circulation are the (1) bicuspid, (2) tricuspid, (3) semilunar, (4) venous, (5) A-V.
87. The blood from the upper parts of the body returns to the heart through the (1) aorta, (2) inferior vena cava, (3) superior vena cava, (4) abdominal aorta, (5) hepatic-portal.
88. Blood is carried from the abdominal aorta to the kidneys by the (1) pulmonary vein, (2) pulmonary artery, (3) renal vein, (4) renal artery.
89. The valve between the right auricle and right ventricle of the heart is the (1) bicuspid, (2) tricuspid, (3) semilunar.
90. The valve between the left auricle and left ventricle of the heart is the (1) bicuspid, (2) tricuspid, (3) semilunar.

91. The structure that has the function of extracting nutrients from foods and making them available to the blood is called the (1) liver, (2) stomach, (3) digestive system, (4) kidneys.
92. The mouth enzymes are (1) pepsin and rennin, (2) ptyalin and maltose, (3) ptyalin and pepsin, (4) maltose and rennin.
93. The stomach enzymes are (1) pepsin and maltose, (2) pepsin and rennin, (3) saliva and bile, (4) mucin and hydrochloric acid.
94. Carbohydrates begin their digestion in the (1) mouth, (2) esophagus, (3) stomach, (4) small intestine.
95. Proteins begin their digestive process in the (1) mouth, (2) stomach, (3) small intestine, (4) large intestine.
96. Fats begin their digestive process in the (1) mouth, (2) stomach, (3) small intestine, (4) large intestine.
97. The end products of the digestion of carbohydrates are (1) amino-acids, (2) fatty acids, (3) glucose.
98. The end products of the digestion of the proteins are (1) amino acids, (2) fatty acids, (3) glucose, (4) monosaccharides.
99. One of the end products of the digestion of fats is (1) glucose, (2) glycerine, (3) peptones, (4) proteoses, (5) amino acids.
100. When the mixture of food leaves the stomach it is then called (1) glycogen, (2) bolus, (3) chyme, (4) feces.
101. That part of the small intestine which the food enters when it leaves the stomach (1) duodenum, (2) jejunum, (3) ileum.
102. Materials expelled from the alimentary canal (1) bolus, (2) chyme, (3) feces, (4) digestive juices.
103. The chamber at the end of the alimentary canal between the large intestine and the anus (1) colon, (2) caecum, (3) rectum.
104. One of the minute, finger-like structures in the wall of the small intestine into which food is absorbed on entering the blood system is called (1) pylorus, (2) villus, (3) fundus.
105. A hormone produced in the walls of the duodenum which causes the pancreas to secrete (1) ptyalin, (2) pepsin, (3) secretin.
106. The interchange of gases (carbon dioxide and oxygen) between the air and the blood (1) internal respiration, (2) external respiration, (3) costal respiration, (4) abdominal respiration.

107. The interchange of gases between the body tissues and the blood (1) internal respiration, (2) external respiration, (3) costal respiration, (4) abdominal respiration.
108. When oxygen diffuses into the blood stream it combines with (1) plasma, (2) water, (3) sugar, (4) hemoglobin, (5) urea.
109. Minute air chambers in the lungs (1) bronchi, (2) bronchioles, (3) alveoli, (4) trachea.
110. Minute passageways for air in the lungs (1) bronchi, (2) bronchioles, (3) alveoli, (4) trachea.
111. A muscular membrane which separates the chest cavity from the abdominal cavity, the movement of which is to help force the air in and out of the lungs (1) pericardium, (2) visceral pleura, (3) parietal pleura, (4) diaphragm.
112. Each air sac of the lungs is surrounded by a network of (1) veins, (2) arteries, (3) capillaries, (4) arterioles, (5) venules.
113. Exercise increases the rate of breathing because it causes, in the blood, an increase of (1) oxygen, (2) carbon dioxide, (3) water, (4) carbonic acid, (5) carbon monoxide.
114. When we inhale the diaphragm (1) expands, (2) contracts, (3) relaxes.
115. When we exhale the diaphragm (1) expands, (2) contracts, (3) relaxes.
116. That part of the body that contains the lungs and the heart is (1) pleural cavity, (2) abdominal cavity, (3) thoracic cavity.
117. The trachea is commonly known as the (1) larynx, (2) Adam's Apple, (3) windpipe, (4) pharynx.
118. Rate and depth of breathing are controlled largely by a center in the brain (1) cerebrum, (2) cerebellum, (3) medulla, (4) pons.
119. Less than half way down the chest cavity the trachea divides into two branches (1) bronchi, (2) bronchioles, (3) alveoli.
120. The chief organ of respiration (1) trachea, (2) bronchi, (3) bronchioles, (4) lungs, (5) alveoli.
121. Excretion means to (1) secrete, (2) eliminate, (3) absorb.
122. The excretion from the kidneys (1) excreta, (2) urea, (3) urine.
123. The bladder (1) secretes, (2) absorbs, (3) collects.

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124. Urine is carried from the kidneys to the bladder by the (1) urethra, (2) ureters, (3) collecting ducts.
125. The canal through which urine passes from the bladder to the outside (1) urethra, (2) ureter, (3) collecting duct.
126. The kidneys are (1) pear-shaped, (2) bean-shaped, (3) oval-shaped.
127. Valves at the opening of the ureters into the urinary bladder prevent the (1) entrance of urine, (2) backflow of urine, (3) passage of urine.
128. Normal urine is approximately (1) 96% water, (2) 86% water, (3) 76% water.
129. The end of each kidney tubule is a double-walled hollow sac of cells: (1) glomeruli, (2) Bowman's capsule, (3) Malpighian Bodies.
130. Waste that comes from the actual life process of a cell is called (1) metabolic waste, (2) endogenous waste, (3) exogenous waste.
131. The chief excretion through the skin (1) water, (2) oil, (3) sweat, (4) bile, (5) carbon dioxide.
132. The alimentary canal excretes (1) urine, (2) undigested food, (3) water (4) feces.
133. The chief substance excreted by the lungs (1) oxygen, (2) carbon dioxide, (3) nitrogenous waste, (4) ammonia.
134. The blood is not a vital factor in excretion through the (1) skin, (2) digestive tract, (3) lungs, (4) kidneys.
135. Man can live without one of his kidneys or lungs (1) a very few minutes, (2) a few days, (3) a few weeks or months, (4) a few years, (5) indefinitely.
136. The paired organs of the human male which produce sperm cells (1) gametes, (2) kidneys, (3) testes, (4) scrotum, (5) semen.
137. A duct leading from the testes to the urethra (1) sperm-bearing tubule, (2) epididymus, (3) ureter, (4) vas deferens, (5) glans.
138. A fold of skin which, in man, encloses the testes (1) prostrate gland, (2) scrotum, (3) seminal vesicle, (4) prepuce, (5) glans.
139. A fluid containing sperm cells which is ejaculated through the urethra (1) urine, (2) mucus, (3) semen, (4) pus.
140. The passage from the uterus to the exterior of the female (1) Fallo-pian tube, (2) vagina, (3) urethra, (4) vulva.

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141. The monthly shedding of material from the wall of the uterus through the vagina (1) menopause, (2) ovulation, (3) menstruation.
142. The primary sex organs in either sex (1) testes, (2) ovaries, (3) gonads, (4) sperm, (5) egg.
143. A new individual in its earliest stages of development (1) gamete, (2) a zygote, (3) an embryo, (4) a fetus.
144. The unborn child after it has developed the human form (1) a gamete, (2) a zygote, (3) an embryo, (4) a fetus.
145. The inner membrane surrounding the embryo and fetus (1) amnion, (2) chorion, (3) hymen, (4) cervix.
146. The outer membrane surrounding the embryo and fetus (1) amnion, (2) chorion, (3) hymen, (4) cervix.
147. A muscular constriction at the base of the uterus which opens into the vagina (1) amnion, (2) chorion, (3) **hymen**, (4) cervix.
148. A membrane partly closing the opening to the vagina (1) amnion, (2) chorion, (3) hymen, (4) cervix.
149. The external female sexual structures (1) vulva, (2) vagina, (3) uterus, (4) clitoris.
150. Paired organs in the female which produce the egg cells (1) testes, (2) ovaries, (3) gonads, (4) Fallopian tubes.
151. The thyroid gland is located (1) at the base of the brain, (2) at the base of the neck, (3) on anterior part of kidney, (4) in the chest region.
152. The parathyroid glands are located (1) within the thyroid, (2) aside of thyroid, (3) surrounding the thyroid, (4) in gonads.
153. The parathyroid glands regulate (1) basal metabolism, (2) calcium metabolism, (3) fat metabolism, (4) growth hormones.
154. The pituitary gland is located at the (1) mid-section of brain, (2) base of brain, (3) within the chest region, (4) near heart.
155. The front lobe of the pituitary gland regulates (1) skeletal growth, (2) metabolic growth, (3) cranial growth, (4) muscular growth.
156. Adrenal glands are located (1) at the base of the brain, (2) at the base of the neck, (3) in the small intestine, (4) on kidneys.
157. The hormone secreted by the thyroid (1) insulin, (2) thyroxin, (3) cortin, (4) adrenalin.

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158. Parathyrin is a hormone produced by the (1) pituitary gland, (2) thymus gland, (3) thyroid gland, (4) parathyroid gland.
159. Prolactin is a hormone produced by the (1) pituitary gland, (2) thymus gland, (3) pineal gland, (4) Islands of Langerhans.
160. Estrogen is a hormone produced in the (1) testes, (2) ovaries, (3) kidneys, (4) liver, (5) pancreas.
161. Androgen is a hormone produced in the (1) testes, (2) ovaries, (3) kidneys, (4) liver, (5) pancreas.
162. One part of the adrenal glands, the cortex, produces a hormone (1) adrenalin, (2) cortin, (3) sympathin, (4) insulin.
163. The medullary part of the adrenal glands secretes a hormone (1) adrenalin, (2) cortin, (3) sympathin, (4) insulin.
164. The Islands of Langerhans produce a hormone (1) pancreatic juice, (2) secretin, (3) insulin, (4) gastrin.
165. The Islands of Langerhans are located in the (1) small intestine, (2) pancreas, (3) liver, (4) stomach, (5) kidneys.
166. Prophase, Metaphase, Anaphase, and Telophase are stages in the process of (1) metabolism, (2) mitosis, (3) amitosis, (4) meiosis.
167. The locomotor system is composed of the (1) skeletal system, (2) muscular system, (3) skeletal and muscular systems.
168. In the human body, we are safe in saying that there are (1) exactly 206 bones, (2) 208 bones, (3) more than 200 bones.
169. The human skeleton shows an (1) axial skeleton, (2) appendicular skeleton, (3) axial and appendicular skeleton.
170. The only bone of the skull that moves (1) occipital, (2) frontal, (3) malar, (4) maxilla (lower jaw), (5) Maxillae (upper jaw).
171. The glands that occur more abundantly in the palms of the hands and soles of feet (1) oil, (2) sweat, (3) oil and sweat.
172. The glands that occur more abundantly in the scalp are (1) oil, (2) sweat, (3) oil and sweat glands.
173. The teeth are considered appendages of the (1) bones, (2) skin, (3) cartilage, (4) digestive system.
174. Living organisms require for metabolism (1) water and hydrogen, (2) calcium and phosphorus, (3) food and oxygen.

175. The oxidation of the carbohydrates and fats results in the release of energy. Energy derived from the oxidation of fats is (1) greater than that of carbohydrates, (2) equal to that of carbohydrates, (3) less than that of carbohydrates.
176. Most of the water is absorbed through the walls of the (1) stomach, (2) small intestine, (3) large intestine, (4) rectum.
177. The stomach enzyme which curdles milk (1) pepsin, (2) glycogen, (3) rennin, (4) mucin, (5) hydrochloric acid.
178. The substances formed in the partial digestion of the proteins (1) glycogen, (2) glycerol, (3) monosaccharides, (4) peptones.
179. The starch enters the blood in the form of sugar and is stored in the liver and muscle cells as (1) glycerol, (2) glycogen, (3) urea, (4) urine, (5) proteoses.
180. The penis and clitoris are formed from (1) connective tissue, (2) erectile tissues, (3) epithelial tissue, (4) sustentive tissue.
181. Those qualities that enable an individual to "live most" and "serve best" are emphasized in (1) biology, (2) psychology, (3) sociology, (4) health.
182. A good example of a communicable disease (1) tumor, (2) hay fever, (3) tuberculosis, (4) indigestion.
183. Health is primarily concerned with (1) preventing diseases, (2) curing disease, (3) knowledge of disease, (4) medical care.
184. The control of excessive concentration of water in the blood (1) liver, (2) pancreas, (3) kidneys, (4) skin.
185. Simple goiter is caused by malfunctioning of the (1) pituitary gland, (2) adrenal gland, (3) thyroid gland, (4) pancreas.
186. Poliomyelitis is a disease that affects the (1) digestive system, (2) circulatory system, (3) nervous system, (4) endocrine system.
187. Endocarditis is an inflammation of the lining of the (1) vagina, (2) mouth, (3) heart, (4) kidneys.
188. The body's first line of defense is the (1) lymphatic system, (2) blood, (3) mucous lining, (4) skin.
189. Heart burn indicates (1) malformation of heart, (2) digestive disturbance, (3) constipation, (4) dysteric symptoms.

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190. The health aspect of Bio-Social is designed to (1) increase one's knowledge of diseases, (2) provide for adjustments and better living, (3) prepare for medical training.
191. The health or physical examination as conducted by the college during the beginning of the fall quarter was for the purpose of (1) improving individual health, (2) detecting communicable diseases, (3) comparing the health status of students.
192. To improve individual health one should (1) study the history of diseases, (2) be familiar with the sources of diseases, (3) put into practice scientific health principles.
193. The practical method to relieve common constipation is to (1) take a laxative, (2) eat bulky foods, (3) go to bed.
194. Health may be defined as (1) sickness and disease, (2) a feeling of personal worth, (3) a state or condition of the body at any given time.
195. In order for an individual to benefit from health knowledge, he should (1) learn as many health facts as possible, (2) try to avoid contact with people suffering with contagious diseases, (3) learn as many health facts as possible and put this acquired knowledge into practice.
196. Pleurisy is the (1) inflammation of the lungs, (2) inflammation of the membrane covering the lungs, (3) inflammation of bronchi.
197. Scurvy is a disease caused by deficiency of (1) vitamin A, (2) vitamin B, (3) vitamin C, (4) vitamin D.
198. A disease of children characterized by softening of the bones, growth failure, and convulsions (1) St. Vitus's Dance, (2) scurvy, (3) pellagra (4) rickets.
199. Long standing may cause (1) strokes, (2) softness of bones, (3) varicose veins.
200. Continuous use of laxatives causes (1) constipation, (2) inactivity of intestines, (3) diarrhea.
201. Stomatitis indicates an inflammation of the (1) mouth, (2) tongue, (3) gums, (4) salivary glands.
202. Glossitis indicates an inflammation of the (1) mouth, (2) tongue, (3) gums, (4) salivary glands.
203. Gingivitis indicates an inflammation of the (1) mouth, (2) tongue, (3) gums, (4) salivary glands.

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204. Too much (1) starch, (2) proteins, (3) fats will over work the kidneys.
205. The brain immediately liquifies when (1) it cannot get sufficient food, (2) it is exposed to air, (3) too much water is present in the blood, (4) too much carbon dioxide is present in the blood.
206. Tuberculosis is (1) due to colds, (2) inherited, (3) due to degeneration of body, (4) contracted by germs.
207. Improper disposal of excreta may cause the spread of (1) measles, (2) hookworm, (3) common cold, (4) mumps.
208. Carbuncles are acute infection found in the (1) respiratory system, (2) skeletal system, (3) digestive, (4) integumentary.
209. Anemia is an abnormality in which there is a reduction in (1) red corpuscles, (2) white corpuscles, (3) blood platlets.
210. Arteriosclerosis is the (1) rupturing of arteries, (2) stretching of arteries, (3) hardening of arteries, (4) softening of arteries.
211. Man's chief concern in life is (1) the universe, (2) man, (3) each living organism.
212. A state of disequilibrium of the organism which sets up activity or motivation constitutes (1) instinct, (2) drive, (3) wish.
213. One measure for identifying an abnormal person (1) emotional stability, (2) well-adjusted personality, (3) intellectual deficiency.
214. Causes for abnormal behavior are (1) hereditary, (2) environmental, (3) hereditary and environmental, (4) neither hereditary or environmental.
215. The need for food will result in immediate activities when (1) food can be secured with little effort, (2) food is not immediately available, (3) there is emotional instability.
216. The behavior can be observed with the greatest accuracy (1) of an individual, (2) of a small group, (3) of a large group.
217. When man is born, he immediately (1) adapts himself to his environment, (2) is dependent upon someone for an extended period, (3) becomes a human being.
218. A study of human behavior reveals that one common goal for which man strives is (1) to get rich, (2) association with other people, (3) to get married, (4) to rear a family.

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219. The chief function of consciousness seems to select the most powerful need for gratification and (1) to distribute sensory impulses, (2) to integrate motor responses, (3) to effect awareness.
220. An individual witnessing two needs of different strengths his behavior will be determined by (1) both needs, (2) the stronger need, (3) the weaker need, (4) neither need, a new need arises.
221. The study of human nature and culture is a major part of the science of (1) health, (2) biology, (3) psychology, (4) sociology.
222. At birth and by biological inheritance, the individual has certain physical characteristics and potentialities and also (1) personality, (2) character, (3) human nature, (4) membership in group life.
223. A product of group life is (1) social adjustment, (2) social adaptation, (3) social heritage--culture.
224. A body of customary behavior is looked upon as (1) morally right or wrong, (2) being correct at all times, (3) being incorrect at all times.
225. Keeping in the background on social occasions, suffering from stage fright, having feelings easily hurt, and blushing are considered characteristics of (1) introversion, (2) extroversion, (3) ambiversion.
226. The first reaction of a hungry animal depends upon (1) his personal likes or dislikes, (2) the nature of the environment, (3) hereditary factors.
227. The direction in which one's major efforts will be exerted is determined largely by (1) parental suggestions, (2) what friends do, (3) one's own interest.
228. Civilization may be defined as (1) man's physical development, (2) man's mental development, (3) man's cultural development.
229. Material evidence of civilization may be revealed through (1) scientific investigations, (2) analysis of fossils, (3) observations of our own surroundings.
230. Intelligence may be defined as the (1) way an individual acts, (2) capacity to learn, (3) way one thinks.
231. It would be correct to say that the environment is (1) the home one lives in, (2) the community one lives in, (3) the external influences within which one lives.

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232. Acquired tendencies to act in specific ways are (1) instincts, (2) drives, (3) habits.
233. Progress is a (1) change in direction, (2) change in position, (3) change in position with respect to a goal, (4) change in position in direction toward a goal.
234. Religion may be considered (1) a spirit, (2) a body of beliefs, (3) based on scientific reasoning.
235. A man is human when (1) he is born, (2) he reaches adulthood, (3) he has finished the public school, (4) he learns his cultural habits.
236. Culture began (1) with the origin of life, (2) with the origin of man, (3) when man learned to express himself, (4) when man learned to live together.
237. A society has (1) less duration than, (2) greater duration than, (3) same duration as any of its members.
238. An outstanding characteristic of man's relation to society is (1) his dependence upon it, (2) his contribution to it, (3) his achieved status within.
239. The origin of society was based upon (1) the need for food, (2) the need for sex, (3) both of these, (4) neither of these.
240. Social living (1) is necessary for human existence, (2) is not necessary for human existence, (3) may or may not be necessary for human existence.
241. During infancy and childhood we are completely and directly dependent upon (1) our physical environment, (2) the people in our social environment, (3) the people in our government.
242. The type of behavior most common to man, as well as other animals, is (1) sexual relationships at any time, (2) finding and eating food, (3) taking care of offspring.
243. Human nature is another one of our cultural explanations of (1) natural forces, (2) human behavior, (3) natural balance.
244. The directing of one's interests exclusively or mainly to the external world and such related objectives is known as (1) overt behavior, (2) extroversion, (3) introversion.
245. A person whose attention is directed mainly inward and reflects only upon himself is known as an (1) extrovert, (2) introvert, (3) ambivert.

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246. The Film "Heart and Circulation" dealt primarily with (1) the blood, (2) the heart, (3) the veins, (4) organs and tissues of circulation.
247. The Film "Food and Nutrition" dealt with (1) digestion of foods, (2) hunger and thirst, (3) nutritional deficiencies, (4) nutritional requirements and their absorption.
248. The Film "Mechanism of breathing" dealt specifically with (1) external and internal respiration, (2) the organs of respiration and their functions, (3) diffusion of oxygen and carbon dioxide, (4) rate of oxygen consumption.
249. The Film "Work of the Kidneys" dealt with (1) excretion, (2) urine, (3) secretion, (4) the kidneys.
250. The Film "Nervous System" portrayed (1) the anatomy of the nervous system, (2) the physiology of the nervous system, (3) the physiology and anatomy of the nervous system.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Winter Quarter Final Examination

Science 132, W. Q. 1955

DIRECTIONS: Select the number of the correct answer for each item and mark the corresponding number on the answer sheet.

1. All life from life (*omne vivum ex vivo*) is a concept supporting the theory on the origin of life (1) abiogenesis, (spontaneous generation), (2) biogenesis, (3) special creation, (4) planetary, (5) cosmozoa.
2. All life from non-living matter was a concept supporting the theory on the origin of life (1) abiogenesis (spontaneous generation), (2) biogenesis, (3) special creation, (4) planetary, (5) cosmozoa.
3. All life brought to earth from some other part of the universe was a concept supporting the theory on the origin of life on earth (1) abiogenesis, (2) biogenesis, (3) special creation, (4) planetary, (5) cosmozoa.
4. Each species of animal was specially created is a concept supporting the theory on the origin of life (1) abiogenesis, (2) biogenesis, (3) special creation, (4) planetary, (5) cosmozoa.
5. The concept on which Science 132 is based supports the theory (1) abiogenesis, (2) biogenesis, (3) special creation, (4) planetary, (5) cosmozoa.
6. Reproduction by means of sexual cells (egg and sperm) is (1) asexual, (2) sexual, (3) budding, (4) spore formation, (5) fission.
7. Reproduction without sexual cells (egg and sperm) (1) asexual, (2) sexual, (3) budding, (4) spore formation, (5) fission.
8. When eggs develop normally without being fertilized by spermatozoa (1) paedogenesis, (2) parthenogenesis, (3) metagenesis, (4) gametogenesis, (5) eogenesis.
9. An organism with both male and female reproductive organs producing both eggs and spermatozoa (1) monocotyledonous, (2) dicotyledonous, (3) monoecious, (4) dioecious, (5) uni-sexual.
10. An organism with either male or female reproductive organs producing either eggs or spermatozoa (1) monocotyledonous, (2) dicotyledonous, (3) monoecious, (4) dioecious, (5) bi-sexual.

11. In some hermaphroditic animal species the eggs of an individual are fertilized by the spermatazoa from the same individual (1) parthenogenesis, (2) paedogenesis, (3) self-fertilization, (4) cross-fertilization, (5) metagenesis.
12. Animals that lay eggs that are hatched outside of their bodies are (1) monoecious, (2) dioecious, (3) oviparous, (4) viviparous, (5) ovoviviparous.
13. Animals that bring forth their young in an active condition following embryonic development are (1) monoecious, (2) dioecious, (3) oviparous, (4) viviparous, (5) ovoviviparous.
14. Animals that lay and hatch their eggs within their bodies are (1) monoecious, (2) dioecious, (3) oviparous, (4) viviparous, (5) ovoviviparous.
15. Two types of individuals belonging to one species where one type reproduces sexually represent (1) spermatogenesis, (2) oogenesis, (3) metagenesis, (alternation of generation), (4) gametogenesis, (5) biogenesis.
16. The process of division that terminates in the production of spermatazoa and the distribution of the chromosomes during this period is (1) abiogenesis, (2) biogenesis, (3) metagenesis, (4) oogenesis, (5) spermatogenesis.
17. The process of division that terminates in the production of eggs and the distribution of the chromosomes during this period is (1) abiogenesis, (2) biogenesis, (3) metagenesis, (4) oogenesis, (5) spermatogenesis.
18. The total number of chromosomes per cell for a particular species (1)--48, (2)--24, (3)--96, (4) haploid, (5) diploid.
19. Half of the total number of chromosomes per cell for a particular species (1)--48, (2)--24, (3)--96, (4) haploid, (5) diploid.
20. The reduction from the total number to one-half of the total number of chromosomes for a particular species (1) mitosis, (2) meiosis, (3) amitosis, (4) ameiosis, (5) symbiosis.
21. The beginning of spermatogenesis shows a division of the primordial germ cells to form many (1) spermatazoa, (2) primary spermatocytes, (3) secondary spermatocytes, (4) primary spermatogonia, (5) secondary spermatogonia.
22. In the primary spermatocyte the chromosomes unite in pairs, a process called (1) conjugation, (2) copulation, (3) symbiosis, (4) synapsis.

23. The period of multiplication is referred to as the equation division involving the process of (1) mitosis, (2) amitosis, (3) meiosis, (4) ameiosis, (5) symbiosis.
24. After the period of multiplication, the spermatogonia increase in size without dividing and thus become (1) secondary spermatogonia, (2) primary spermatocytes, (3) spermatids, (5) spermatozoa.
25. The period of growth is shown in the (1) primary spermatogonia, (2) secondary spermatogonia, (3) primary spermatocytes, (4) secondary spermatocytes, (5) spermatids.
26. The reduction division is begun in the (1) spermatogonia, (2) primary spermatocytes, (3) secondary spermatocytes, (4) spermatids, (5) spermatozoa.
27. Each primary spermatocyte divides into two (1) secondary spermatogonia, (2) secondary spermatocytes, (3) spermatids, (4) spermatozoa, (5) primary spermatogonia.
28. Each secondary spermatocyte divides into two (1) primary spermatogonia, (2) secondary spermatogonia, (3) primary spermatocytes, (4) spermatids, (5) spermatozoa.
29. One logical explanation is that duplication of chromosomes takes place during the pairing process in the primary spermatocyte, thus producing the number of chromosomes (1) in dyads, (2) in triads, (3) in tetrads, (4) one for each trait, (5) three for each trait.
30. Another logical explanation is that there is a pairing without duplication of chromosomes in the primary spermatocyte, thus producing the number of chromosomes, (2) in dyads, (2) in triads, (3) in tetrads, (4) one for each trait, (5) three for each trait.
31. Among one-celled organisms, a frequent type of reproduction is by (1) simple division or fission, (2) regeneration, (3) parthenogenesis, (4) spore formation, (5) metagenesis.
32. Among multicellular organisms reproduction may be (1) sexual, (2) asexual, (3) sexual or asexual, (4) sexual and asexual, (5) sexual and/or asexual.
33. The most important type of asexual reproduction in plants is (1) spore formation, (2) regeneration, (3) budding, (4) parthenogenesis, (5) paedogenesis.
34. Sexual reproduction involves two kinds of reproductive cells called (1) zoospores, (2) zygospores, (3) gametes, (4) spermatozoa, (5) ova.

35. Sexual reproduction predominates among (1) unicellular plants, (2) unicellular animals, (3) multicellular plants, (4) multicellular animals, (5) unicellular organisms.
36. Cell division involves the division of the (1) nucleus, (2) cytoplasm, (3) nucleus or cytoplasm, (4) nucleus and cytoplasm, (5) nucleus and/or cytoplasm.
37. Mitosis is described as occurring in a number of different phases, named in order (1) anaphase, metaphase, prophase, telophase, (2) prophase, metaphase, anaphase, telophase, (3) telophase, prophase, metaphase, anaphase.
38. The chromatin appearing as a network within the nuclear membrane (1) resting cell, (2) prophase, (3) metaphase, (4) anaphase, (5) telophase.
39. The chromatin has condensed into thread-like structures, the centrosphere has divided, astral rays appearing and the centrioles have separated (1) early prophase, (2) late prophase, (3) metaphase, (4) anaphase, (5) telophase.
40. The chromosomes have become shorter and thicker, the asters have migrated to the opposite ends of the nucleus, and the nuclear membrane has broken down (1) early prophase, (2) late prophase, (3) metaphase, (4) anaphase, (5) telophase.
41. The longitudinally split or duplicated chromosomes are arranged in an equatorial plate (1) early prophase, (2) late prophase, (3) metaphase, (4) anaphase, (5) telophase.
42. One-half of each double chromosome is moving toward either end of the cell (1) early prophase, (2) late prophase, (3) metaphase, (4) anaphase, (5) telophase.
43. The chromosomes reach the asters and begin to lose their distinctiveness, the centrioles divide, and a constriction begins to divide the cell into two (1) prophase, (2) metaphase, (3) anaphase, (4) early telophase, (5) late telophase.
44. The chromosomes approach a network in appearance, a nuclear membrane forms, the astral rays begin to disappear, and the constriction of the cell becomes deeper (1) prophase, (2) metaphase, (3) anaphase, (4) early telophase, (5) late telophase.
45. Nuclear reconstruction and division of the cell body completed (1) resting cell, (2) prophase, (3) metaphase, (4) anaphase, (5) telophase.
46. The division or segmentation of the fertilized egg is (1) cleavage, (2) blastula, (3) gastrula, (4) germ-layer formation, (5) coelom.

47. An early developmental stage in which the embryo consists of a hollow ball of cells is (1) cleavage, (2) blastula, (3) gastrula, (4) germ-layer formation, (5) coelom.
48. The outer layer of cells formed in the developmental stages of the embryo is the (1) ectoderm, (2) entoderm, (3) mesoderm, (4) endoplasm, (5) mesoplasm.
49. The inner layer of cells formed during the developmental stages of the embryo is the (1) ectoderm, (2) entoderm, (3) mesoderm, (4) ectoplasm, (5) mesoplasm.
50. The middle layer of cells formed during the developmental stages of the embryo is the (1) ectoderm, (2) entoderm, (3) mesoderm, (4) ectoplasm, (5) endoplasm.
51. Animals with two primary or germ-layers are (1) blastodermic, (2) gastrodermic, (3) diploblastic, (4) triploblastic.
52. Animals with three primary or germ-layers are (1) blastodermic, (2) gastrodermic, (3) diploblastic, (4) triploblastic.
53. The cavity in the mesoderm lined by an epithelium into which develop the reproductive organs is called (1) blastocoele, (2) enteron, (3) archenteron, (4) coelom, (5) graafian follicle.
54. In embryonic development the ectoderm layers supply cells for the formation of the (1) digestive tract and internal organs, (2) skin, gonads and nervous system, (3) skeleton including bones and muscles.
55. In embryonic development the entoderm layers supply cells for the formation of the (1) digestive tract and internal organs, (2) skin, gonads and nervous system, (3) skeleton including bones and muscles.
56. In embryonic development the mesoderm layers supply cells for the formation of the (1) digestive tract and internal organs, (2) skin, gonads and nervous system, (3) skeleton including bones and muscles.
57. When two cells replace one cell in a multicellular organism, the process is called (1) mitosis, (2) amitosis, (3) fission, (4) binary fission, (5) meiosis.
58. When two unicellular organisms replace one unicellular organism, the process is called (1) mitosis, (2) amitosis, (3) fission, (4) binary fission, (5) meiosis.
59. When a unicellular organism is replaced by two organisms of unequal sizes which may remain attached, this process is called (1) mitosis, (2) amitosis, (3) fission, (4) sporulation, (5) budding.

60. When a multicellular organism develops a lump of cells which tend to shape themselves similar to parent and begin to enlarge, this process is called (1) mitosis, (2) amitosis, (3) fission, (4) sporulation, (5) budding.
61. Thallophytes are the more primitive plants which do not have vascular tissues nor (1) possess cellular structures, (2) form embryos during development, (3) carry on the process of metabolism, (4) use oxygen in respiration, (5) excrete waste.
62. An important factor used in classifying thallophytes for this course was (1) number of cells, (2) size, (3) habitat, (4) mode of reproduction, (5) behavior.
63. All of the thallophytes reproduce sexually at some time in their life cycle except the blue-green algae and possibly (1) some of the bacteria, (2) most of the molds, (3) most of the remaining algae, (4) all parasitic fungi, (5) all saprophytic fungi.
64. The landmarks which serve to divide the life cycle of a plant into two phases are the union of gametes and (1) fertilization, (2) sporulation, (3) germination, (4) copulation, (5) alternation of generation.
65. The phase characterized by diploid cells is the one extending from fertilization to the formation of (1) sporangia, (2) zygote, (3) embryo, (4) spore mother cells, (5) spores.
66. The phase characterized by haploid cells is the one terminating with fertilization and beginning with the formation of (1) sporangia, (2) zygote, (3) embryo, (4) spore mother cells, (5) spores.
67. In many algae and some fungi, only the zygote is a diploid cell and the haploid phase may be one-celled or many-celled which requires the zygote nucleus to divide by (1) mitosis, (2) amitosis, (3) meiosis, (4) direct cell division, (5) indirect cell division.
68. All the higher plants and some algae and fungi have a life-cycle which results in the daughter cells having the same number of chromosomes as the parent cell requiring the zygote and cells derived from it to divide by (1) mitosis, (2) amitosis, (3) meiosis, (4) direct cell division, (4) indirect cell division, (5) indirect cell division.
69. The higher plants and some algae and fungi will produce haploid spores which in turn will produce a many-celled haploid generation by (1) mitosis, (2) amitosis, (3) meiosis, (4) direct cell division, (5) indirect cell division.

70. The haploid generation completes the life cycle by producing (1) gametes which unite to form the zygote, (2) spores which form the zygospore, (3) spores which develop into the zoospore, (4) spore mother cells which develop into spores, (5) sporangia.
71. The spore-producing generation is called the sporophyte and is (1) haploid, (2) diploid, (3) haploid and diploid, (4) haploid or diploid, (5) haploid and/or diploid.
72. The gamete-producing generation is called the gametophyte and is (1) haploid, (2) diploid, (3) haploid and diploid, (4) haploid or diploid, (5) haploid and/or diploid.
73. Plants generally have a life-cycle characterized by an alternation of generations, a gamete-producing generation alternating with a spore-producing generation or a (1) haploid alternating with a diploid, (2) diploid alternating with a haploid, (3) either, (4) both.
74. According to the order in the differentiation of gametes, the following thallophytes are in a logical sequence: (1) spirogyra, ulothrix, oedogonium, (2) ulothrix, oedogonium, spirogyra, (3) oedogonium, spirogyra, ulothrix, (4) spirogyra, oedogonium, ulothrix, (5) ulothrix, spirogyra, oedogonium.
75. According to the order in the differentiation of cells, the following thallophytes are in a logical sequence: (1) spirogyra, ulothrix, oedogonium, (2) ulothrix, oedogonium, spirogyra, (3) oedogonium, spirogyra, ulothrix, (4) spirogyra, oedogonium, ulothrix, (5) ulothrix, spirogyra, oedogonium.
76. The protococcus is a thallophyte and (1) an alga, (2) a fungus, (3) an alga and/or fungus, (4) parasitic fungus, (5) saprophytic fungus.
77. The protococcus may reproduce by (1) budding, (2) fission, (3) alternation of generations, (4) isogametes, (5) heterogametes.
78. The protococcus may also reproduce by (1) conjugation, (2) gametes, (3) sporulation, (4) direct cell division, (5) indirect cell division.
79. The spirogyra is a thallophyte and (1) an alga, (2) a fungus, (3) an alga and/or fungus, (4) parasitic fungus, (5) saprophytic fungus.
80. The spirogyra may reproduce by (1) spores, (2) zoospores, (3) budding, (4) cell division, (5) sporulation.
81. The spirogyra may also reproduce by (1) heterogametes, (2) male and female gametes, (3) conjugation, (4) copulation.

82. The ulothrix, a thallophyte, reproduces asexually by means of (1) zoospores, (2) zygospores, (3) spores, (4) isogametes, (5) heterogametes.
83. The ulothrix reproduces sexually by means of (1) spores, (2) zoospores, (3) zygospores, (4) isogametes, (5) heterogametes.
84. Any cell of the ulothrix with the exception of the holdfast cell may produce (1) spores, (2) zoospores, (3) zygospores, (4) gametes, (5) heterogametes.
85. The asexual structures produced by the ulothrix each having four flagella and an eyespot are (1) zoospores, (2) zygospores, (3) spores, (4) isogametes, (5) heterogametes.
86. The asexual structures produced by the ulothrix each having four flagella and an eyespot differ from plant structures, since they lack (1) a cell membrane, (2) a cell wall, (3) chlorophyll, (4) nucleus, (5) chromosomes.
87. The structures of sexual reproduction in the ulothrix each having two flagella and an eyespot are (1) gametes, (2) isogametes, (3) heterogametes, (4) zoospores, (5) zygospores.
88. The sexual and asexual structures of reproduction in the ulothrix differ thus (1) eyespot, (2) method of locomotion, (3) number of flagella, (4) cell wall, (5) cell membrane.
89. The sexual and asexual structures of reproduction in the ulothrix differ thus (1) ability to divide, (2) ability to swim, (3) ability to absorb food material, (4) ability to move freely.
90. The germination of the zygospore in the ulothrix produces (1) a zygote, (2) zygospores, (3) zoospores, (4) isogametes, (5) heterogametes.
91. When the zygote in sexual reproduction of the ulothrix forms a resistant cell wall, it becomes a (1) gamete, (2) isogamete, (3) spore, (4) zoospore, (5) zygospore.
92. Asexual reproduction in the oedogonium occurs by means of (1) spores, (2) zoospores, (3) zygospores, (4) isogametes, (5) heterogametes.
93. The production of the asexual structures in the oedogonium causes the entire protoplast to (1) shrink in size, (2) increase in size, (3) shrink or increase in size, (4) remain the same size.
94. The production of the asexual structures in the ulothrix causes the entire protoplast of a cell to (1) shrink, (2) increase in size, (3) shrink or increase in size, (4) remain the same in size.

95. The asexual structures of reproduction in the oedogonium develop means of locomotion (1) pseudopodia, (2) flagella, (3) cilia, (4) tail.
96. The asexual structures of the ulothrix and oedogonium differ (1) in possessing a cell wall, (2) in the type of locomotive structures, (3) in the ability to swim, (4) in developing a holdfast.
97. The sexual structures of the oedogonium are (1) gametes, (2) isogametes, (3) heterogametes, (4) zygospore, (5) zoospore.
98. The male sexual and the asexual structures of the oedogonium are similar except for (1) structures of locomotion, (2) cell wall, (3) size, (4) cell membrane.
99. The male and female sexual structures of the oedogonium are similar since both are produced by (1) antheridia, (2) oogonium, (3) special modified filament cells, (4) same filament cells.
100. The sexual reproductive processes of both the ulothrix and the oedogonium involve the development of (1) isogametes, (2) heterogametes, (3) spores, (4) zygospores.
101. The sexual and asexual reproductive processes of both the ulothrix and the oedogonium involve the development of (1) gametes, (2) zoospores, (3) zygospores, (4) isogametes, (5) heterogametes.
102. The bread mold, a thallophyte, is (1) an alga, (2) a parasitic fungus, (3) a saprophytic fungus, (4) a chloroplast.
103. The bread mold may reproduce by (1) fission, (2) cell division, (3) spore formation, (4) zoospore.
104. The bread mold may also reproduce by (1) isogametes, (2) heterogametes, (3) conjugation, (4) copulation.
105. The sexual process of the bread mold produces (1) a zoospore, (2) zygospore, (3) sporangium, (4) spore.
106. The mushroom, a thallophyte, is (1) an alga, (2) a parasitic fungus, (3) a saprophytic fungus, (4) a chloroplast.
107. The mushroom may reproduce by (1) fission, (2) spores, (3) zoospores, (4) cell division.
108. The mushroom may reproduce by producing (1) heterogametes, (2) a zygote nucleus, (3) a zygospore, (4) zoospores.

109. The spirogyra reproduces by (1) fission, (2) spore formation, (3) cell division, (4) zoospores.
110. The spirogyra reproduces by (1) gametes, (2) isogametes, (3) conjugation, (4) copulation.
111. The yeast is a thallophyte and reproduces by (1) gametes, (2) zoospores, (3) budding, (4) conjugation.
112. The yeast may also reproduce by (1) sporulation, (2) isogametes, (3) heterogametes, (4) copulation.
113. The penicillium usually reproduces by (1) gametes, (2) isogametes, (3) spores, (4) zoospores.
114. Bacteria reproduce by (1) gametes, (2) conjugation, (3) fission.
115. The gametophyte asexual reproduction of the marchantia is by (1) spore formation, (2) budding, (3) zoospores, (4) zygospores.
116. The gametophyte sexual reproduction of the marchantia is by (1) isogametes, (2) heterogametes, (3) zoospores, (4) zygospores.
117. The sporophyte asexual reproduction of the marchantia is by (1) budding, (2) spores, (3) fission, (4) indirect cell division.
118. The reproductive cycle of the marchantia is (1) sexual, (2) asexual, (3) sexual and/or asexual, (4) alternation of generations.
119. The male reproductive organs of the marchantia are the (1) antheridia, (2) archegonia, (3) oogonia, (4) spermatogonia.
120. The female reproductive organs of the marchantia are the (1) antheridia, (2) archegonia, (3) oogonia, (4) spermatogonia.
121. The life-cycle of the liverwort is composed of (1) a gametophyte generation, (2) a sporophyte generation, (3) alternation of generations, (4) sexual or asexual, (5) sexual and/or asexual.
122. In the life-cycle of the liverwort, the spore produces the (1) gametophyte, (2) sporophyte, (3) young gametophyte, (4) young sporophyte, (5) none of these.
123. The male receptacles of the liverwort produce certain structures each of which in turn produces many sperms, the certain structures are (1) spore-mother cells, (2) antheridia, (3) archegonia, (4) oogonia, (5) spermatozoa.

124. The female receptacles of the liverwort produce certain structures each of which in turn produces a single egg, the certain structures are (1) spore-mother cells, (2) antheridia, (3) archegonia, (4) co-gonia, (5) ova.
125. Fertilization of the liverwort takes place in the (1) female gametophyte, (2) female receptacle, (3) oogonium, (4) archegonium.
126. The zygote of the liverwort produces the (1) spores, (2) sporophyte, (3) gametes, (4) gametophyte.
127. Spore germination of the moss produces (1) a protonema, (2) buds, (3) leafy plants, (4) antheridia or archegonia, (5) sperms or eggs.
128. The zygote of the moss develops into (1) a capsule, (2) spore mother cells, (3) protonemas, (4) gametophytes, (5) embryo aporophytes.
129. Spore germination in the fern produces (1) a prothallium, (2) archegonia, (3) antheridia, (4) eggs, (5) sperms.
130. The sporophyte fern produces (1) spores, (2) spore-mother cells, (3) sporangia, (4) prothallium, (5) archegonia and antheridia.
131. The female gametophyte is also known as (1) pollen tube, (2) microspore, (3) pollen grain, (4) embryo sac, (5) generative cell.
132. The male gametophyte is also known as (1) pollen tube, (2) microspore, (3) sperm nucleus, (4) tube nucleus, (5) generative cell.
133. The fertilization process of lowering plants begins after the pollen tube reaches the ovule, enters by the way of the micropyle, and passes through the megasporangium to the gametophyte: (1) a sperm nucleus fuses with the egg nucleus, (2) a single endosperm nucleus is formed, (3) a zygote is formed, (4) the sperm nuclei are discharged from pollen tube, (5) none of these.
134. The structures produced by the ovule of flowering plants are (1) microspores, (2) megaspores, (3) pollen grain, (4) pollen tube, (5) microspore mother cell.
135. The plant bearing the flowers in the (1) gametophyte, (2) sporophyte, (3) gametophyte and sporophyte, (4) gametophyte and/or sporophyte.
136. The two problems, cross fertilization and dispersal, are simplified in the algae since they (1) contain chlorophyll, (2) manufacture their own food, (3) are green in color, (4) live in water.
137. Fertilization is facilitated in the ulothrix by (1) two separate generations, (2) sperm cells, (3) gametes, (4) spores.

136. Fertilization is facilitated in the oedogonium by (1) two separate generations, (2) sperm cells, (3) gametes, (4) spores.
139. Land plants such as the mosses and ferns, the gametophyte provides for (1) sexual reproduction, (2) asexual reproduction, (3) cross fertilization, (4) distribution, (5) sexual reproduction including cross fertilization.
140. Land plants such as the mosses and ferns, the sporophyte provides for (1) sexual reproduction, (2) asexual reproduction, (3) cross fertilization, (4) distribution, (5) distribution including asexual reproduction.
141. The nuclear changes in mosses and liverworts are similar to those in the fern (1) the gametophyte generation is diploid and the sporophyte generation is haploid, (2) the gametophyte generation is haploid and the sporophyte generation is diploid, (3) the gametophyte and the sporophyte generations are diploid, (4) the gametophyte and sporophyte generations are haploid, (5) the gametophyte and sporophyte generations are haploid and/or diploid.
142. Meiosis in the plants reproducing by alternation of generation occurs when (1) the sporophyte produces sporangia, (2) the sporangia produce spore-mother cells, (3) the spore mother cells form spores, (4) the spores form young gametophyte, (5) the gametes fuse to form zygotes.
143. The nuclei of the cells of the gametophyte and of the gametes are (1) haploid, (2) diploid, (3) haploid and diploid respectively, (4) diploid and haploid respectively, (5) haploid or diploid.
144. The nuclei of all the cells of the sporophyte, including the spore mother cells, are (1) haploid, (2) diploid, (3) haploid and diploid respectively, (4) diploid and haploid respectively, (5) haploid or diploid.
145. Two nuclear divisions accompanied by only one division of the chromosomes (1) mitosis, (2) amitosis, (3) meiosis, (4) equational division.
146. The evolution of the sporophyte shows in the marchantia (1) spores supported entirely by the gametophyte, (2) spores developed within a capsule (sporangium) supported by a stalk, (3) an independent plant possessing a stem, leaves, and roots, (4) spores are borne on special leaves, (5) retrogression of the gametophyte to minute dependent plants.
147. The evolution of the sporophyte shows in the moss (1) a ball of spore mother cells supported entirely by the gametophyte, (2) spores developed within a capsule (sporangium) supported by a stalk, (3) an

- independent plant possessing stem, leaves, and roots, (4) spores are borne on special leaves, (5) retrogression of the gametophyte to minute dependent plants.
148. The evolution of the sporophyte shows in the fern (1) a ball of spore mother cells supported entirely by the gametophyte, (2) spores developed within a capsule (sporangium) supported by a stalk, (3) an independent plant possessing a stem, leaves, and roots, (4) spores are borne on special leaves, (5) retrogression of the gametophyte to minute dependent plants.
149. The evolution of the sporophyte shows in the seed-bearing plants (1) a ball of spore mother cells supported entirely by the gametophyte, (2) spores developed within a capsule (sporangium) supported by a stalk, (3) an independent plant possessing a stem, leaves, and roots, (4) spores are borne on special leaves, (5) retrogression of the gametophyte to minute dependent plants.
150. The evolution of the sporophyte has been accompanied by a corresponding (1) evolution of the gametophyte, (2) retrogression of the gametophyte, (3) more conspicuous gametophyte.
151. The amoebas reproduce by (1) fission, (2) binary fission, (3) budding, (4) sporulation, (5) conjugation.
152. *Endamoeba gingivitis* and *endamoeba histolytica* are protozoa similar to the amoeba proteus and are found to be parasitic in man and many other animals causing in man, respectively (1) pyorrhea and dysentery, (2) dysentery and pyorrhea, (3) stomatitis and stenosis, (4) stenosis and stomatitis, (5) ulcers and tumors.
153. The euglena reproduces by (1) fission, (2) binary fission, (3) longitudinal binary fission, (4) transverse binary fission.
154. The volvox reproduces (1) sexually, (2) asexually, (3) sexually and asexually.
155. The *trypanosoma gambiense* is a parasite in man causing (1) malaria fever, (2) sleeping sickness, (3) dysentery, (4) poliomyelitis.
156. The *trypanosoma* is transmitted from one mammalian host to another by the (1) anopheles mosquito, (2) female anopheles mosquito, (3) tsetse fly, (4) earthworm, (5) snail.
157. The *trypanosoma* reproduces in the blood of its host by (1) fission, (2) transverse division, (3) longitudinal division.
158. In order to cause the disease in man the *trypanosoma* must work its way into the (1) digestive system, (2) respiratory system, (3) circulatory system, (4) nervous system, (5) muscular system.

159. The paramecium reproduces asexually by (1) fission, (2) binary fission, (3) longitudinal binary fission, (4) transverse binary fission, (5) budding.
160. The paramecium reproduces sexually by (1) endomixis, (2) conjugation, (3) isogametes, (4) heterogametes.
161. The plasmodium vivax causes (1) sleeping sickness, (2) dysentery, (3) malaria fever, (4) pyorrhea, (5) athlete's foot.
162. The plasmodium reproduces asexually in the (1) red blood cells of man, (2) blood plasma of man, (3) salivary glands of man, (4) stomach of man, (5) digestive tract of man.
163. The plasmodium reproduces sexually in the transmitting hosts' (1) blood system, (2) stomach, (3) salivary glands, (4) mouth.
164. Fertilization in the sexual process of the plasmodium takes place in the transmitting hosts' (1) blood system, (2) stomach, (3) salivary glands, (4) mouth.
165. The male and female gametocytes of the plasmodium are transformed into male and female gametes (ova and spermatozoa) during a process of maturation while they are within the transmitting hosts' (1) blood system, (2) stomach, (3) salivary glands, (4) mouth.
166. The sporozoites of the plasmodium are found in the (1) blood of the transmitting hosts, (2) red blood cells of man, (3) stomach of transmitting hosts.
167. The trophozoite of the plasmodium is found in the (1) red blood cell of man, (2) red blood cells of transmitting hosts, (3) stomach of transmitting hosts, (4) blood plasma of man.
168. The merozoites of the plasmodium are found in the (1) red blood cells of man, (2) blood plasma of man, (3) salivary glands of transmitting hosts, (4) stomach of transmitting hosts.
169. The cycle which produces the symptoms rather acutely is from (1) sporozoite to sporozoite, (2) trophozoites to trophozoites, (3) merozoites to merozoites, (4) gametocyte to gametocyte.
170. The obelia colony reproduces asexually by (1) fission, (2) budding, (3) spore formation.
171. The sexual method of the obelia is by (1) isogametes, (2) conjugation, (3) sperm and eggs.
172. The sexual method of the aurelia is by (1) isogametes, (2) conjugation, (3) sperm and eggs.

173. Metagenesis (alternation of generations) occurs in the coelenterates, when present (1) the medusa stage is sexual and the polyp stage is asexual, (2) the medusa stage is asexual while the polyp stage is sexual, (3) the medusa and polyp stages are sexual, (4) the medusa and polyp stages are asexual.
174. In the hydra, however, there is no alternation of generations: (1) sexual reproduction occurs in the polyp stage, (2) asexual reproduction occurs in the polyp, (3) sexual and asexual reproduction occur in the polyp stage, (4) sexual and asexual reproduction occur in the medusa stage.
175. In obelia there is a typical alternation of generations: (1) the colony representing the sexual generation and the medusa the asexual generation, (2) the colony representing the asexual generation and the medusa the sexual, (3) the colony representing both sexual and asexual generations, (4) the medusa representing both the sexual and asexual.
176. In the aurelia the large and conspicuous stage is the medusa: (1) the asexual stage is conspicuous, (2) the sexual stage is conspicuous, (3) the sexual and asexual stages are both conspicuous, (4) the sexual stage is conspicuous and the asexual stage is reduced.
177. In the coelenterates, when an alternation of generations occurs (1) the cells of the sporophyte stage or generation are diploid, (2) the cells of the gametophyte stage or generation are haploid, (3) the cells of the sporophyte are haploid, the gametophyte diploid, (4) the individuals of both generations have the diploid number of chromosomes.
178. The reduction from diploid to haploid in the coelenterates occurs (1) during spore formation, (2) during the formation of gametes, (3) during the formation of spores and gametes.
179. In plants, when alternation of generations occurs: (1) the cells of the sporophyte are diploid, (2) the cells of the gametophyte are diploid, (3) the cells of the sporophyte are diploid, the gametophyte haploid, (4) the cells of both generation are diploid.
180. In plants, when alternation of generations occurs reduction from diploid to haploid takes place (1) during spore formation, (2) during the formation of gametes, (3) during the formation of spores and gametes.
181. The planarians reproduce sexually by means of (1) isogametes, (2) conjugation, (3) male and female gametes.
182. As a rule, the planarians' sexual process involves (1) self-fertilization, (2) cross-fertilization, (3) parthenogenesis.

183. The planarians are (1) viviparous, (2) oviparous, (3) ovoviviparous.
184. The liver fluke (*fasciola hepatica*) is a parasite and may be found as an adult in certain mammals including man (1) in the small intestines, (2) in the bladder, (3) in the blood system, (4) in the bile ducts of the liver, (5) in the gall bladder.
185. The tapeworm (*Taenia colium*) is a parasite in certain mammals including man reaching the adult stage in the (1) intestines, (2) bile ducts of the liver, (3) muscular tissue, (4) kidneys.
186. The sexual reproduction of the tapeworm is by (1) isogametes, (2) conjugation, (3) heterogametes, (4) none of these.
187. A man infected with a single tapeworm may expel daily (1) several ripe proglottids each containing thousands of eggs, (2) bladderlike structures known as "bladder worms," (3) several mature sperm cells to aid in the fertilization process.
188. Parasites attached to external surface of hosts (1) ectoparasites, (2) endoparasites, (3) tissue parasites, (4) none of these.
189. Parasites occurring inside in body cavities (1) ectoparasites, (2) endoparasites, (3) tissue parasites, (4) none of these.
190. Parasites require for their life-cycle (1) one host, (2) two hosts, (3) three hosts, (4) one, two, or three hosts.
191. The host-parasite relationship (1) requires adaptation of parasite to the environment afforded by host, (2) requires a simple reproductive system, (3) requires a well-developed bodily system.
192. The hosts serving the adult parasites in which sexual reproduction occurs (1) reproduction hosts, (2) final hosts, (3) intermediate hosts, (4) beginning hosts.
193. The ascaris is a parasite in certain mammals including man and are found in the (1) liver, (2) intestines, (3) blood, (4) kidneys.
194. When the eggs of the ascaris are swallowed by the host (1) they penetrate the mucous membrane, (2) they are carried by the blood stream to the liver, (3) they are carried by the blood stream to the heart, (4) they are carried by the blood stream to the lungs, (5) the embryos hatch in the small intestine.
195. The trichina worm is a parasite to which man is host causing a muscular disease called (1) necrosis, (2) tremor, (3) trichinosis, (4) trichininitis.
196. Man becomes infected by eating raw meat containing (1) eggs of the worm, (2) encysted larvae of the worm, (3) adult worms.

197. After man eats infected meat with *trichina* worms (1) they mature and the adults mate, (2) the larvae come out of their cysts in the intestine, (3) the minute larvae are carried all over the body in the blood stream, (4) the larvae enter the fibers of the striated muscles (diaphragm, chest, and tongue).
198. The earthworm is hermaphroditic (1) self-fertilization is the rule, (2) cross-fertilization is the rule, (3) parthenogenesis is the rule.
199. The eggs of the grasshopper are fertilized in the (1) oviduct, (2) vagina, (3) ovipositors, (4) spermatheca.
200. The eggs of the honeybee when fertilized will be fertilized in the (1) oviduct, (2) vagina, (3) spermatheca, (4) ovarian tubules.
201. In the bee, (1) the fertilized eggs develop into male individuals, (2) the fertilized eggs develop into female individuals, (3) the fertilized eggs may develop into male and female individuals.
202. In the bee (1) the male bee determines the sex of the offspring, (2) the queen bee determines the sex of the offspring, (3) the diet determine the sex of the offspring.
203. The pouched mammals are in subclass (1) prototheria, (2) metatheria, (3) eutheria.
204. The egg laying mammals are in subclass (1) prototheria, (2) metatheria, (3) eutheria.
205. The placental mammals are in subclass (1) prototheria, (2) metatheria, (3) eutheria.
206. The duckbill is a (1) egg-laying mammal, (2) pouched mammal, (3) placental mammal.
207. The kangaroo is a (1) egg-laying mammal, (2) pouched mammal, (3) placental mammal.
208. The rabbit and monkey are (1) egg-laying mammals, (2) pouched mammals, (3) placental mammals.
209. The bat and the whale are (1) egg-laying mammals, (2) pouched mammals, (3) placental mammals.
210. Spermatozoa are discharged from the male bird to the female bird by means of the (1) copulatory organs, (2) vagina, (3) cloaca.
211. The predominant type of family found in the United States at the present time is (1) polygyny, (2) polyandry, (3) monogamy.

212. The basic way by which mates are selected here in the United States is by (1) purchase, (2) capture, (3) wooing.
213. The process whereby people in one country move around from place to place within that country is called (1) emigration, (2) immigration, (3) migration.
214. The process whereby people leave their established place of abode and go to another country is called (1) migration, (2) immigration, (3) emigration.
215. The process whereby people come into another country from their established place of abode is called (1) emigration, (2) immigration, (3) migration.
216. The economic state in which a person or persons find himself or themselves whereby they depend on charity for their total support with no attitude to improve the existing condition is called (1) being economically poor, (2) a state of poverty, (3) pauper.
217. The type of family which consists of a man, a woman and children is (1) economic, (2) private, (3) natural.
218. The type of family which consists of a man, woman, children and all helpers is called (1) private, (2) economic, (3) natural.
219. The type of family whereby a specified sum is paid for the upkeep of the individual at a designated time is called (1) natural, (2) economic, (3) private.
220. The type of family which is recorded each decade by an authorized member employed by the U. S. Census Bureau is called (1) natural, (2) census, (3) private, (4) economic.
221. The Negro family is characterized by a great degree of economic dependency upon (1) monthly salary, (2) weekly earning, (3) daily wages.
222. The middle and upper class Negroes have (1) none of the problems of discrimination and jim crow, (2) only those problems relating to economics and amusements, (3) all of the problems of discrimination and jim crow which the lower class Negroes have.
223. Urban families have (1) no children, (2) many children, (3) few children.
224. Due to improved scientific and technological developments the number in the home is (1) decreasing, (2) remaining unchanged, (3) increasing.
225. The number of functions performed by the family are (1) expanding, (2) in a state of transition, (3) decreasing.

226. Problems of courtship, reproduction, marriage, home and family relations are met and solved in (1) one way or another, (2) strikingly similar, (3) the same way by all groups.
227. The wide gap between infancy and maturity in humans presents (1) only problems of biological change, (2) problems of social adjustment, (3) many problems of personal and social adjustment.
228. In monogamous unions it is assumed that two individuals will indulge in the sexual act (1) will confine their sexual relations with one another throughout their life time, (2) will utilize the institutions and practices established for extra-marital relationships, (3) with a variety of partners.
229. One factor which exists between a man and woman that is idealized in our best songs, poetry, fiction and art is one of the chief psychic forces by which the human family is held together (1) love, (2) money, (3) religion.
230. The major function of a family is to (1) protect the interest of each individual and group, (2) to perpetuate the human stock, (3) to provide wholesome recreation.
231. Man ranks superior over all other types of animals because he is standing in an upright position, has the use of his hands, has a well-developed system of communication, flexible brain and (1) a superior vision, (2) a well-developed history passed down from generation to generation, (3) can think and reason.
232. The family as a group of parents and offspring existed (1) only since man has been on earth, (2) long before man made his appearance on earth, (3) only as a development of man's culture.
233. One great difference exists between the family behavior of mammals, birds and insects and that of man (1) in lower animals there is the selection of a mate, (2) in lower animals there is interaction between the male and female, (3) in lower animals are levels of control over father, mother, and children, (4) in lower animals the care of the child is performed by the mother, (5) in lower animals the family life throughout the world is much the same in any given species.
234. The reason for this difference is (1) the animal family is shaped by culture, (2) the human family is largely biological in nature, (3) the animal family is largely biological in nature and the human family is cultural, (4) none of these.
235. Monogamy and polygamy are found (1) among human societies only, (2) among a very few human societies, (3) both among the anthropoid apes and in human societies.

236. The following factors are determinants of human family patterns except this one (1) geographic environment, (2) economic conditions, (3) culture, (4) biological factors.
237. "Animal mates but man marries." This statement indicates that (1) mating is social, (2) marriage is biological, (3) mating is biological while marriage is social.
238. In primitive societies the family is of the extended type (1) being composed of both parents and their immediate offspring, (2) composed of several generations, (3) composed of parents, children and grandchildren.
239. Historical families in which the dominance of the male head whether father or grandfather over the other members was unquestioned (1) large patriarchal family, (2) small patriarchal family, (3) modern democratic family.
240. Historical families in which male dominance which gave more or less absolute control over his wife, his unmarried daughters, and his sons and their wives and children (1) large patriarchal family, (2) small patriarchal family, (3) modern democratic family.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Psychology Test

Science 133, S. Q. 1955

SELECT THE NUMBER OF THE BEST ALTERNATIVE FOR EACH ITEM AND MARK THE CORRESPONDING NUMBER ON THE ANSWER SHEET.

1. Psychology is best described as: (1) a mental science, (2) a social science, (4) a biosocial science.
2. The combined characteristic pattern of psychological processes exhibited by an individual is known as: (1) experience, (2) neurosis, (3) psychosis, (4) personality.
3. The two general divisions of psychology are: (1) heredity and environment, (2) adjustment and maladjustment, (3) experience and behavior, (4) mind and body.
4. Modern scientific psychology has established a sound basis for: (1) phrenology, (2) physiognomy, (3) graphology, (4) none of the above.
5. The claim that character may be read by analysis of facial features is termed: (1) graphology, (2) phrenology, (3) physiognomy, (4) physiology.
6. One of the chief characteristics of the scientific method is that: (1) prejudices are kept out of the observations, (2) apparatus is used, (3) information is collected without regard to its theoretical or practical value, (4) a theory must result.
7. The method usually employed in the study of patients with mental or behavioral disturbances is: (1) experimentation, (2) naturalistic observation, (3) the clinical procedure, (4) the statistical method.
8. In the experimental method one of the many conditions in a situation is changed, and the effect noted on some: (1) independent variable, (2) dependent variable, (3) external stimulus, (4) internal stimulus.
9. The method whose special function is to interpret facts rather than to discover them is: (1) naturalistic observation, (2) the clinical method, (3) the experimental method, (4) the statistical method.
10. The data of psychology are: (1) always quantitative, (2) independent of the other sciences, (3) consistent with the data of all other sciences, (4) derived from common sense.
11. Physiology and psychology are similar in: (1) subject-matter content, (2) methods of observation, (3) reliance upon philosophy, (4) subject-matter difficulty.

12. The problem of how the individual adjusts to his environment is:
(1) a problem of philosophy rather than of psychology, (2) confined to the analysis of consciousness, (3) related to questions about the learning process, (4) meaningless.
13. In diagnosing and treating a problem child the method employed is the
(1) experimental, (2) statistical, (3) naturalistic, (4) clinical.
14. The term "mind" is best used to refer to: (1) soul, (2) behavior of an organism, (3) only consciousness, (4) that behavior which is observable.
15. Psychology is best defined as the science of: (1) personality and its disorders, (2) consciousness, (3) experience and behavior, (4) intelligence testing.
16. The three basic response systems of the human organism are: (1) response, locomotion, and prehension, (2) receptors, effectors, and conductors, (3) legs, hands, and language mechanisms, (4) cerebellum, cerebrum, and spinal cord.
17. Psychological development from ameoba to man is characterized by:
(1) specialization and centralization of functions, (2) maturation and activity of functions, (3) relative increase in size of olfactory bulbs, (4) an increased dependence upon hereditary versus environmental factors.
18. Aspects of the environment which initiate responses are called: (1) receptors, (2) effectors, (3) reflexes, (4) stimuli.
19. Impulses from receptors to effectors are conducted by means of:
(1) muscles, (2) glands, (3) sense organs, (4) nerve fibers.
20. Man's ability to see what the ameoba cannot see represents a difference known as: (1) effector properties, (2) manipulation of the environment, (3) sensitivity to stimulation, (4) conduction of the effects of stimulation.
21. The path from a sense organ through the nerve center to a muscle is:
(1) a synapse, (2) a dendrite, (3) an axon, (4) a reflex arc.
22. The gray matter that lies on the surface of the cerebrum is the:
(1) cortex, (2) cerebellum, (3) brain stem, (4) thalamus.
23. Communication from the spinal cord to the effectors is provided by the:
(1) afferent neurons, (2) efferent neurons, (3) association neurons, (4) sensory nerves.
24. An unlearned and involuntary muscular or glandular response is called:
(1) a reflex, (2) an instinct, (3) a neural discharge, (4) a nervous impulse.

25. The central control mechanism for man's behavior is located in the:
(1) receptors, (2) spinal cord and brain, (3) receptors and effectors,
(4) muscles and glands.
26. The chief development in the evolution of the brain was: (1) an increase in cerebral size relative to body weight, (2) an increase in olfactory structures, (3) a decrease in areas given over to association functions, (4) an increase in the absolute size of the brain.
27. The ability to respond to the color of an object depends upon:
(1) simple brightness sensitivity, (2) the specialization of the common chemical sense, (3) the specialization of the visual receptors, (4) the development of effector organs.
28. As receptors and effectors became more specialized, the nervous system became more: (1) disorganized, (2) centralized, (3) diffused, (4) independent of receptor and effector connections.
29. The general principle represented by the S-O-R formula is that:
(1) there is no response without a stimulus, (2) the organism is continuously active, (3) there is either a stimulus or a response, (4) the sperm and ovum reproduce.
30. Maturation refers to growth resulting from: (1) heredity, (2) evolution from lower animal species, (3) activity and exercise, (4) interacting hereditary and environmental factors.
31. Studies which attempt to hold environment constant aim to show: (1) how much difference is produced by variation in environment, (2) how much difference is produced by variation in heredity, (3) whether identical twins reared apart turn out differently, (4) that acquired characteristics are passed on by heredity.
32. The point of view expressed in this course is that human nature is:
(1) infinitely plastic material, molded by society, (2) modified, within biological limits, by learning, (3) everywhere the same, (4) sharply divided from animal nature.
33. The stimulus-response formula represents the relation between: (1) the behavior of the individual and his environment, (2) sensitivity and receptors, (3) motor behavior and effectors, (4) the brain and the nervous system.
34. The human organism is enabled to act as a unit since: (1) receptors and effectors are developed into specialized organs, (2) all the nerves lead to or from the brain or spinal cord, (3) the effects of a given stimulus are transmitted to all parts of the body, (4) the mind coordinates and directs activities of the body.

35. The hereditary mechanism is responsible for the transmission of:
(1) the I.Q., (2) the gene, (3) personality, (4) criminality.
36. Differences between individuals must be attributed to: (1) heredity, (2) environment, (3) both heredity and environment always, (4) either heredity or environment.
37. In any attempt to compensate for unequal heredity and bring everyone to as uniform a standard as possible: (1) equal environmental opportunities would have to be provided, (2) unequal environmental influences would be necessary, (3) uniform training would have to begin at an early age, (4) standards would be set at the level of average ability.
38. Suppose that you possess the genes for superior intelligence but circumstances prevent you from getting an education; in that case your children: (1) are likely to be below average intelligence at birth, (2) are likely to be just average in intelligence at birth, (3) are likely to be above average intelligence at birth, (4) will probably be just as good in school as those from homes with educated parents.
39. Growth from maturation differs from growth from exercise in that: (1) maturation applies to the enlargement of existing fibers, (2) maturation applies to the increase in number of cells, (3) maturation applies to the process of cell degeneration, (4) maturation is over in most children by the age of ten years.
40. If tallness were dominant, a cross between Tt and Tt would produce:
(1) two tall to one short, (2) all tall, (3) three tall to one short, (4) all short.
41. As between identical twins, any difference found in intelligence must be attributed to: (1) differences in heredity, (2) differences in environment, (3) differences in both heredity and environment, (4) faulty tests.
42. The ability to respond to weak intensities of light is known as:
(1) dexterity, (2) kinesthesia, (3) auditory sensitivity, (4) visual sensitivity.
43. The chief function of the nervous system is: (1) reception, (2) locomotion, (3) manipulation, (4) conduction.
44. A nerve cell including its branches is called a: (1) photon, (2) neutron, (3) neurogram, (4) neuron.
45. The postnatal environment is identical for: (1) all human beings, (2) brothers and sisters, (3) identical twins, (4) no two persons.

46. The fact that for one person a sister means someone to protect, and for another someone to fight, illustrates the difficulty involved in:
 (1) holding heredity constant, (2) holding environment constant,
 (3) varying heredity, (4) varying environment.
47. A stimulus: (1) is any energy change, (2) incites the organism, (3) is transmitted along the nerve, (4) affects all receptors in the same way.
48. The effector mechanism consists of: (1) Muscles and motor end plates, (2) Axons and dendrites, (3) muscles and glands, (4) striped and smooth muscles.
49. The mechanism of heredity is: (1) demonstrated by resemblance to parents, (2) modified by acquired habits, (3) not operative after conception, (4) carried by the germ plasm.
50. Personal motives may be best understood by: (1) tracing their physiological origins, (2) studying different cultures, (3) studying individual cases, (4) experimentation on animals.
51. Success tends to raise, and failure to lower: (1) the level of aspirations, (2) the level of performance, (3) the intelligence quotient, (4) the post-hypnotic suggestion.
52. The distinction between common social and personal motives lies in:
 (1) the variability of the latter, (2) the lack of a physiological basis in the latter, (3) the lack of a physiological basis in the former, (4) the greater intensity of the latter.
53. Life goals, interests, and attitudes fall under the head of: physiological drives, (2) common social motives, (3) personal motives, (4) coenotropes.
54. The study of motivation leads to the conclusion that: (1) every activity has a different motive, (2) every motive is associated with a specific activity, (3) many different activities may have a common motive, (4) physiological drives are stronger than personal motives.
55. An abnormal fear of an objectively harmless object illustrates:
 (1) force of habit, (2) functional autonomy, (3) unconscious motivation, (4) cowardliness.
56. Drug addiction: (1) may produce psychological but not physiological changes, (2) always indicates a desire to escape from reality, (3) is easily cured, (4) may result in an acquired physiological need.
57. In its effect upon the hungry child, the ice cream cone is best described as: (1) a motive, (2) a drive, (3) an instinct, (4) an incentive.

58. The problem of why we behave like human beings belongs to: (1) the psychology of motivation, (2) psychiatry rather than psychology, (3) prescientific psychology, (4) the psychology of thinking.
59. A motive which is universal in man: (1) is necessarily physiological, (2) is a learned motive, (3) may be either inborn or learned, (4) is acquisitiveness.
60. An example of a human instinct is: (1) gregariousness, (2) acquisitiveness, (3) pugnacity, (4) hard to find.
61. The long period of human infantile helplessness is responsible for: (1) maturation, (2) the development of instincts, (3) man's dependence upon socially acquired habits, (4) the sexual drive.
62. The argument "you can't change human nature" usually indicates a belief in: (1) the instinctive origin of common social motives, (2) the environmental acquisition of motives, (3) the peace-loving nature of man, (4) the need for research on motivation.
63. Forgetting the name of a friend who has treated you badly is most likely an example of: (1) conditioned inhibition, (2) reinforcement, (3) generalization, (4) extinction.
64. The sexual drive often appears as the basis for human maladjustment, due to: (1) the fact that sex is the strongest drive, (2) the fact that sex had a physiological basis, (3) the fact that sex is an instinct which demands satisfaction, (4) cultural restrictions on sex satisfaction.
65. An object which satisfies a need is called: (1) a symbolic reward, (2) a motive, (3) a drive, (4) an incentive.
66. The maternal motive in humans may be characterized as: (1) universal, (2) unlearned, (3) the strongest drive, (4) largely learned.
67. The immediate physiological basis for the experience of thirst is: (1) glandular, (2) dryness of mouth and throat, (3) dryness of stomach, (4) body temperature.
68. With regard to hunger in everyday life, it has been found that: (1) animals eat more in the presence of other eaters, (2) animals eat less in the presence of other eaters, (3) animal hunger is not affected by social factors, (4) food preferences in humans are mostly physiological.
69. Mating behavior in man may be described as: (1) instinctive, (2) originating in man's cultural rather than his physiological heritage, (3) a learned means of satisfying a physiological drive, (4) an unlearned pattern of behavior.

70. In order to satisfy his physiological needs, man largely depends upon: (1) habits, (2) instincts, (3) universal stereotyped patterns, (4) maturation.
71. An unlearned complex pattern of responses is sometimes known as (1) reflex, (2) a physiological drive, (3) an instinct, (4) a motive.
72. Projection is the term given to: (1) the attempt to find good reasons for one's actions, (2) the "sour-grapes" attitude, (3) the reversion to childish modes of reaction, (4) finding one's own inadequacies in others.
73. The student who complains that he failed a course because the textbook was poorly written is probably: (1) regressing, (2) overcompensating, (3) repressing, (4) rationalizing.
74. The weak child who is continually absorbed by Superman comics is probably engaging in: (1) belittling others, (2) blaming others, (3) identifying, (4) projection.
75. The adult who has a temper tantrum when he cannot have his own way illustrates: (1) neurosis, (2) repression, (3) rationalization, (4) regression.
76. The parts of the nervous system most intimately involved in emotion do not include: (1) the cortex, (2) the hypothalamus, (3) the cerebellum, (4) autonomic.
77. The best way to cure a child's fear of the dark is by: (1) physical punishment, (2) inducing repression, (3) mild ridicule, (4) conditioning.
78. The procedure not recommended as a means of eliminating fear in children is: (1) Forcing them to face the feared situation, (2) developing skills related to the feared situation, (3) gradually increasing their familiarity with the feared object, (4) associating pleasantness with the feared object.
79. The emotional response of the human newborn is best characterized as: (1) fear, (2) fear or rage, (3) fear, rage, or love, (4) general excitement.
80. Removal of the cerebral cortex: (1) decreases the intensity of emotional expression, (2) increases the intensity of emotional expression, (3) has no effect upon emotional behavior, (4) increases the ability to avoid danger or injury.

81. The fact that certain emotional expressions appear at about the same age in all children, despite variations in environment, shows the importance of: (1) heredity and environment, (2) maturation, (3) learning, (4) stimulation.
82. Albert's fear of the rat, following the association of the rat with a loud noise, illustrates: (1) emotional conditioning, (2) emotional maturation, (3) the role of heredity, (4) stimulus differentiation.
83. The three neural mechanisms most closely involved in emotion are: (1) the cerebellum, cerebrum, and midbrain, (2) the afferent, efferent, and sympathetic, (3) the autonomic, sympathetic, and parasympathetic, (4) the autonomic, hypothalamus, and cerebral cortex.
84. Studies of the language of facial expression of emotions show that: (1) a particular situation arouses the same emotional expression in most people, (2) a particular emotion, as reported, gives rise to a uniform facial pattern, (3) college students cannot be made to experience fear or disgust in the laboratory, (4) facial patterns are not uniform in response to emotional situations or experiences.
85. Emotional behavior is largely a product of: (1) maturation, (2) learning, (3) both maturation and learning, (4) heredity.
86. Artificial injections of adrenin will arouse: (1) an angry emotion in all subjects, (2) a pleasant emotion in all subjects, (3) varying types of emotional experiences and expectations, (4) no emotional reaction in most subjects.
87. The brain center for the autonomic system is located in the: (1) spinal chord, (2) hypothalamus, (3) parasympathetic, (4) sympathetic.
88. During the state of anger: (1) digestive movements increase, (2) the heart slows down, (3) adrenin is secreted, (4) blood pressure falls.
89. According to the James-Lange theory of emotions: (1) bodily sensations contribute to the emotional experience, (2) mere knowledge of danger is a feeling of fear, (3) we run because we feel afraid, (4) the feeling of fear is independent of the organic state.
90. The topic of emotion might well be considered in the context of: (1) motivation, (2) intelligence, (3) aptitude, (4) memory.
91. The number of senses in man is: (1) five, (2) six, (3) about eight, (4) about twelve.
92. The lower limit of hearing is at a frequency of about: (1) one cycle per second, (2) 20 cycles, (3) 50 cycles, (4) 100 cycles.

93. The chief physical correlate of pitch is: (1) frequency, (2) intensity, (3) quality, (4) amplitude.
94. The usual basis of judgment for the distance of a familiar sound is: (1) phrase, (2) frequency, (3) aural disparity, (4) loudness.
95. The strength or weakness of a sound is referred to as: (1) pitch, (2) volume, (3) loudness, (4) timbre.
96. The range of frequencies to which the human ear is most sensitive lies between: (1) 1-500 cycles per second, (2) 500-1000 cycles, (3) 1000-5000 cycles, (4) 5000-10,000 cycles.
97. The chief advantage of the eyes over the camera is: (1) the lens, (2) the iris, (3) right-side-up vision, (4) three-dimensional vision.
98. The physical correlate of hue is: (1) chroma, (2) pigment, (3) color, (4) wave length.
99. Visual sensation differs from visual perception in that the former particularly emphasizes: (1) symbolic processes, (2) affective processes, (3) receptor processes, (4) past experience.
100. There are no reds in the: (1) yellow-blue zone, (2) periphery of the retina, (3) nocturnal animals, (4) fovea.
101. The smallest visible separation between two points is usually taken as a measure of: (1) visual acuity, (2) dark adaptation, (3) brightness sensitivity, (4) flicker frequency.
102. The function served by the diaphragm on a camera is performed for the eye by the: (1) retina, (2) iris, (3) cornea, (4) lens.
103. The point of greatest sensitivity in the eye is the: (1) entrance point of the optic nerve, (2) fovea, (3) lens, (4) cornea.
104. When the eyes adapt to a lighted room: (1) the iris contracts, (2) a blue light is easier to see than a red of the same intensity, (3) the threshold for yellowish-green is lowered, (4) complementary hues become uncomplementary.
105. The function of the lens of the human eye is to: (1) regulate the amount of light entering the eye, (2) focus light on the retina, (3) protect the eye from intense light, (4) contract and dilate the iris.
106. The most frequently appearing score is the: (1) mode, (2) mean, (3) median, (4) standard.

107. The amount of relation between two or more different test performances is given by the: (1) standard deviation, (2) probable error, (3) reliability, (4) correlation.
108. A graph showing the relation between test scores and the number of individuals making each score is a: (1) normal probability curve, (2) frequency distribution, (3) probable error curve, (4) correlation diagram.
109. The amount of spread in a distribution is indicated by the: (1) range, (2) central tendency, (3) correlation, (4) skewness.
110. The most widely used measure of central tendency is known as the: (1) mean, (2) mode, (3) median, (4) average.
111. Within the limits marked off by one sigma on each side of the mean, the per cent of scores is: (1) 100, (2) 75, (3) 68, (4) 50.
112. The coefficient of correlation may be interpreted as indicating: (1) the per cent of relationship between two variables, (2) the significance of a difference between two measures, (3) the degree to which scores are scattered around the mean, (4) whether any relation exists between two variables.
113. When a trait is normally distributed, it means that: (1) the trait is not abnormal, (2) no one in the group tested is feeble-minded, (3) individuals are spread evenly over the scale, (4) the scores pile up at the center of the range.
114. The reliance upon limited samples of the population for making measurements necessitates the use of: (1) the mean, (2) correlation techniques, (3) critical ratio techniques, (4) the range.
115. The standard error of a mean indicates: (1) the reliability of that mean, (2) the correlation, (3) the dependence of the mean on the median, (4) the normality of the distribution.
116. The percentile score of 60 means that a person: (1) is equaled or exceeded by 60% of the persons tested, (2) has an intelligence equal to that of 60% of the persons tested, (3) has answered 60% of the questions, (4) is equaled or exceeded by 40% of those tested.
117. The ability to predict vocational success from aptitude tests is shown by: (1) the sigma of the distribution, (2) a high validity coefficient, (3) a measure of central tendency, (4) a small standard deviation.
118. Versatility of adjustment is called: (1) personality, (2) intelligence, (3) reasoning, (4) thinking.

119. Of two coefficients of correlation +87 and -87: (1) the + correlation is higher, (2) no distinction can be made, (3) the - correlation is just as meaningful as the +, (4) the + correlation is more meaningful for prediction.
120. If a student makes a percentile rank of 65 on a final course examination, this means that: (1) he should leave school, as he probably will not graduate, (2) he might have a chance of making Phi Beta Kappa, (3) he falls above the average of the general population, (4) he should get a failing grade in the course.
121. Correlation is: (1) a measure of the relation between two individuals, (2) a measure of central tendency, (3) a measure of dispersion, (4) a measure of the correspondence between two sets of scores.
122. Racial differences are not adequately measured by existing intelligence tests because: (1) different races have different educational opportunity, (2) some races do not have as much intelligence as others, (3) different races differ in their inborn drive to learn, (4) those who administer the tests are white.
123. A test is said to be valid if it: (1) measures the same thing every time it is given, (2) measures what it is supposed to, (3) can be objectively scored, (4) has been given to a large standardized group.
124. In interpreting scores on intelligence tests: (1) it is only necessary to know the reliability of the test, (2) the socio-economic level of the parents must be considered, (3) one must know the real intellectual level of the individual, (4) the home background of the child must be considered.
125. The I.Q. may be expected to remain constant when: (1) more educational opportunities are offered, (2) the endocrine balance is interfered with, (3) environmental conditions are markedly changed before the child is six years old, (4) mental age keeps pace with chronological age.
126. If an individual has an I.Q. like that of only 2% of the population: (1) his MA is quite different from his CA, (2) he is not likely to be feeble-minded, (3) he is most likely to have children of normal intelligence, (4) he is not likely to be a genius.
127. A high intellectual level is usually found in persons: (1) born in the warm months of the year, (2) with glandular dysfunctions, (3) whose parents are highly intelligent, (4) who are well fed.
128. The chief objection to the so-called "IQ Tests" in popular magazines is that they are: (1) group tests rather than individual tests, (2) aptitude tests, rather than intelligence tests, (3) not written by psychologists, (4) not adequately standardized.

129. Compared to the average child, the brightest children tend to be (1) socially maladjusted, (2) better adjusted, (3) in poor physical health, (4) emotionally unstable.
130. Applicants for college entrance are usually given intelligence tests in order to: (1) eliminate all who will fail, (2) discover which courses the student should take, (3) determine motivation, (4) determine scholastic aptitude.
131. Individual X is highly intelligent: it is most likely, according to present evidence, that: (1) his ancestors migrated from southern Europe, (2) he comes from a large family, (3) his parents married early in life, (4) he will have intelligent children.
132. With regard to the personality of an individual: (1) a few abilities may be better developed than the rest, (2) his temperament is unrelated to his body build, (3) his intellectual ability suggests the degree of his athletic ability, (4) if he cheats at cards he is likely to cheat at an examination.
133. A good test: (1) separates the inferior from the superior individuals with regard to whatever trait is being measured, (2) may be applied to any and all individuals simultaneously, (3) gives a valid and reliable score regardless of the conditions under which it is administered, (4) gives a valid and reliable score regardless of the educational background of the individuals tested.
134. The ability to see relations among words, numbers, or objects refers to: (1) a primary intellectual ability, (2) a cluster of traits, (3) introversion, (4) ectomorphy.
135. The ideal interview is one in which: (1) only the answers and not the behavior of the person interviewed are noted, (2) the interviewer suggests the answers he wants, (3) particular information is sought, (4) approval and disapproval are expressed on occasion by the interviewer.
136. Entrance of College Board examinations fall into the category of: (1) aptitude tests, (2) personality tests, (3) rating scales, (4) projective techniques.
137. A measure of the amount of relation between scores, traits, abilities, and the like is: (1) S.D., (2) C.R., (3) M, (4) r.
138. For evaluating an aptitude test, an independent measure of success on the job is the: (1) validity criterion, (2) job battery, (3) reliability criterion, (4) test score.
139. Statistics is best described as: (1) a branch of psychology, (2) a tool of science, (3) pure mathematics, (4) a means of disguising data.

140. The measure of central tendency most likely to be affected by extreme scores is the (1) mean, (2) mode, (3) median, (4) sigma.
141. Statistical methods do not help to determine: (1) what the average individual is like, (2) how we differ from one another, (3) how much variation may be expected, (4) what variables are actually being measured.
142. A test for firing a gun is said to be reliable when: (1) it picks out good gunners, (2) all persons make the same scores, (3) it is machine scored, (4) individuals receive comparable scores each time the test is given.
143. An important situational influence on the development of personality is (1) social class, (2) neural constitution, (3) physique, (4) endocrine secretion.
144. An individual's "somatotype" refers to his: (1) degree of normality, (2) photograph, (3) personality profile, (4) scaled physical dimensions.
145. Judgments of personality are least improved by: (1) careful observation of anatomical features, (2) observations of behavior, (3) using standardized tests, (4) combining the ratings of several judges.
146. The best check on the validity of any personality test is to: (1) compare measures of dimensions of physique, (2) size up the subject's personality entirely from the test and compare with information from other sources, (3) give the test repeatedly and compare results, (4) utilize the interpretations of expert clinicians who have not seen the subject.
147. A personality test which has norms based on the performance of a representative sample of the population is: (1) valid, (2) standardized, (3) reliable, (4) projective.
148. An aptitude test which differentiates between the successful and the unsuccessful in the job involved, is said to be: (1) valid, (2) reliable, (3) a measure of capacity, (4) a criterion.
149. A high score on a general intelligence test: (1) does not permit prediction of probable success in college work, (2) does not permit prediction of performance in an occupation, (3) does permit prediction of probable success in both college work and occupation, (4) indicates low aptitudes for many special activities.
150. High degree of aptitude for any skill indicates: (1) both inborn capacity and interest, (2) specific training, (3) present ability to perform that skill, (4) high general intelligence.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Interpretation Test

Science 133, S. Q. 1955

NAME _____ Sec. _____ Date _____

READ THE FOLLOWING SELECTION CAREFULLY BEFORE ANSWERING THE ITEMS.

The year 1950 is the hundredth anniversary of the landing of English sparrows in the United States. They are really neither sparrows nor English. They are weavers, originally from Africa, that have attached themselves, like the dog, bedbug, and rat, to the fortunes of man. They colonized Europe long ago, swarming in its cities paved with nutritious refuse. In 1850, they reached Brooklyn.

Brooklyn in those days was plagued with insects. The native birds did not like city life. As U. S. cities expanded, the birds retired to rural refuges, leaving the shade trees and flower gardens defenseless against insect pests. Finally the Brooklyn Institute of Arts and Sciences sent to England for an urban bird--the English sparrow.

The birds found the city a sparrow's paradise. The streets were strewn with refuse of the horse and buggy age, and under each bright street light there was a collection of dead insects. The sparrows soon overflowed Brooklyn. Riding in empty grain cars along new-built railways, they pioneered the West. By 1886, they had occupied all of the U. S.

Soon there were cries of anguish from bird lovers. The violent, aggressive English sparrows were too successful. Wherever the sparrow came, blue birds and wrens got out. Audubon Society members reported native birds being

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pursued, insulted and pecked by sparrows. Said Biologist Ned Dearborn of the U. S. Biological Survey, "The English sparrow among birds, like the rat among mammals, is cunning, destructive, and filthy."

But by the 1920's the sparrow hosts were declining. Their downfall was not the Audubon Society, but the automobile. As horses grew scarcer, sparrows grew scarcer, too. Now they survive in cities mostly on the leavings of pigeons.

In some smaller U. S. cities sparrows are still plentiful. There they have solved their food problem by a kind of inverse commuting. True to their urban traditions, they build their nests in town. In the mornings they fly out to the country to forage in the grainfields and barnyards. Then they come back, full fed, for the brawling social life in town.

(Quoted from Time Magazine, Vol. LV, No. 15, April 10, 1950, p. 50)

DIRECTIONS: FOR EACH OF THE FOLLOWING ITEMS SELECT THE BEST ANSWER AND MARK THE CORRESPONDING SPACE ON THE ANSWER SHEET TO THE RIGHT OF THE ITEM NUMBER (UNLESS REQUESTED TO MARK THE ITEMS DIRECTLY.)

1. The English sparrows were introduced into Brooklyn in an attempt to solve a problem. This problem was how to
 - ___(1) Dispose of street refuse.
 - ___(2) Lure the native birds back into the city.
 - ___(3) Enable the birds to live with human beings.
 - ___(4) Get some kind of bird life re-established in the city for aesthetic reasons.
 - ___(5) Restore something approximating a balance of nature.
2. The introduction of the English sparrow was most similar to
 - ___(1) A chance occurrence.

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- ___(2) An uncontrolled experiment.
- ___(3) A controlled experiment.
- ___(4) A study made under natural conditions.
- ___(5) A "shot in the dark."
3. The situation described in the fourth paragraph which arose as a result of the migration of the English sparrow over the United States, was due to
- ___(1) A decrease in the total number of birds.
- ___(2) An increase in the number of native birds.
- ___(3) The inability of the native birds to live in the towns.
- ___(4) The inability of the native birds to compete with the English sparrows.
- ___(5) The inability of the English sparrows to compete with the native birds outside of the town.
4. The situation referred to in the preceding item resulted in the
- ___(1) Formation of some new natural relationships.
- ___(2) Improvement of some old natural relationships.
- ___(3) Reconstruction of original natural relationships.
- ___(4) Abolition of all natural relationships.
- ___(5) Deterioration of all natural relationships.
5. With the coming of the automobile, the number of English sparrows has decreased because
- ___(1) The English sparrows now no longer compete with the native birds.
- ___(2) The native birds have increased their ability to compete with the English sparrows.
- ___(3) A new factor in the old relationship has been introduced leading to the destruction of the old relationship.
- ___(4) A factor in the old relationship has been reduced in importance leading to the development of a new relationship.
- ___(5) The English sparrow is not a native bird.

6. The new "commuting habits" of some English sparrows indicate
- (1) An adjustment of the species in connection with the attainment of a new relationship.
 - (2) An attempt by the English sparrow to maintain the old relationship.
 - (3) That the species is on the way to becoming extinct in America.
 - (4) That the species is again increasing to its former numbers.
 - (5) That the English sparrow is becoming a country bird rather than a city bird.
7. The statement by Dearborn, "The English sparrow among birds, like the rat among mammals, is cunning, destructive and filthy," is
- (1) An hypothesis.
 - (2) A guess.
 - (3) A verified conclusion.
 - (4) An opinion.
 - (5) An established fact.
8. On the basis of the article, the statement that the English sparrow is a bird which is associated with human dwellings, towns, and cities would be
- (1) An hypothesis.
 - (2) An assumption.
 - (3) A conclusion.
 - (4) A theory.
 - (5) An unwarranted assertion.
9. On the basis of the article, a statement that the English sparrow may be expected to become a permanent competent of the bird life of temperate North America, would be
- (1) A reasonable hypothesis.
 - (2) An assumption.
 - (3) An unwarranted assertion.
 - (4) A proved fact.

- ___ (5) An unwarranted conclusion.
10. The most effective method of testing the validity of the statement given in item #9 would be to take a census of
- ___ (1) All English sparrows in ten American cities of different sizes.
- ___ (2) All native birds in ten American cities of different sizes.
- ___ (3) All birds, including English sparrows in ten American cities of different sizes.
- ___ (4) All birds, including English Sparrows in ten American cities of different sizes, and in a ten-mile zone around each city.
- ___ (5) All birds, including English Sparrows, in ten American cities of different sizes, and in a ten-mile zone around each city, at ten-year intervals.
11. In evaluating the factors which will determine what part various species will play in the total bird population of the United States 100 years from now, a scientist expects that
- ___ (1) The native species will eventually triumph.
- ___ (2) Man will determine which species survive and which do not.
- ___ (3) The influence of the Audubon Society and other bird-lovers will weigh strongly in favor of the native species.
- ___ (4) Those species will survive and increase which are best able to do so in competition with others in the environment which man has modified.
- ___ (5) In this length of time there will be new species that are better adapted to man-modified conditions which will evolve and replace those which are now here.
12. Between 1850 and 1950 which one of the following was the most important in the solution of the problem resulting from the introduction of the English sparrow?
- ___ (1) Increase and decrease in the number of English sparrows.
- ___ (2) Decrease in the number of other birds in towns.
- ___ (3) Relationship of other birds to English sparrows.
- ___ (4) Change in the food habits of the English sparrows.
- ___ (5) Relationships of native birds, English sparrows, horses, and human beings to one another.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Misconception Test

Science 133, S. Q. 1955

NAME _____ Date _____

INSTRUCTIONS: The following is a list of 100 statements to be labeled T (True) or F (False). The decision is to be based on the accuracy of the statement with reference to its factuality of its actual occurrence either now or in times past.

- ___1. The precocious child is apt to have a puny body.
- ___2. The Bible relates that three wise men visited the infant Christ.
- ___3. Women mature earlier in hot climates.
- ___4. Playing wind instruments induces consumption of the lungs.
- ___5. It is harmful to your watch to turn the hands backward.
- ___6. "As Maine goes, so goes the nation."
- ___7. Water can be found by a dowser by the use of a divining rod.
- ___8. The needle of a compass points to the North Pole.
- ___9. Lightning conductors do more harm than good because they attract electricity.
- ___10. Quicksand sucks.
- ___11. Lightning never strikes twice in the same place.
- ___12. Tropical parents are the most prolific.
- ___13. Most automobile accidents are due to excessive speed.
- ___14. An electric fan cools the air of a room in which it is operating.
- ___15. Cleopatra was an Egyptian.
- ___16. Byron had a clubfoot.
- ___17. On learning that the French poor could not get bread, Marie Antoinette said: "Then why do they not eat cake?"

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- ___ 18. Aesop wrote Aesop's Fables.
- ___ 19. Opposites are more likely to be happily mated in marriage.
- ___ 20. Pheidippides ran the marathon distance to Athens with the tidings of the glorious victory of the Greeks over the Persians.
- ___ 21. Watts' observation of a steaming teakettle led to his invention of the steam engine.
- ___ 22. Wellington said: "The Battle of Waterloo was won on the playing fields of Eton."
- ___ 23. Singeing the hair is beneficial, aiding it to grow more abundantly.
- ___ 24. William Tell shot an apple off his son's head with a bow and arrow.
- ___ 25. Horatius defended the Sublican bridge over the Tiber with the aid of two friends.
- ___ 26. The narcotic addict is the most dangerous and desperate of criminals.
- ___ 27. It is more dangerous to prick oneself with a pin than with a needle.
- ___ 28. The Old Testament says that a whale swallowed Jonah.
- ___ 29. According to Darwin, man is descended from monkeys.
- ___ 30. The Bible says that Adam and Eve ate an apple.
- ___ 31. Brilliant scholars do not succeed in business.
- ___ 32. Child prodigies peter out.
- ___ 33. The principle of evolution was discovered by Darwin.
- ___ 34. Columbus discovered North America.
- ___ 35. The fall of an apple suggested to Newton his theory of gravitation.
- ___ 36. A red rag will madden a bull.
- ___ 37. Marconi invented wireless telegraphy.
- ___ 38. Nero played a fiddle while Rome was burning.
- ___ 39. George Washington cut down a cherry tree and when confronted by his father said: "I cannot tell a lie."

Misconception Test

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- ___40. Man is the only animal that laughs.
- ___41. The beaver uses its broad flat tail as a trowel.
- ___42. There is a law of compensation in nature--e.g. beautiful women are dumb; blind persons have an extraordinary sense of touch.
- ___43. A snake, cut or hack it as you please, will never die till sunset.
- ___44. An ostrich, when pursued, hides its head in sand and thinks that as it cannot see its pursuers, therefore they cannot see it.
- ___45. Crocodiles shed tears.
- ___46. Tortoise shell is obtained from tortoises.
- ___47. The earth is nearest the sun in June and farthest away in December.
- ___48. Shooting stars are stars.
- ___49. The sun sets earliest on December 22 each year, that being the shortest day.
- ___50. Robert Fulton invented the first American steamboat.
- ___51. A frosty winter is more healthful than a mild one.
- ___52. Red cheeks are a sign of health.
- ___53. Night air is unwholesome.
- ___54. Adding certain powders to the bath will reduce body weight.
- ___55. Stuff a cold and starve a fever.
- ___56. Dead teeth do not ache.
- ___57. It is more dangerous for an adult than for a child to have whooping cough.
- ___58. Moth eat clothes.
- ___59. Fish is a brain food.
- ___60. Chop suey originated in China.
- ___61. Cocoa is made from coconuts.
- ___62. Wine kept in glass bottles becomes stronger with age.

Misconception Test

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- ___ 63. Drinking hot tea cools you.
- ___ 64. The human heart is on the left side of the body.
- ___ 65. A drowning person always rises three times before finally sinking.
- ___ 66. Exercising the body rests the mind.
- ___ 67. Alcoholic liquors keep out the cold.
- ___ 68. Blood is purified during its passage through the heart.
- ___ 69. Some people are double-jointed.
- ___ 70. Eating green apples will cause stomach-ache.
- ___ 71. The ninth wave in the surf is always the largest.
- ___ 72. The Hudson seal is a seal from Hudson Bay.
- ___ 73. A declining birth rate means depopulation.
- ___ 74. Rain before seven means clear before eleven.
- ___ 75. A halo around the moon is a sign of approaching rain.
- ___ 76. There is soda in soda water.
- ___ 77. Camel's hair brushes are made from the hair of camels.
- ___ 78. The only way to avoid scurvy is to eat fresh vegetables.
- ___ 79. Cork legs are made of cork.
- ___ 80. A laughing jackass is a mammal.
- ___ 81. India ink comes from India.
- ___ 82. Explosions produced by firing big guns, or by other means, bring down heavy rain.
- ___ 83. George Washington was the first President of the United States.
- ___ 84. The number of man's senses is five.
- ___ 85. The criminal can be readily distinguished by certain definite physical stigmata, such as a big jaw or protruding ears.
- ___ 86. Alcohol is a stimulant.

Misconception Test

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- ___ 87. Women are inferior to men in intelligence.
- ___ 88. Lindbergh was the first man to make a non-stop flight across the Atlantic.
- ___ 89. All men are created equal in capacity for achievement.
- ___ 90. Women possess a power of intuition absent in men.
- ___ 91. The slow learner retains what he gets better than the fast learner.
- ___ 92. A person is apt to get indigestion if he consumes fruit and milk because milk curdles in the stomach when fruit is present.
- ___ 93. Shaving makes the hair grow faster.
- ___ 94. One hour's sleep before midnight is worth two after midnight.
- ___ 95. The Caesarian operation in obstetrics derives its name from the manner in which Julius Caesar was born.
- ___ 96. Tan shoes are noticeably cooler for summer wear than black
- ___ 97. If a man had faith enough he could heal a broken limb.
- ___ 98. Women are by nature purer than men.
- ___ 99. Long slender hands indicate an artistic nature.
- ___ 100. Ministers' sons usually turn out poorly.

ALABAMA STATE COLLEGE, MONTGOMERY, ALABAMA
Freshman College Division

Spring Quarter Final Examination

Science 133, S. Q. 1955

DIRECTIONS: Select the number of the correct answer for each item and mark the corresponding number on the answer sheet.

1. Psychiatry deals with the (1) treatment of the diseases of the mind, (2) method of analyzing the mind, (3) study of the functioning of the nervous system.
2. Psychoanalysis is a (1) treatment of the diseases of the mind, (2) method of analyzing the mind, (3) study of the functioning of the nervous systems.
3. Hypnosis is a natural phenomena of mental life, induced by certain conditions of monotonous stimulation. (1) true, (2) false, (3) meaningless.
4. (1) Wm. James, (2) Tichner, (3) Watson introduced in America the idea that psychology should be concerned only with the study of behavior.
5. (1) Berkely, (2) hume, (3) Kant believed that the nature of the mind itself influenced the pattern of our sensation.
6. Psychology endeavors to create the habit of looking at (1) others objectively, (2) yourself objectively, (3) others and yourself both objectively and subjectively.
7. All of us tend to remember things better if they fit in with the beliefs that we already hold. (1) true, (2) false.
8. The central problem of psychology is (1) understanding the behavior of abnormal, non-integrated organism, (2) understanding and predicting the behavior of a total, integrated organism.
9. The scientific method encourages (1) doubt and criticism, (2) repeated observations, (3) logical reasoning, (4) all of the above.
10. The naive idea of self (1) localizes some specific portion of the body as the self, (2) places the self in a spirit which resides in the body, (3) makes the self a sum total of all that man can call his.
11. The primitive idea of self (1) localizes some specific portion of the body as the self, (2) recognizes the self as a product of the complex activity of the bodily organism, (3) places the self in a spirit in the body.

12. The Emergent idea of self (1) makes the self an outgrowth of the operation of the structural parts of the body, (2) localizes some portion of the body as the self, (3) places the self in a spirit residing in the body.
13. The Comprehensive idea of self (1) localizes some portion of the body as the self, (2) makes the self a sum total of all that man can call his, (3) recognizes the self as a product of the complex activity of the bodily organism.
14. The individual can influence his (1) society, (2) structural make-up, (3) society and structural make-up.
15. In judging others, we tend to use (1) our own distorted self-concept as a standard, (2) our concept of what others should be, (3) the social standards set up by society.
16. Psychosomatic medicine recognizes the influence of emotional states upon the functioning of the body itself. (1) true, (2) false.
17. An energy which can activate an organism in part or as a whole is known as a (1) motive, (2) stimulus, (3) response.
18. We define a drive as (1) a persisting stimulus, (2) purposive behavior, (3) an attempt to restore equilibrium, (4) all of the above.
19. The strong response in a situation which throws the organism into a state of extreme unbalance is known as (1) stimulus, (2) an emotion, (3) drive.
20. The stimulus, in order to arouse emotion, must (1) be perceived, (2) have meaning, (3) affect the nervous system, (4) all of the above.
21. Conflict with society arises whenever an attempt to restore equilibrium is (1) interfered with, (2) blocked by mores and folkways, (3) both of the above.
22. The thwarting of a pattern of activity is usually referred to as (1) conflict, (2) emotion, (3) frustration.
23. The state of being emotionally upset is described as (1) frustration, (2) the effect of frustration, (3) conflict situation.
24. A person's behavior is considered normal if (1) most people are engaging in it, (2) relatively few people are engaging in it, (3) it does not cause the person to come into conflict with society.

25. If an individual persists in unsuccessful attempts to achieve a goal by repeating inadequate behavior, he is exhibiting (1) aggression, (2) perservation, (3) frustration.
26. The attempt to satisfy a motive and achieve equilibrium by changing the goal is known as (1) sublimation, (2) substitution, (3) negativism.
27. If a person exerts unusually strong efforts to counteract frustrating forces he is employing (1) substitution, (2) compensation, (3) negativism.
28. The process of avoiding personal blame is called (1) rationalization, (2) compensation, (3) artistic thinking.
29. Behavior which deviates from the average enough to be called abnormal, but is not severe enough to be called insane is known as (1) psychotic, (2) psychoneurotic, (3) subnormal.
30. Behavior which is so abnormal as to be anti-social or unsocial is called (1) psychotic, (2) psychoneurotic, (3) regressive.
31. By measuring variations in the flow of sweat, blood pressure, and respiration psychologists are able to differentiate the emotions a subject experiences. (1) true, (2) false.
32. The physiological changes accompanying emotions vary (1) widely, (2) not at all, (3) slightly, depending upon what the emotion is.
33. Emotions have (1) no place, (2) a very definite place, in our highly civilized society.
34. Many of our facial expressions are learned symbols and do not arise naturally from particular emotions. (1) true, (2) false.
35. During emotion (1) gastric juices, (2) oxygen, (3) sugar is injected into the blood stream.
36. The flow of gastric juices (1) increases, (2) decreases, (3) stops during emotion.
37. The digestive processes (1) increase, (2) decrease, (3) stop during emotion.
38. Recoveries from psychoses are (1) relatively rare, (2) relatively frequent, (3) impossible.
39. The inability to resolve conflicts in new situations may lead to excessive homesickness. (1) true, (2) false.

40. Sublimation is a type of substitution response which society considers (1) valuable, (2) undesirable, (3) immoral.
41. A form of religious worship which provides for a small group of people who revolted from an organized religious body is called a (1) sect, (2) cult, (3) denomination.
42. A collection of religious worshipers who have furthered a revolt from an established and organized institution may be called a (1) cult, (2) denomination, (3) sect.
43. A large and well organized collection of religious worshipers who follow a formal system of worship as an order or church service and who has a central head and operative creed as a matter of guidance and law may be called a (1) denomination, (2) cult, (3) sect.
44. The basic concern for discussion in Science 133 deals with four major classes of events, (1) the reaction of individuals to individuals, (2) the reaction of the individual to groups of individuals, (3) the reaction of groups of individuals to individuals, (4) the reaction of group to group.
45. The last great religious revolution was the (1) Protestant Reformation, (2) Martin Luther's Revolt from the Roman Catholic Church, (3) Revolt from the Church of England which served as an outgrowth of the Methodist Church.
46. The major proponent of the last great Religious Revolution was (1) Luther, Christ, Mohammed, (2) Wesley, Wesley-Whitfield.
47. The one factor which contributed to the success of the last great Religious Revolution was (1) the establishment of Christianity, (2) Songs were written and taught the congregation so it could participate in the services, (3) strong and determined leadership furnished by the revolters.
48. The author of the poem given in class was (1) Hughes, (2) Downie, (3) Emerson.
49. The two answers to the magic squares given in class were (1) 17-15, (2) 9-16, (3) 15-34.
50. One of the earliest forms of religious development was (1) Herotheism, (2) Animism, (3) Polytheism.
51. The early form of religion which provided for all persons to worship a national god was (1) Plytheism, (2) Herotheism, (3) Monotheism.
52. The predominant type of religious worship in the western world civilization as of now is (1) Polytheism, (2) Monotheism, (3) Methodism.

53. The South's social order, since the destruction of Slavery has been based upon (1) a strict policy of segregation, (2) the maintenance of the color line, (3) the promotion of discord between Negroes and whites.
54. The South is the poorest section of the United States filled with urban and rural slums whose people are kept from plunging even to lower depths of misery and degradation because they are (1) God-fearing, (2) have a great deal of unexplored wealth, (3) lie already on the stinking bottom.
55. Hundreds of thousands of young men and women migrate to other sections of the country because they (1) are driven out by poverty, (2) are accepted by other people in other sections, better than at home, (3) cannot earn a living at home.
56. The standards of living in the South have remained low but the (1) standard of human selection has remained high, (2) the economic standard has remained high, (3) the standard of breeding has remained high.
57. In spite of the poverty condition of the South it spends (1) more than half of its income in education, (2) three-fourths of its income on education, (3) nearly half of its income on education.
58. Southern people are pleasure loving, reckless of money, engagingly hospitable and are bound by the law of set mores, (2) partisan in politics, (3) not bound by general customs of any set group.
59. The Southerner bases his political choice on (1) the party machine, (2) individual personalities, (3) his own convictions.
60. The Southerner's whole society and way of life are conditioned by the presence of (1) obvious poverty, (2) too much religion which is not fundamental in its philosophy, (3) the Negro.
61. It is part of the paradox of the South that while the Southern Negro has made great progress during the past half century race relations (1) have kept pace with other progress, (2) have advanced beyond other obvious progress, (3) have deteriorated.
62. Younger Negroes in the South who are better educated than their predecessors are (1) satisfied with the existing conditions, (2) intent upon securing what they take to be their rights, (3) ready to make reasonable compromises and forget about the whole affair.
63. The basic bottom of all the problems existing between the Negro and the white in the south is (1) economic, (2) unequal educational opportunities, (3) blood and sexual relationships.

64. The Negro question in this country is a (1) local question, (2) a Southern question, (3) a National question.
65. The question of difference between the Negro and the whites in this country especially in the South shows that the whites are victims of the (1) set customs and traditions, (2) mores and their beliefs, (3) sum of their inheritance and their environment.
66. One of the following bits of behavior is characteristic of introversion: (1) making friends easily, (2) laughing frequently and easily, (3) blushing frequently and easily.
67. One of the following bits of behavior is characteristic of extroversion: (1) daydreaming frequently, (2) accepting orders from others as a matter of course, (3) having the feelings hurt easily.
68. A child with a mental age of 6 when he is chronologically 9 years of age will probably have about which one of the following mental ages when he is chronologically 12: (1) 7, (2) 8, (3) 15.
69. It has been found that children of superior intellectual ability tend when they reach adulthood to be (1) superior, (2) mentally deficient, (3) below the average.
70. According to the Mendelian laws of heredity, dominant characteristics tend to appear in what ratio to recessive characteristics: (1) 1 to 1, (2) 1 to 3, (3) 3 to 1.
71. Identical twins always have (1) the same heredity but not necessarily similar environments, (2) the same heredity and similar environments, (3) equal hereditics but not the same heredity.
72. Trial and error learning occurs with (1) subhuman animals but not with human beings; (2) human beings but not with subhuman animals, (3) both human beings and subhuman animals.
73. One of the following forms of behavior will least likely help an individual develop a pleasing personality (1) playing bridge, (2) playing solitaire, (3) playing in an orchestra.
74. The behavior of an individual in a mob is least satisfactorily explained in terms of (1) his feeling for power, (2) the influence of the mob mind, (3) his belief that he has the approval of the group.
75. The first step in treating ungrouped data should be to (1) arrange them in order from the largest number to the smallest number, (2) arrange them in order from the smallest number to the largest number, (3) find the range by subtracting the smallest number from the largest number.

76. The second step should be to (1) tabulate, (2) add the frequencies, (3) choose the interval and determine the number of class intervals.
77. The third step should be to (1) set up a frequency table, (2) choose the interval, (3) determine the number of class intervals.
78. The fourth step should be to (1) add the frequencies, (2) tabulate, (3) set up frequency table.
79. The fifth step should be (1) add the frequencies, (2) determine the number of class intervals, (3) set up frequency table of scores.
80. The first step in finding the mean from frequency table should be to (1) assume the interval with the highest frequency, (2) assume the mean, (3) assume the midpoint.
81. The second step in finding the mean from the frequency table should be to (1) find the mid-point of the frequencies, (2) find the interval that has the highest frequency, (3) establish the deviations from the interval of the assumed means.
82. The third step in finding the mean should be to (1) secure the products to frequencies times the deviations, (2) determine the cumulative frequencies to include the midpoint of the frequencies, (3) find the lower limit of the interval with highest frequency.
83. The fourth step in finding the mean should be to (1) find the sum of the products of the frequencies times the deviations, (2) find the sum of the deviations, (3) find the sum of the cumulative frequencies.
84. The fifth step in finding the mean should be to (1) substitute in the formula and solve, (2) assume the means, (3) find the sum of the products of the frequencies times the deviations.
85. The first step in finding the median from the frequency table should be to (1) assume the mean, (2) choose an interval, (3) find interval containing the midpoint of the frequencies.
86. The second step in finding the median should be to (1) establish the deviations from the interval of the assumed mean, (2) find the lower limit of the interval containing the midpoint, (3) find the sum of the products of the frequencies times the deviations.
87. The third step in finding the median should be to (1) find the sum of the frequencies up to but not including the interval containing the midpoint of the frequencies, (2) find the interval containing the midpoint of the frequencies, (3) find the lower limit of the interval containing the midpoint of the frequencies.

88. The fourth step in finding the median should be to (1) find the sum of the frequencies, (2) select the frequency of the interval containing the midpoint of the frequencies, (3) select the frequency of the interval containing the highest number of cases.
89. The fifth step in finding the median should be to (1) substitute in median formula and solve, (2) find sum of the deviations, (3) find the sum of the frequencies.
90. The first step in finding the mode from the frequency table should be to (1) locate the class interval with the highest frequency, (2) locate the interval containing the midpoint of the frequencies, (3) locate the interval of the assumed mean.
91. The second step in finding the mode should be to (1) determine the deviations from the mean interval, (2) locate the lower limit of the modal class, (3) locate the interval with the highest frequency.
92. The third step in finding the mode should be to (1) locate the frequencies immediately above the highest frequency, (2) locate the midpoint of the interval with the highest frequency, (3) locate the interval of the assumed means.
93. The fourth step in finding the mode should be to (1) locate the frequency immediately below the highest frequency, (2) locate the midpoint of the interval with the highest frequency, (3) locate the interval of the assumed mean.
94. The fifth step in finding the mode should be to (1) substitute in the formula for finding the mode, (2) locate the lower limit of the interval containing the midpoint, (3) locate the lower limit of the interval with the highest frequency.
95. The decrease in the death rate due to appendicitis is due to the widespread use of (1) surgery and radiation, (2) sulfa drugs and penicillin, (3) hydrotherapy and thermotherapy, (4) psychiotherapy and physiotherapy.
96. The three major functions of life-growth, nutrition and reproduction are regulated by (1) gonads, (2) pituitary glands, (3) adrenal glands, (4) thyroid glands.
97. The two sports that are the cause of many fatalities are (1) tennis and track, (2) ping pong and volley ball, (3) water sports and hunting, (4) football and boxing.
98. There are two forms of treatment for cancer (1) surgery and radiation, (2) sulfa drugs and penicillin, (3) psychotherapy and physiotherapy, (4) hydrotherapy and thermotherapy.

99. The disease diabetes is due to disorder of certain cells in (1) liver, (2) pancreas, (3) duodenum, (4) stomach.
100. Goiter is an enlargement of (1) pituitary gland, (2) adrenal gland, (3) prostate gland, (4) thyroid gland.
101. Simple goiter is due to deficient (1) iron, (2) calcium, (3) iodine, (4) phosphorus in food and water.
102. The weakening of the heart muscle is called (1) stenosis, (2) myocarditis, (3) gout, (4) nephritis.
103. Coronary thrombosis is a (1) blood clot near the brain, (2) blood clot near the heart, (3) blood clot near the kidneys, (4) blood clot near the lungs.
104. Urinalysis is one of the most important diagnostic tests for (1) the lungs, (2) heart, (3) kidney and bladder.
105. One class of persons especially prone to have automobile accidents, as shown by records is (1) young males, (2) older males, (3) young females, (4) older females.
106. When veins are persistently overfull, and tend to dilate and lengthen and become tortuous, this condition is known as (1) pyelitis, (2) cystitis, (3) varicose veins, (4) diabetes.
107. Encephalitis is inflammation of (1) the liver, (2) the brain, (3) the stomach, (4) kidney.
108. The commonest bacterial cause of mental disease is (1) typhoid fever, (2) malaria, (3) syphilis, (4) streptococcus diseases.
109. Among the diseases involving the spinal cord is (1) diabetes, (2) poliomyelitis, (3) appendicitis, (4) asthma.
110. The usual explanation for the young male's high rate of accidents is (1) lacks skill, (2) he overestimates what his skill can do in given traffic conditions, (3) muscular weakness, (4) road.
111. The magazine article written by David L. Cohen--which was assigned to be read as a class assignment, was taken from one of the following magazines: (1) Atlantic Monthly, (2) Nation, (3) Survey-Literary Digest.
112. Although Southerners differ from state to state, county to county, there is a recognizable and clearly (1) inferiority complex, (2) Southern mentality, (3) fear of justice being given to the non-white group.

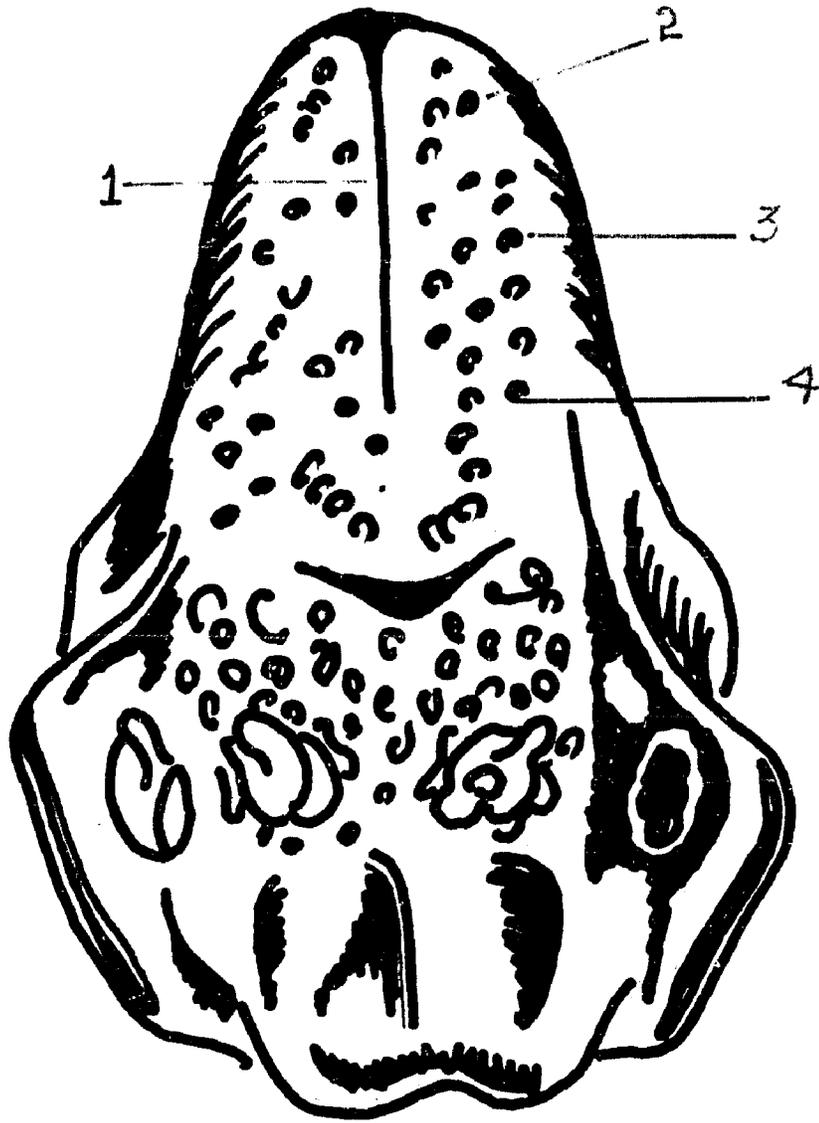
113. The south is the poorest section of the U. S. filled with rural and urban slums--whose people are kept from plumbing to even lower depths of misery and degradation because they already lie on the (1) last round of economic security, (2) the stinking bottom, (3) near the middle in wealth of the other states in the union.
114. The whole picture is pathetic and pitiless in that there is a constant struggle going on as (1) poor farmers against rich farmers, (2) the disposed against those of plenty, (3) poor whites against poor Negroes.
115. Many thousands of young men and women migrate to other sections of the country annually because (1) they want to live and work in a better environment, (2) in an effort to find more outlet for their talent, (3) because they cannot make a living at home.
116. In spite of the fact that the western world civilization has given man a choice of a higher standard of living and more children-- Southerners have chosen (1) the higher standard of living, (2) more children to each family, (3) a higher scale of living.
117. As a result of the crushing poverty the south is the most illiterate section of the nation--although southern states spend one of the following amounts on education: (1) all of their total income, (2) one-third of their annual income, (3) half of their annual income.
118. It is part of the paradox of the South that in spite of the great amount of progress the Negro has made during the last half century, race relations have (1) become closer and closer, (2) have been at a standstill all during the 20th century, (3) have deteriorated during the last few years.
119. Southerners in regards to their social position are (1) poor, (2) proud, (3) poised, (4) prolific.
120. Regardless to what section the southerner is located, he is bent and determined to see that (1) all are cared for in all respects, (2) that the Negro is to be kept in his place, (3) the color-line must be kept.
121. The skin is a (an) (1) effector, (2) conductor, (3) receptor, (4) neither, (5) all.
122. Some scientist consider the skin as being a (an) (1) system, (2) organ, (3) gland, (4) neither, (5) all (answer two).
123. In Biosocial we consider the skin as a (an) (1) sense organ, (2) sense system, (3) sense gland, (4) neither, (5) all.

124. The skin is a receptor for the sense of (1) taste, (2) smell, (3) sound, (4) touch, (5) sight.
125. The skin registers (1) three basic sensations (heat, cold, and pain) (2) one basic sensation (touch), (3) four basic sensations (heat, cold, touch, and pain), (4) two basic sensations (touch and cold).
126. We have at least (1) one, (2) three, (3) six, (4) eight, (5) five kinds of temperature sensations.
127. The kind of sense that gives us awareness of movement, direction, and position of the body is called (1) kinesthetic sense, (2) somesthetic sense, (3) organic sense, (4) neither, (5) all.
128. The sense organ for the sense of taste is the (1) mouth, (2) nose, (3) tongue, (4) eye, (5) skin.
129. The tongue is a (1) receptor, (2) effector, (3) conductor, (4) neither, (5) all.
130. Taste is a (1) physical sense, (2) chemical sense, (3) not a sense, (4) both physical and chemical.
131. Our basic taste sensations are (1) one in number, (2) two in number, (3) three in number, (4) four in number.
132. Our taste sensations are really combined with (1) touch only, (2) smell only, (3) smell and touch, (4) none of these, (5) all of these.
133. The ear is a (1) receptor, (2) effector, (3) conductor, (4) neither, (5) all of these.
134. The ear is the sense organ for the sense of (1) touch, (2) sight, (3) sound, (4) smell, (5) taste.
135. We are able to hear because of (1) vibrations, (2) light rays, (3) taste, (4) smell, (5) taste.
136. Organs in our ears are responsible for our (1) seeing only, (2) hearing only, (3) tasting and balance, (4) hearing and balance, (5) sight, and balance.
137. In order for us to hear the vibrations we must be between (1) 2 and 29 per second, (2) 20 and 200 per second, (3) 20 and 20,000 per second, (4) 200 to 2000 per second, (5) 20 and 2000 per second.
138. The part of the ear that is insignificant in the process of hearing is the (1) ear drum, (2) cochlea, (3) hammer, (4) anvil, (5) pinna.

139. Balance organs of the ear are the (1) pinna and cochlea, (2) ear drum and saccule, (3) striole and saccule, (4) bone and ossicles, (5) eustachian tube and utricle.
140. The eye is a (1) conductor, (2) effector, (3) receptor, (4) neither, (5) all of these.
141. The eye is the sense organ for the sense of (1) sound, (2) smell, (3) taste, (4) touch, (5) sight.
142. The point of keenest focus on the retina of the eye is the (1) pupil, (2) iris, (3) cornea, (4) fovea, (5) lens.
143. When the lens of the eye flatten they are (1) lengthening light rays, (2) registering color, (3) letting in some light, (4) shortening light rays.
144. Rods of the eye are sensitive to (1) taste, (2) smell, (3) color, (4) light, (5) sound.
145. Cones of the eye are sensitive to (1) taste, (2) smell, (3) color, (4) light, (5) sound.
146. The nose is a (1) conductor, (2) effector, (3) receptor, (4) neither of these, (5) all of these.
147. The nose is the sense organ for the sense of (1) sound, (2) smell, (3) taste, (4) touch, (5) sight.
148. Smelling is a (1) physical sense, (2) chemical sense, (3) motor sense, (4) none of these, (5) all of these.
149. In order for us to smell the substance must be a (1) liquid, (2) gas, (3) solid, (4) neither, (5) all.
150. The olfactory receptor is located in the (1) lower part of the nose, (2) side of the nose, (3) rear of the nose, (4) front of the nose, (5) upper part of the nose.

TURN TO THE PICTURES FOR TEST ON IDENTIFICATION--The Tongue

151. Number one of the tongue (side) shows the part of the tongue where (1) sour taste is registered, (2) sweet taste is registered, (3) bitter taste is registered, (4) salty taste is registered.
152. Number two of the tongue (tip) shows where (1) sour taste is registered, (2) sweet taste is registered, (3) bitter taste is registered, (4) salty taste is registered.



TONGUE

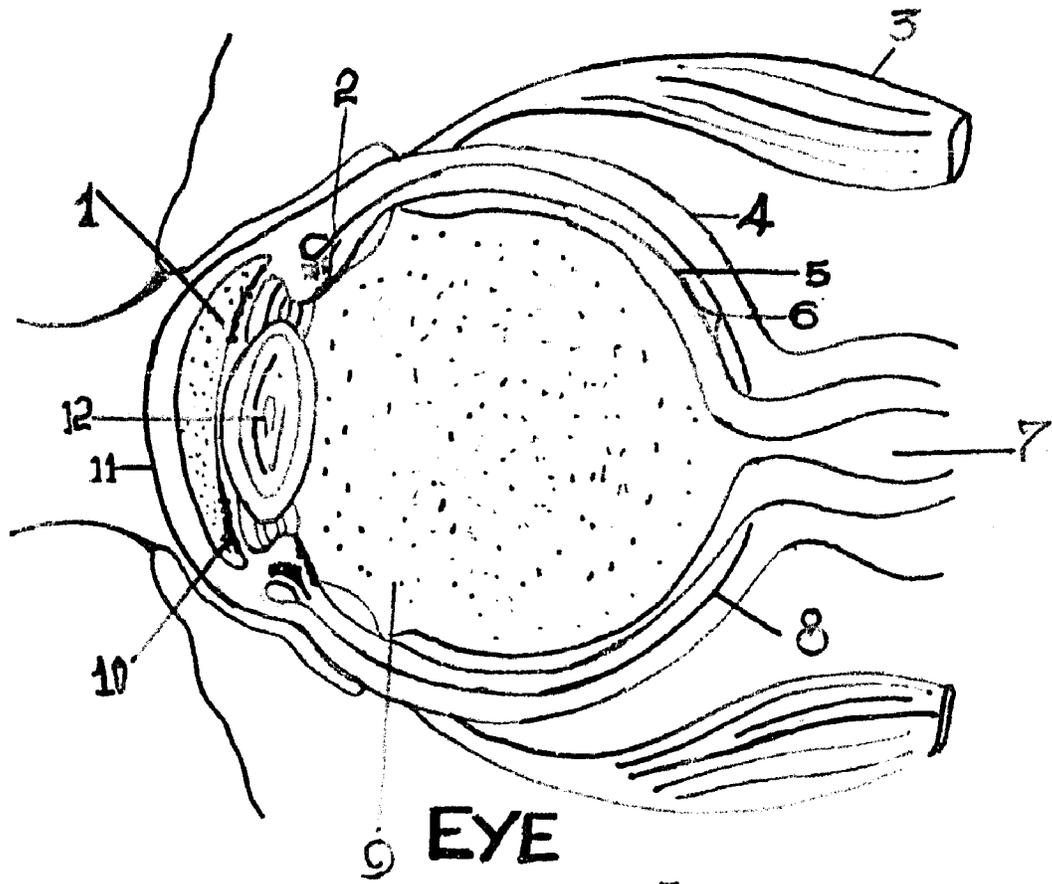
153. Number three of the tongue (all over) shows where (1) sour taste is registered, (2) sweet taste is registered, (3) bitter taste is registered, (4) salty taste is registered.
154. Number four of the tongue (back) shows where (1) sour taste is registered, (2) sweet taste is registered, (3) bitter taste is registered, (4) salty taste is registered.

THE EYE

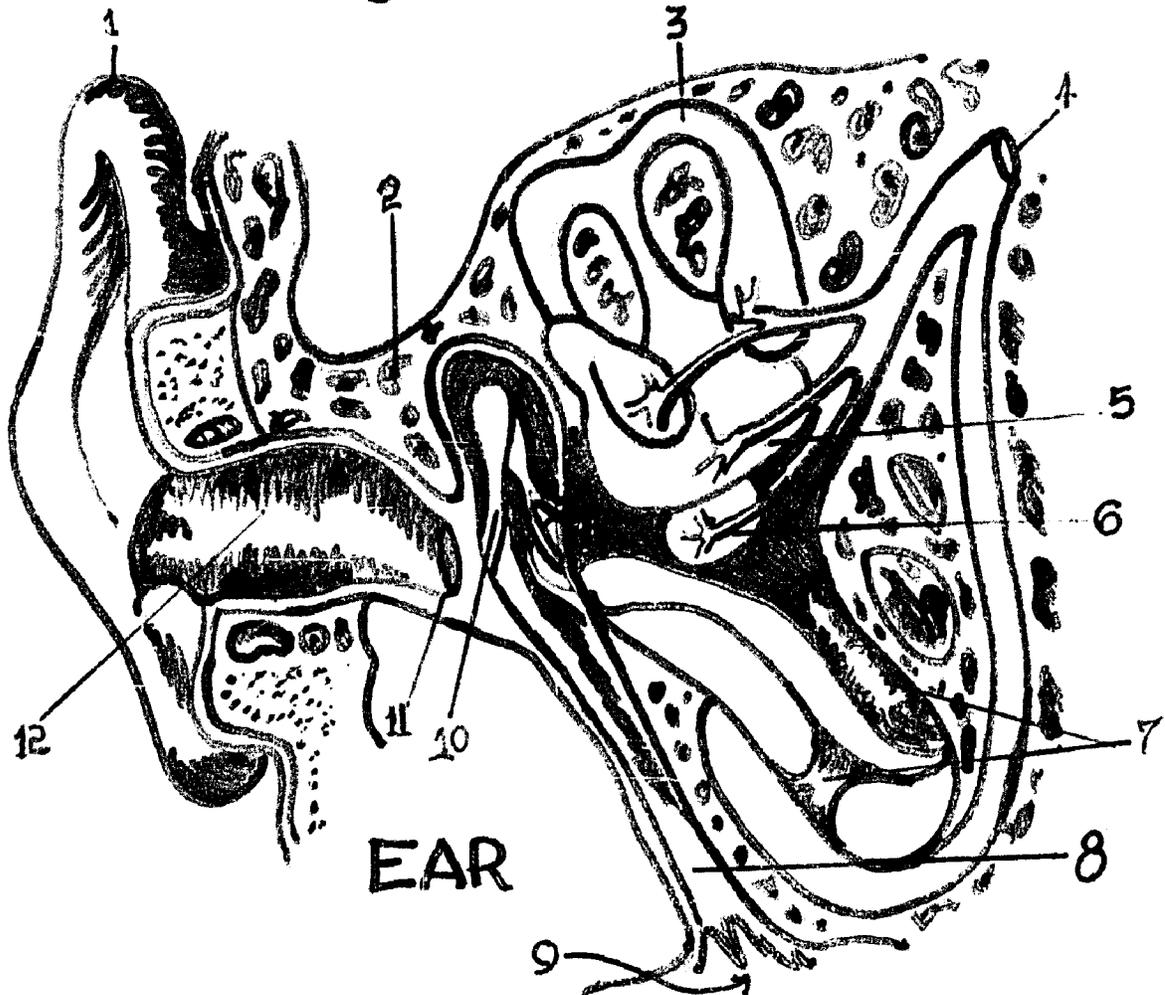
155. Number one of the eye is the (1) lens, (2) vitreous humor, (3) fovea, (4) aqueous humor, (5) iris.
156. Number two of the eye is the (1) lens, (2) oblique muscle, (3) ciliary muscle, (4) iris, (5) vitreous humor.
157. Number three of the eye is the (1) ciliary muscle, (2) aqueous humor, (3) eye muscle, (4) iris, (5) pupil.
158. Number four of the eye is the (1) retina, (2) choroid coat, (3) sclerotic coat, (4) pupil, (5) fovea.
159. Number five of the eye is the (1) lens, (2) iris, (3) pupil, (4) retina, (5) cornea.
160. Number six of the eye is the (1) fovea, (2) lens, (3) iris, (4) pupil, (5) retina.
161. Number seven of the eye is the (1) fovea, (2) lens, (3) iris, (4) pupil, (5) optic nerve.
162. Number nine of the eye is the (1) fovea, (2) lens, (3) vitreous humor, (4) cornea, (5) iris.
163. Number ten of the eye is the (1) iris, (2) lens, (3) pupil, (4) fovea, (5) muscle.
164. Number eleven of the eye is the (1) lens, (2) cornea, (3) fovea, (4) iris, (5) pupil.
165. Number twelve of the eye is the (1) pupil, (2) cornea, (3) iris, (4) fovea, (5) lens.
166. Number nine of the eye is the (1) vitreous humor, (2) lens, (3) iris, (4) pupil, (5) fovea.

THE EAR

167. Number one of the ear is the (1) cochlea, (2) saccule, (3) ear drum, (4) utricle, (5) bone.



EYE



EAR

Spring Quarter Final Examination

Sec. 133, S. O. 1955

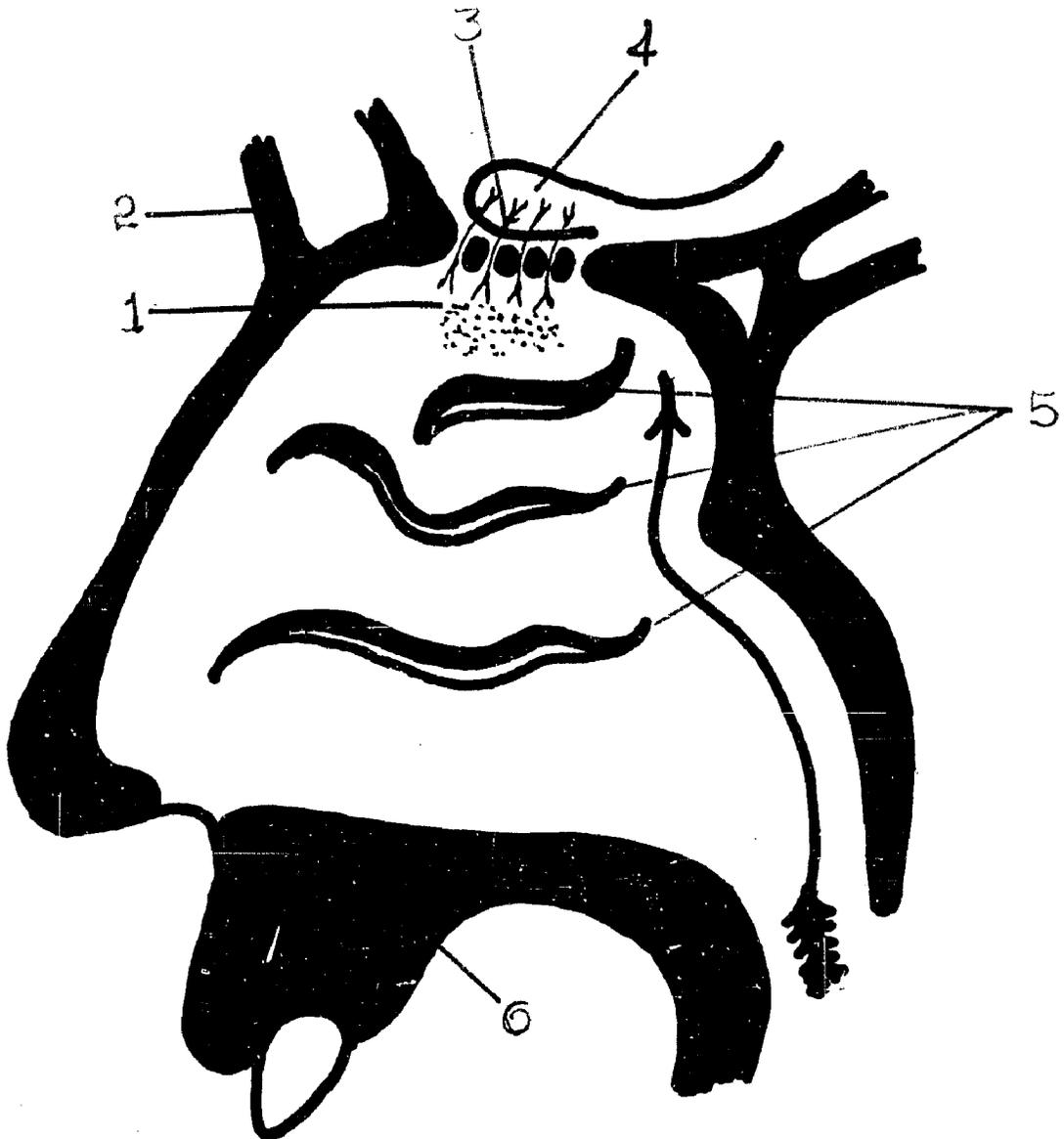
168. Number two of the ear is the (1) bone, (2) saccule, (3) utricle, (4) ear drum, (5) cochlea.
169. Number three of the ear are the (1) ossicles, (2) cochleas, (3) semicircular canals, (4) utricle, (5) saccule.
170. Number four of the ear is the (1) auditory canal, (2) auditory nerve, (3) cochlea, (4) ossicles.
171. Number five of the ear is the (1) saccule, (2) ossicle, (3) auditory nerve, (4) cochlea, (5) utricle.
172. Number six of the ear is the (1) saccule, (2) utricle, (3) cochlea, (4) ear drum.
173. Number seven of the ear is the (1) eustachian tube, (2) cochlea, (3) ear drum, (4) pinna, (5) saccule.
174. Number eight of the ear is the (1) ear drum, (2) eustachian tube, (3) cochlea, (4) saccule, (5) utricle.
175. Number ten of the ear is the (1) ossicles, (2) ear drum, (3) saccule, (4) utricle.
176. Number eleven of the ear is the (1) ear drum, (2) cochlea, (3) auditory canal, (4) utricle.

THE NOSE

177. Number one of the nose is the (1) bone, (2) olfactory receptor, (3) mouth cavity, (4) concha of nose.
178. Number three of the nose is the (1) olfactory receptor, (2) mouth cavity, (3) olfactory bulb of brain, (4) nares.
179. Number four of the nose is the (1) anterior nares, (2) concha of nose, (3) bone, (4) brain cavity.
180. Number five of the nose is the (1) upper mouth cavity, (2) posterior nares, (3) concha, (4) olfactory bulb.

END OF IDENTIFICATION

181. Plant and animal effectors (1) receive the stimulus, (2) conduct the stimulus, (3) respond to the stimulus.
182. A structure which actually performs the activities involved in an organic response is an (1) stimulus, (2) conductor, (3) receptor, (4) effector.



**Cross Section of Right Nasal Cavity
in Man**

183. Organs which carry out the responses of the organism are (1) conductors, (2) sensory cells, (3) effectors.
184. Muscles are (1) conductors, (2) effectors, (3) receptors.
185. Muscles attached to the bone for skeletal movement are (1) striated muscles, (2) cardiac muscles, (3) smooth muscles.
186. Muscles found in the digestive tract are (1) cardiac muscles, (2) smooth muscles, (3) striated muscles, (4) striped muscles.
187. One of these may be classified as plant effectors (1) hormones, (2) tips of leaves and roots, (3) the regions of cell elongation in roots, stems, and leaves.
188. Muscles found in the heart are (1) smooth muscles, (2) cardiac muscles, (3) striped muscles.
189. Striated muscles are (1) involuntary muscles, (2) voluntary muscles, (3) neither, (4) both.
190. Smooth muscles are (1) voluntary muscles, (2) involuntary muscles, (3) action only, (4) non-action.
191. Cardiac muscles are (1) non-action muscles, (2) involuntary muscles, (3) voluntary muscles, (4) non-moving muscles.
192. Glands are (1) enzymes, (2) hormones, (3) effectors, (4) receptors.
193. Endocrine glands secrete (1) muscle fluids, (2) enzymes, (3) hormones, (4) glandular acids.
194. The pituitary gland is located in the (1) abdomen, (2) thoracic cavity, (3) floor of the brain, (4) neck.
195. The thyroid glands are located in the (1) thorax, (2) neck, (3) lungs, (4) kidneys.
196. The parathyroid glands are located or embedded in the (1) pancreas, (2) pineal, (3) thyroid, (4) adrenals.
197. One of the following glands can be classified as an endocrine and exocrine in function (1) thymus, (2) pineal, (3) gonads, (4) pancreas.
198. The word hormone means (1) to drain, (2) to stop, (3) to excite, (4) to rebirth.
199. An increase in the metabolic rate could be traced to hyperfunction of the (1) adrenals, (2) pituitary, (3) thyroid, (4) gonads.

200. Reflexes which produce muscular and glandular responses that carry on the internal adjustments of the body are known as (1) vital centers, (2) vital reflexes, (3) vital organs, (4) vital nerves.
201. The vigor of our breathing depends upon the amount of (1) chlorine in the breathing centers, (2) carbon in the breathing centers, (3) acid in the breathing centers.
202. Carbon dioxide in the breathing mechanism is (1) a slight, (2) essential, (3) non-essential, (4) of little use.
203. The regular rhythm of breathing is dependent not upon direct stimulation of the center by acid, but upon reflexes from the receptors located in the (1) chest tissue, (2) lung tissue, (3) heart tissue, (4) diaphragm tissue.
204. Breathing differs from most of our internal adjustments in being carried out by (1) skeletal muscles, (2) glands, (3) heart muscles, (4) smooth muscles.
205. Neurons which run from the autonomic ganglia to the heart muscle, smooth muscles and glands are known as (1) wane fibers, (2) nerve fibers, (3) tissue fibers, (4) postganglionic fibers.
206. Neurons which run from the spinal cord to the autonomic ganglia are known as (1) post ganglionic fibers, (2) preganglionic fibers, (3) nerve fibers.
207. A chemical formed when parasympathetic fibers act upon their effectors is considered to be (1) adrenin, (2) acetylcholine, (3) sympathin, (4) vasoconstrictor.
208. Sympathin chemical is formed when sympathetic fibers act upon their (1) hormones, (2) effectors, (3) receptors.
209. A system composed of the sympathetic division of the autonomic nervous system and the adrenal glands, preparing the body for activity is known as the (1) vasoconstrictor system, (2) sacral system, (3) sympathicoadrenal system.
210. A hormone reinforcing the activity of the sympathetic nervous system is known as (1) adrenin, (2) sympathin, (3) pituitrin, (4) parathormone.
211. Inhibiting digestive and sexual activity is brought about by a (1) sacral nerve, (2) cranial nerve, (3) sympathetic nerve.
212. Augmenting digestive and sexual activities in an opposing role is the (1) sacral and sympathetic, (2) sympathetic and cranial, (3) craniosacral nerves.

213. Digestive responses involve nervous impulses affecting (1) muscles, (2) glands, (3) muscles and glands.
214. Muscular coordination is controlled by the (1) spinal cord, (2) cerebellum, (3) medulla oblongata.
215. The vigor of peristaltic movements controlled by a set of nerves in the walls of the stomach is controlled by (1) glandular stimulation, (2) autonomic nerve fibers, (3) action of the central nervous system.
216. It is characteristic for every part of the sympathetic system to go into action (1) at once, (2) slowly, (3) without stimulation.
217. Reflexes occurring in one part of the body at a given time, to meet special local conditions are known as (1) parasympathetic reflexes, (2) sympathetic reflexes, (3) sympathetic ganglion reflexes.
218. Smooth muscle cells have (1) many nuclei, (2) five nuclei, (3) one nuclei, (4) two nuclei.
219. Muscle cells of the heart have (1) two nuclei, (2) three nuclei, (3) one nuclei, (4) many nuclei.
220. Tendons are (1) nerve fibers, (2) bones, (3) elongated muscle cells, (4) tissues of bone attachment.
221. Biceps are (1) three headed muscles, (2) five headed muscles, (3) two headed muscles.
222. Triceps are (1) three headed muscles, (2) four headed muscles, (3) six headed muscles.
223. Penniform muscles are (1) pin-like, (2) fan-like, (3) knife-like, (4) fork-like.
224. Muscles in the iris of the eye which contract and expand the pupil are (1) striped muscles, (2) striated muscles, (3) cardiac muscles, (4) smooth muscles.
225. Muscles in the resting position are contracted slightly; this condition is called (1) reflex arc, (2) muscle tones, (3) contraction, (4) relaxing.
226. When biceps muscles contract the triceps (1) relax, (2) contract, (3) contract and relax.
227. Respiration and circulation are controlled by the (1) cerebrum, (2) medulla oblongata, (3) cerebellum, (4) spinal cord.

228. Vital reflexes having to do with heat control are (1) local reflexes, (2) total reflexes, (3) cooling and warming reflexes.
229. In cold weather, the first sign that heat is being lost too rapidly is the formation of (1) wrinkles in the skin, (2) heat bumps, (3) goose-pimples.
230. On a hot summer day, the temperature of a "cold-blooded" animal in relation to a "warm-blooded" animal is (1) medium, (2) higher, (3) lower.
231. There are (1) five kinds of effectors (2) three kinds of effectors, (3) two kinds of effectors, (4) four kinds of effectors.
232. A hormone involved in emotional behavior is secreted by the (1) pituitary gland, (2) parathyroid glands, (3) adrenal glands.
233. Regulation of calcium metabolism in the organism is attributed to the (1) thymus gland, (2) pineal gland, (3) thyroid gland, (4) parathyroid glands.
234. The pituitary gland is composed of (1) four parts, (2) three parts, (3) two parts, (4) six parts.
235. The glands responsible for the organisms reproductive behavior is (1) thyroid, (2) gonads, (3) adrenals, (4) pituitary.
236. Over activity in glands is termed as (1) hypofunction, (2) hyperfunction, (3) abnormal function.
237. Over development of jaw-bones, widely separated teeth, over-sized hands and feet is generally known as (1) cretinism, (2) acromegaly, (3) epiphyses.
238. A condition in which a gland secretes some substance other than its regular substance is called (1) hypofunction, (2) dysfunction, (3) hyperfunction, (4) autocoid.
239. Endocrine glands are found in (1) some animal species, (2) all animal species, (3) specific animal species.
240. The hormone furnishing the body with a constant supply of carbohydrate fuels is known as (1) thyroxin, (2) insulin, (3) cortin, (4) adrenalin, (5) cortisone.
241. Most responses of internal adjustment are performed by the heart muscles, smooth muscles and glands which are innervated by (1) peripheral nervous system, (2) central nervous system, (3) autonomic nervous system.

242. The autonomic ganglia and the pre-and-post-ganglionic nerve fibers constitute the (1) central nervous system, (2) autonomic nervous system, (3) peripheral nervous system.
243. The cranial, sympathetic, and sacral are divisions of the (1) central nervous system, (2) peripheral nervous system, (3) autonomic nervous system.
244. The cranial division, in which the pre-ganglionic fibers leave is known as (1) brain stem, (2) spinal cord (lower region), (3) spinal cord.
245. The sympathetic division, in which the pre-ganglionic fibers leave known as (1) spinal cord (middle region), (2) brain stem, (3) spinal cord (lower region).
246. The sacral division, in which the pre-ganglionic fibers leave is known as the (1) spinal cord (middle region), (2) spinal cord (lower region), (3) brain stem.
247. The sympathetic system and the adrenal glands together are called (1) sympathico-adrenal system, (2) sympathetic, (3) parasympathetic.
248. The parasympathetic is opposed in its action on the effectors to the (1) sympathico-adrenal system, (2) autonomic nervous system, (3) sympathetic.
249. The part of the nervous system that bears impulses to the glands and smooth muscles is recognized as the (1) central nervous system, (2) autonomic nervous system, (3) peripheral nervous system.
250. The primary function of the autonomic nervous system is to (1) stimulate visceral organs, (2) stimulate nerves, (3) activate hormones, (4) activate muscles and glands.
251. The autonomic nervous system is sometimes referred to as the (1) excretory system, (2) respiratory system, (3) visceral system.
252. The three major divisions of the brain are (1) cerebellum, cerebrum, and medulla-oblongata, (2) central, peripheral and autonomic nervous system, (3) the cerebellum, cerebrum, and spinal cord, (4) the central nervous and the autonomic nervous system.
253. The three major divisions of the nervous system are (1) central nervous system, (2) the central, peripheral, and autonomic nervous system, (3) the cerebellum, cerebrum, and the medulla-oblongata, (4) the cerebellum, cerebrum, and spinal cord.
254. A simple reflex arc involves (1) the cerebrum and spinal cord, (2) the brain and stimulated organs, (3) stimulated organ and the spinal cord, (4) the brain and spinal cord.

255. The part of the brain which has to do with the "higher" (3rd level) response is (1) the cerebrum, (2) cerebellum, (3) thalamus, (4) medulla oblongata.
256. The part of the nervous system which has to do with the "lower" (first order) responses is the (1) none of the below, (2) spinal cord, (3) cerebellum, (4) medulla-oblongata.
257. Responses such as working, playing, reading, talking, etc. are controlled by the (1) cerebellum, (2) cerebrum, (3) spinal cord, (4) medulla-oblongata.
258. Muscular coordination is controlled by the (1) spinal cord, (2) cerebrum, (3) cerebellum, (4) medulla-oblongata.
259. The long thin part of the neuron which carries impulses from the cell body to points of synaptic contact with other neurons is known as the (1) axon, (2) end brush, (3) dendrite, (4) cell body.
260. A simple response which can be integrated in the spinal cord or brain stem is called a (1) neuron, (2) synapse, (3) response, (4) integration, (5) reflex.
261. The point where an impulse travels from one neuron to the other is called (1) end brush, (2) synapse, (3) impulse, (4) axon, (5) dendrite.
262. The nerve cells which transmit impulses from one point to another within the central nervous system are called (1) sensory neurons, (2) central neurons, (3) motor neurons, (4) connector neurons.
263. The nerve cells which carry impulses from the sense organs to the central nervous system are called (1) sensory neurons, (2) central neurons, (3) motor neurons.
264. The nerve cells which carry impulses from the central nervous system to the effectors are called (1) central neurons, (2) sensory neurons, (3) motor neurons.
265. A nerve cell is called a (1) axon, (2) neuron, (3) dendrite, (4) end-brush, (5) synapse.
266. Plant and animal effectors (1) conduct the stimulus, (2) respond to stimuli, (3) receive the stimulus.
267. Plant and animal receptors (1) receive the stimulus, (2) respond to the stimulus, (3) conduct the stimulus.
268. Plant and animal conductors (1) conduct the impulses, (2) receive the stimulus, (3) respond to the stimulus.

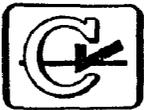
269. The receptors, conductors, and effectors are the main divisions of the (1) nervous system, (2) digestive system, (3) response system.
270. When the brain develops, the surface becomes covered with furrows, the deeper furrows are called (1) surface folds, (2) ridges, (3) passe, (4) convolutions, (5) fissures.
271. The cerebrum is divided into (1) one hemisphere, (2) four hemispheres, (3) two hemispheres, (4) three hemispheres.
272. The spinal cord and brain are wrapped in three sheets of connective tissue, known as (1) pericardium, (2) meninges, (3) endolymph.
273. Modern man has a brain volume of about (1) 600 cc, (2) 1500 cc, (3) 940 cc, (4) 1000 cc.
274. The most posterior part of the brain, lying next to the spinal cord is the (1) cerebrum, (2) medulla oblongata, (3) cerebellum, (4) pons.
275. The reflex centers which control many of the fundamental physiological processes of the body such as respiration, heart rate, etc. are located in the (1) cerebrum, (2) cerebellum, (3) medulla oblongata, (4) pons.
276. Above the medulla is located the (1) pons, (2) midbrain, (3) cerebrum, (4) cerebellum.
277. Running crosswise on the ventral side of the brain just below the cerebellum is a thick bundle of fibers, known as (1) pons, (2) midbrain, (3) cerebellum.
278. In front of the cerebellum and pons lies the (1) pons, (2) midbrain, (3) cerebellum.
279. Learned behavior is controlled by the (1) cerebellum, (2) pons, (3) midbrain, (4) cerebrum.
280. The first level responses are controlled by the (1) cerebrum, (2) cerebellum, (3) spinal cord.
281. Any chain of neurons leading from a receptor through the spinal cord and back to an effector is a (1) reflex action, (2) reflex arc, (3) synapse, (4) dendrite.
282. The response that results from a stimulus received through a reflex arc is called (1) synapse, (2) dendrite, (3) axon, (4) reflex action.
283. The point of contact between the endbrush of one neuron and the dendrite of another neuron is called a (1) reflex action, (2) reflex arc, (3) synapse, (4) cell body.

284. The second level response involves (1) lower brain centers, (2) spinal cord, (3) cerebrum, (4) cerebellum.
285. The third level response involves (1) lower brain centers, (2) spinal cord, (3) cerebrum, (4) cerebellum.
286. The section of the brain which is a fissured and convoluted mass, composed of two hemispheres is called (1) medulla oblongata, (2) cerebellum, (3) cerebrum, (4) pons.
287. In the peripheral nervous system, the number of nerves are (1) 12 pairs, (2) 31 pairs, (3) 43 pairs.
288. The cranial nerve which innervates the eye is called the (1) olfactory nerve, (2) optic nerve, (3) auditory nerve, (4) vagus nerve.
289. The cranial nerve which innervates the ear is called the (1) optic nerve, (2) olfactory nerve, (3) auditory nerve, (4) vagus nerve.
290. The cranial nerve which innervates the nose is called the (1) olfactory nerve, (2) optic nerve, (3) vagus nerve, (4) auditory nerve.
291. Dilation of the eye pupil is brought about by action of a (1) sympathetic nerve, (2) sacral nerve, (3) cranial nerve.
292. Contraction of the eye pupil is brought about by (1) sympathetic nerve, (2) parasympathetic nerve, (3) spinal sympathetic nerve.
293. Acceleration of the heart beats is done by the (1) sympathetic nerve, (2) cranial nerve, (3) sacral nerve.
294. Inhibiting digestive and sexual activities is brought about by a (1) sympathetic nerve, (2) sacral nerve, (3) cranial nerve.
295. The longitudinal fissure divides the cerebrum into (1) front and back, (2) right and left, (3) sensory and motor.
296. The fissure of Rolando divides the cerebrum into two areas (1) front and back, (2) right and left, (3) sensory and motor.
297. The occipital lobe of the brain occupies the (1) anterior end of the cerebral hemisphere, (2) central part of the cerebral hemisphere, (3) posterior extremity of the cerebral hemisphere.
298. The brain and spinal cord are enclosed within (1) five membranes, (2) two membranes, (3) three membranes.
299. The autonomic nervous system is composed of (1) sympathetic, (2) parasympathetic, (3) sympathetic and parasympathetic.

Spring Quarter Final Examination

Sc. 133, 3. Q. 1955

300. The cranial and sacral systems combined constitute the (1) parasympathetic, (2) sympathetic, (3) sympathico-adrenal system.



CALIFORNIA TEST BUREAU

5916 HOLLYWOOD BLVD. HOLLYWOOD 3-2384

LOS ANGELES 28, CALIFORNIA

April 10, 1958

Mr. Benjamin E. Hatcher
Alabama State College
Montgomery, Alabama

Dear Mr. Hatcher:

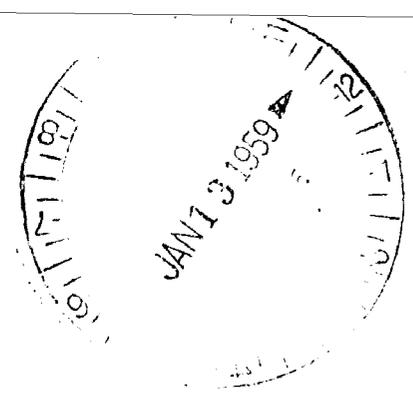
Thank you for your letter of April 4 requesting permission to use our California Capacity Questionnaire, Form A, in your doctoral dissertation.

This letter will grant you permission to use the above-mentioned test for this purpose. We assume that you will give the customary credit to the California Test Bureau.

Sincerely yours,

June C. Duran
Administrative Vice President

JCD:mjs



1215 Lapsley Street
Selma, Alabama
January 10, 1959

Mrs. Gladys Martin, Secretary
Graduate School
Wayne State University
Detroit 2, Michigan

Dear Mrs. Martin:

In reply to your letter of December 11, 1958, I wish to state that I have since received permission from each of the publishers to use the following tests included in my dissertation:

- 1) Iowa Silent Reading Test, copyrighted in 1943 by World Book Company.
- 2) Otis Quick-Scoring Mental Ability Test, copyrighted in 1937 by World Book Company.
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I regret the prolonged delay.

Yours truly

Benjamin E. Hatcher
Benjamin E. Hatcher

APPENDIX B

Samples of Commercially Published Tests Used

Iowa Silent Reading Tests

California Capacity Questionnaire

Otis Quick- Scoring Mental Ability Tests

Essential High School Content Battery

Cooperative Biology Test

IOWA SILENT READING TESTS

NEW EDITION

By H. A. GREENE
 Director, Bureau of Educational Research and Service, University of Iowa

A. N. JORGENSEN
 President, University of Connecticut

and V. H. KELLEY
 University Appointment Office, University of Arizona, Tucson, Arizona

Median Score	
Grade Percentile	
Grade Equiv.	
Age Equiv.	

Adv.
B_M
 (Revised)
 New Edition

ADVANCED TEST : FORM B_M (Revised)

Name..... Age..... Grade.....
Years Months

Sex..... Date..... 19..... Teacher.....
Boy Girl

School..... City and state.....

PROFILE CHART

No.	TEST	STAND. SCORE
1	Rate: A + B	
	Comprehension: A + B	
2	Directed Reading	
3	Poetry Comprehension	
4	Word Meaning	
5	Sentence Meaning	
6	Paragraph Comprehension	
7	Location of Information A. Use of Index	
	B. Selection of Key Words	

Score Scale	TEST							Median Score		
	1R	1C	2	3	4	5	6		7A	7B
230										
220										
210										
200										
190										
180										
170										
160										
150										
140										
130										
120										
110										
100										

Published 1943 by World Book Company, Yonkers-on-Hudson, New York, and Chicago, Illinois
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TEST 1. RATE-COMPREHENSION — PART A

DIRECTIONS. This is a test to see how well and how rapidly you can read silently. Read the story below very carefully so that you can answer questions about it. At the end of one minute you will hear the word "Stop." Put a circle around the word you are then reading and wait for further instructions.

RUBBER

1 Rubber is a substance composed of carbon and hydrogen, obtained from a milky liquid known as latex. 2 Latex comes from the roots, stems, branches, leaves, and fruit of a wide variety of trees. 3 For the most part these trees grow in the tropics. 4 The milky juice is not the true sap, but a secretion which does not seem to be essential to the life of the plant. 5 If this liquid is allowed to stand for a few hours, the particles of rubber rise to the surface. 6 The doughy mass thus obtained can easily be rolled into a sheet or other convenient form. 7 When allowed to dry, it loses its doughy character and becomes the firm, elastic solid known as raw or crude rubber. 8 In whatever form the crude rubber comes to the factory, the first thing that must be done is to clean it thoroughly and test it, as rubber varies greatly in composition. 9 Until it is used it is stored in a cool, dark place, usually underground. 10 When a load is brought to the manufacturing plant, the first step is to steam it into a soft, plastic mass. 11 It is then thoroughly washed by being passed through heavy rollers while water is sprinkled on from above. 12 Finally it comes out looking like a thin piece of sheet sponge. 13 Vacuum driers take this spongy sheet and extract every particle of moisture. 14 Next it is put into mills which rub and crush it until it loses its elasticity and becomes soft and plastic like putty. 15 In this form it is ready for the mixing room, where sulphur and other ingredients are added to it. 16 Each rubber product has a special requirement which must be taken into account in the preparation. 17 For some articles the substance must be hard, for others soft; some must stand abrasion, others heat. 18 Some will come in contact with acid, others must stand continuous pounding, and still others a steady pressure. 19 Each ingredient is weighed with painstaking care. 20 Then the mixture is rolled between hot rollers, from which it emerges a sheet of prepared rubber about a quarter of an inch in thickness. 21 The rubber is then ready for the products factory. 22 After the articles have been fashioned, they are vulcanized. 23 That is, the rubber is cured by the use of heat. 24 The hardness of the article is determined by the amount of heat and the length of time it is applied.

Wait for further directions. Do not answer any of the questions until you are told to do so.



- 10. When ready for the mixing room, the rubber is in the form of — 1 an elastic solid 2 a soft, plastic mass 3 sheet sponge.
9. What determines the kind and amount of the ingredients which are added to the rubber in the mixing room? 1 ultimate use of article 2 moisture content 3 purity of sample.
8. Manufactured rubber articles are first fashioned in the — 1 mixing room 2 rubber mill 3 products factory.
7. What name is given to the elastic substance when it first comes to the factory? 1 dough 2 crude rubber 3 elastic.
6. Special chemicals are added to the rubber in the mixing room — 1 to dry it 2 to purify it 3 to vary the quality.
5. What is used to cleanse the rubber at the factory? 1 hot oil 2 fresh water 3 strong acid.
4. The rubber is tested when it first comes to the factory to determine its — 1 composition 2 moisture content 3 elasticity.
3. How are the particles of rubber separated from the liquid? 1 by allowing it to stand 2 by stirring it 3 by heating it.
2. What is the name of the liquid from which rubber is made? 1 sap 2 latex 3 secretion.
1. What is meant by the vulcanization process? 1 adding chemicals 2 purifying the rubber 3 curing by heat.

DIRECTIONS. Without looking at the story you have just read, answer these questions about it. You will have two minutes for this work. Read each question and the answers given below it. Select the correct answer. Notice the number of this correct answer. In the answer spaces at the right fill the space under this number. The sample is answered correctly.

SAMPLE. How is rubber obtained?

Table with 3 columns labeled 1, 2, 3 and rows corresponding to the sample and questions 1-10. Row 1 has a checkmark under column 2.

TEST 1. RATE-COMPREHENSION — PART B

3

DIRECTIONS. Read this story very carefully so that you can answer questions about it. When you hear the word "Stop," put a circle around the word you are then reading and wait for further instructions.

THE INFLUENCE OF THE PRESS

¹ The policy of the government in a democracy is decided in the long run by public opinion. ² The government sometimes takes a position that is unpopular, but it must justify its course in order to hold the support of the majority of the people. ³ If the party in power fails to do this, it will eventually be voted out of office and a party more to the liking of the majority will be set up in its place. ⁴ The people are the masters, and the greatest problem that confronts the United States is that of making the people fit to exercise their sovereignty.

⁵ One of the most important instruments in the formation and expression of public opinion is the printing press. ⁶ The freedom of the press from interference by the government has been guaranteed in the provisions of the first ten Amendments. ⁷ It must be admitted, however, that the people, during both the Civil War and the World War, consented to governmental interference with the press in the form of an extensive censorship of the news. ⁸ At such times the pressure of military necessity creates a situation which would not be tolerated in times of peace. ⁹ The press itself recognizes that when the very existence of the nation is at stake, it must refrain from publishing information that will aid the enemy or weaken the people's morale.

¹⁰ Undoubtedly the most influential division of the press is the newspaper. ¹¹ The large daily newspaper has correspondents in every part of the world, who telegraph daily accounts of events in their respective territories. ¹² Local reporters are also assigned to keep in touch with the many activities of the city, and to write accounts of events that are of interest to the local readers of the paper. ¹³ In addition to the daily news, many newspapers, especially in their elaborate Sunday editions, conduct departments intended to promote general culture by reviewing new books, scientific discoveries, plays at the local theaters,

musical attractions, art exhibits, and many other similar features.

¹⁴ The public is entitled to an account of the events of the world, uncolored by editorial opinion. ¹⁵ Too often the news reports are tinged with propaganda either by the insertion of editorial comment in the text of the story or by misleading headlines designed to guide the judgment of the reader. ¹⁶ Newspapers with the best of intentions find it impossible always to keep the reporter's natural bias out of his stories.

¹⁷ The editorial columns are the legitimate place for the expression of opinion about the news of the day. ¹⁸ To express opinion, to interpret the news by intelligent comment, is the business of the editor. ¹⁹ News columns are read to discover the facts and consequently should be unbiased. ²⁰ Editorial columns should be read in much the same way that one might discuss the news with an intelligent neighbor, to test one's opinions and perhaps to modify them, if strong arguments for contrary views are presented. ²¹ The editorial page should be approached in a critical frame of mind, in which the reader expects to find, not bare facts, but the interpretation of these facts by an individual who is often biased in his judgment.

²² The business interests of large advertisers often influence the policy of the newspaper. ²³ The largest part of the cost of publishing a newspaper is paid by businessmen and corporations using its advertising columns to display their wares. ²⁴ The people who subscribe for the paper pay a very small percentage of the total cost. ²⁵ It is not surprising, then, that some newspapers treat large business interests with more than benevolent neutrality. ²⁶ It is, of course, contrary to public interest to have the organs of public opinion controlled by business interests; for business corporations, like individuals, are likely to take a biased view of questions which might concern their profits.

Wait for further directions. Do not turn this page until you are told to do so.

←3

RATE: A + B	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Standard Score	79	81	84	88	91	93	95	100	102	105	107	112	115	118	121	127	130	134	137	144	147	151	154	160	163	166	169	172	175	178	181	184	187	189

RATE: A + B	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Standard Score	192	195	197	199	202	203	205	206	208	211	213	216	218	220	222	223	225

TEST 1. RATE-COMPREHENSION — PART B (Cont'd)

DIRECTIONS. Without looking again at the article, answer these questions. Study these statements carefully. Decide whether, in terms of the article, a statement is true, false, or not discussed. If, according to the article, the statement is true, fill in the answer space under T (for true); if false, fill in the space under F (for false). If a statement is not discussed in the article (even though true or false in itself), fill in the space under N (for not discussed). The sample is answered correctly.

SAMPLE. Public opinion never determines policy in a democratic government.

- 1. In the long run, the political party in power in a democratic nation must express the wishes of the majority.
2. The weekly and monthly magazines exert more influence on public opinion than do the daily newspapers.
3. Newspaper stories and headlines always tell the truth.
4. News reporters write accounts of activities within the community as a means of creating local interest.
5. An important instrument in the formation and expression of public opinion is the radio.
6. The Twelfth Amendment to the Constitution provides for freedom of the press.
7. The policy of the government in a democracy is determined by the attitude of the press.
8. The greatest problem that confronts our government today is that of educating the citizens to exercise their sovereignty wisely.
9. Freedom of the press is provided for in the Preamble to the Constitution.
10. Censorship of the press is enforced in times of great military necessity.
11. There are many highly organized agencies for the collection and distribution of news.
12. Editorial interpretation should be emphasized in the news column.
13. Weekly summaries of current news are replacing the newspapers in the formation of public opinion.
14. The editorial column of a newspaper is the place in which the publisher's opinions and critical interpretation of the news of the day are presented.
15. The reader should accept any statement presented in the editorial columns of a newspaper as an unquestionable fact.
16. The President, as commander-in-chief of the army, may order a newspaper to cease publication.
17. Large corporations frequently own large amounts of stock in the companies publishing newspapers.
18. The policy of a newspaper is sometimes very definitely influenced by the interests of large advertisers.
19. News reporters often refuse to cooperate with government agencies in releasing news of great national importance.
20. Newspapers publishing false and libelous stories may be punished by law.
21. Newspapers frequently conduct departments intended to stimulate interest in some field of general culture.
22. The advertisements in a newspaper are a good index of its policy.
23. The price the reader pays for his paper is practically the same as the cost of publication.
24. The active control of newspaper policy by big business interests is unfavorable to public welfare.
25. Newspaper editors find it easy to keep reporters from coloring their stories with their own personal views.

Grid for marking answers with columns T, F, N and rows corresponding to each question number.

Do not turn this page until you are told to do so.

COMPREHENSION

Table with 32 columns for scores and 2 rows: No. Right: A + B and Standard Score.

TEST 2. DIRECTED READING

DIRECTIONS. A story is given below, with each sentence numbered. These numbers are to help you answer questions about the story. Read each question and find the sentence in the story which answers it. Notice the number of this sentence. Find this number among the answer spaces at the right of the question and fill in the space under it. Look at the sample below. Space No. 1 is filled because the question in the sample is answered in sentence No. 1 in the article. Answer the other questions in a similar manner.

You will have *three minutes* for this work. You may reread parts of the story if you need to do so.

GLASS

¹ Glass is made by melting sand with lime, potash, soda, or oxide of lead at a great heat. ² Silica, which is the basis of sand, enters into all varieties of glass. ³ It has more to do with determining the quality than any of the other ingredients. ⁴ The purity of the ingredients and the proportion in which they are mixed also have much to do with the quality of the glass.

⁵ Sand may be said to form the basis of the glass. ⁶ Consequently the clearness of the glass depends largely upon the quality of this ingredient. ⁷ The proportion of silica varies in different kinds of glass. ⁸ In lead glass it is from 42 to 60 per cent; plate contains about 79 per cent, and window glass about 70 per cent. ⁹ The amount of silica usually determines the degree of hardness, though other substances have some effect upon this quality. ¹⁰ Lead tends to make glass soft. ¹¹ Sometimes lime is used to make it hard.

¹² Nearly all the silica used in the glass factories within the last fifty years is in the form of sand. ¹³ Prior to that the best qualities of glass were produced by crushing and washing flint and quartz rock. ¹⁴ This process was so expensive that it made the glass too costly for general use. ¹⁵ Bohemian and a few other varieties of European glass are still made from silica obtained in this way. ¹⁶ The expense of Bohemian glass in this country restricts it to the homes of wealthy people.

¹⁷ In the manufacture of glass of high grade, the quality and purity of sand are of the greatest importance. ¹⁸ The most searching examination and careful tests are made to determine the nature and extent of any impurities which the sand may contain. ¹⁹ These impurities are commonly oxide of iron (iron rust), alumina in the form of clay, loam, gravel, and decaying animal or vegetable matter. ²⁰ Most of these impurities except iron can be removed by burning and washing. ²¹ Oxide of iron can be removed only by the use of chemicals. ²² Iron is the most troublesome of all because it discolors the glass and destroys its transparency. ²³ For the best qualities of glass it must be entirely free from iron. ²⁴ A proportion greater than one half of one per cent renders the sand worthless for even the poorest quality of glass.

SAMPLE. In what sentence does the article tell how glass is made?

1. What one substance is always present in some form in all kinds of glass? 1
2. What two factors in the manufacture of glass greatly affect its quality? 2
3. What effect does the quality of sand have on glass? . . . 3
4. Is silica used in the same amounts in different varieties of glass? 4
5. What substance used in glass making tends to make the glass less brittle? 5
6. What percentage of silica is found in plate glass? . . . 6
7. What one ingredient has the greatest effect on the hardness of glass? 7
8. Is lime mentioned as an ingredient which is sometimes used to affect the hardness of glass? 8
9. In what form is the silica obtained in most modern glass factories? 9
10. From what sources is the silica obtained which is used in making Bohemian glass? 10
11. What kinds of glass are still made from the silica in quartz rock? 11
12. What effect does the use of flint and quartz rock have on the cost of glass? 12
13. Are tests made for the presence of impurities in the sand that is to be used for glass? 13
14. What kind of sand is required when making the best grade of glass? 14
15. What foreign-made glass is found only in the homes of the rich? 15
16. What are the most common impurities that are found in sand? 16
17. What effect does iron have in the manufacture of glass? 17
18. What method is used in removing many of the harmful impurities from sand? 18
19. Is the science of chemistry employed in the manufacture of glass? 19
20. What per cent of iron in sand makes it useless for glass making? 20

1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
2	3	4	5	6
4	5	6	7	8
6	7	8	9	10
6	7	8	9	10
8	9	10	11	12
10	11	12	13	14
10	11	12	13	14
10	11	12	13	14
11	12	13	14	15
11	12	13	14	15
14	15	16	17	18
14	15	16	17	18
15	16	17	18	19
18	19	20	21	22
18	19	20	21	22
19	20	21	22	23
20	21	22	23	24
20	21	22	23	24

5→

Do not turn this page until you are told to do so.



NUMBER RIGHT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Standard Score	121	135	142	149	154	159	164	174	179	183	188	197	201	204	208	212	215	217	218	219	220

TEST 3. POETRY COMPREHENSION

DIRECTIONS. This is a test of your ability to read and interpret poetry. Read the poem below very carefully before attempting to answer any of the questions about it.

Notice that in this selection certain passages are marked by numbered brackets. Read each question and find the bracketed passage which contains the best answer to the question. Answer the question by filling in the answer space at the end of the question which has the same number as the bracketed passage which contains the correct answer.

You may reread parts of the poem if necessary.
The sample is answered correctly.

SAMPLE. How does the poet describe the autumn season?

AUTUMN

Season of mists and mellow fruitfulness,
Close bosom-friend of the maturing sun;
Conspiring with him how to load and bless
With fruit the vines that 'round the thatch-eaves run;
To bend with apples the moss'd cottage-trees,
And fill all fruit with ripeness to the core;
To swell the gourd, and plump the hazel shells
With a sweet kernel; to set budding more
And still more, later flowers for the bees,
Until they think warm days will never cease;
For Summer has o'erbrimm'd their clammy cells.
Who hath not seen Thee oft mid thy store?
Sometimes whoever seeks abroad may find
Thee sitting careless on the granary floor,
Thy hair soft-lifted by the winnowing wind,
Or on a half-reaped furrow sound asleep,
Drowsed by the fume of poppies, while thy hook
Spare the next swath and all its twined flowers;
And sometimes like a gleaner thou dost keep
Steady thy laden head across a brook;
Or by a cider-press, with patient look,
Thou watchest the last oozings, hours by hours.
Where are the songs of Spring? Ay, where are they?
Think not of them, thou hast thy music too,
While barred clouds bloom the soft-dying day,
And touch the stubble-plains with rosy hue;
Then in a wailful choir the small gnats mourn
Among the river-shallows borne aloft
Or sinking as the light wind lives or dies;
And full-grown lambs loud bleat from hilly bourn;
Hedge-crickets sing, and now with treble soft
The red-breast whistles from a garden croft
And gathering swallows twitter in the skies.

From "To Autumn," by John Keats

1. What are the sun and the season planning to do to the grapevines?.....1
2. What are the attributes of this season of the year?2
3. How does the autumn show that the harvest time is near?.....3
4. How does the poet tell you that the apple trees are old and large?.....4
5. For what purpose do the late flowers grow?.....5
6. Does the poet think that everyone has seen the season of which he writes?.....6
7. Have the bees stored up much honey?.....7
8. How do the warm days of autumn confuse the bees?.....8
9. Is it difficult to find the character described?.....9
10. How are the gentle autumn breezes described? ...10
11. What causes autumn to fall asleep in the fields?..11
12. Does autumn linger long at the cider-press?.....12
13. Is spring worth remembering when autumn has come?.....13
14. What does the sunset do to the fields from which the grain has been cut?.....14
15. Is the evening sky of this season cloudless?.....15
16. Are there songs of autumn as well as of spring?..16
17. To what sounds is the noise of the gnats along the river compared?.....17
18. How are the changes in the force of the wind described?.....18
19. Are young lambs found on the hills at this season?19
20. What familiar swift flying birds are used to suggest evening?.....20

6→

1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
5	6	7	8	9
5	6	7	8	9
8	9	10	11	12
10	11	12	13	14
10	11	12	13	14
10	11	12	13	14
12	13	14	15	16
17	18	19	20	21
19	20	21	22	23
24	25	26	27	28
24	25	26	27	28
27	28	29	30	31
28	29	30	31	32
28	29	30	31	32
32	33	34	35	36
37	38	39	40	41
38	39	40	41	42
39	40	41	42	43

Do not turn this page until you are told to do so.

NUMBER RIGHT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Standard Score	115	125	135	141	152	157	163	168	177	181	184	187	191	194	197	200	203	206	209	212	215

TEST 5. SENTENCE MEANING

DIRECTIONS. You are to read each sentence and answer it by filling in the answer space under the right answer. Study the samples. Do not guess.

SAMPLES. A. Are all people dishonest? ... A
B. Are authors often quoted? ... B

- 1. Should the laws operate with equal effect on all people? ... 1
2. Is harmony between nations encouraged by the League of Nations? ... 2
3. Is dependable evidence always available? ... 3
4. Is it wise to misapply talent? ... 4
5. Do nations always react favorably to plans for reduction of arms? ... 5
6. Does success usually depend on one's perseverance? ... 6
7. Are agility and endurance considered undesirable in an athlete? ... 7
8. Is an approximation a precise answer? ... 8
9. Are authorities sometimes quoted in editorials? ... 9
10. Are those who are most boastful ever the least important? ... 10
11. Does allegiance to one's country imply loyalty? ... 11

10 ->

- 12. Are all festivities characterized by formality and ceremony? ... 12
13. Do most occupations involve some work that is not pleasant? ... 13
14. Do exact instruments facilitate accurate measurements? ... 14
15. Should very important work be done only by able men? ... 15
16. Is disagreement among the members of Parliament unusual? ... 16
17. Is it true that all future events are definitely predictable? ... 17
18. Do frequent changes in plans always result in failure? ... 18
19. Must exercise be violent to be considered adequate? ... 19
20. May disputes ever arise over an expedient alliance? ... 20
21. Is the presence of an obnoxious guest displeasing to the host? ... 21
22. Does antagonism to the law indicate that one is patriotic? ... 22
23. Will a precarious position be improved by a lack of care? ... 23
24. Are desirable laws often hard to enforce? ... 24
25. Is flattery always an expression of admiration? ... 25

Go right on to the next page.

Vertical column of YES/NO answer boxes with a large '1' in the first 'NO' box.



TEST 6. PARAGRAPH COMPREHENSION

DIRECTIONS. Read each paragraph carefully, and then study the questions *A*, *B*, and *C* at the right. Select the correct answer. Notice the number of this answer. In the margin at the right, fill in the answer space under this number.

1. Before the match was invented, starting a fire was not an easy matter. The Indians often started fires by rubbing two sticks together. A much more common method among the early settlers was to strike steel and flint together, the sparks lighting a bit of "tinder." Often-times live coals were carried from one house to another. Since the invention of the friction match in 1827, starting a fire has become a simple process.

- 1
- A. Choose the best title for the paragraph.
 1 Invention of Matches 2 Methods of Starting Fires
 3 How Indians Started Fires.....A
- B. In case a pioneer was forced to build a fire while in camp, what did he use to start it? 1 flint and steel
 2 matches 3 coals from another fire.....B
- C. Indians often started fires by —
 1 striking two rocks together 2 rubbing two sticks together
 3 carrying burning tinder with them C

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

2. Rubber is one of the important products of the world today. The annual supply is nearly 300,000 tons, two thirds of which is used in the United States, principally for automobile tires. Rubber is also used in making medical supplies, household articles, batteries, toys, and clothing; and recently a rubber bearing has been successfully used on parts moving in water.

- 2
- A. Choose the best title for the paragraph.
 1 Use of Rubber for Tires 2 Annual Supply of Rubber
 3 Importance of Rubber.....A
- B. What proportion of the world's annual production of rubber is used in the United States?
 1 one half 2 one third 3 two thirds.....B
- 12 →
- C. The principal use of rubber in the United States is in the manufacture of — 1 automobile accessories
 2 clothing 3 household appliances.....C

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

3. The Mayas were a race of Indians inhabiting the peninsula of Yucatan. They were much more civilized than other tribes of American Indians. When they were first found by the white men, they gave evidence of possessing many skills and abilities which were similar to those displayed by the whites. They constructed houses of faced concrete, four and five stories high. The Mayas were expert potters and have left many beautiful products of their skill. Their history, religion, rites, and magic were recorded in their books in hieroglyphic characters.

- 3
- A. Choose the best title for the paragraph.
 1 Mayan Architecture 2 Civilization of the Mayas
 3 American Indians.....A
- B. What special evidence of advanced civilization did the Mayas leave? 1 use of hieroglyphics 2 domesticated animals
 3 modern building construction B
- C. The Mayas, a highly civilized race of Indians, formerly lived in —
 1 Mexico 2 Yucatan 3 Peru.....C

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

4. All animals sleep, but many of them do so in ways so curious that they seem to be awake. Ducks sleep on open water, and to keep from drifting ashore paddle with one foot continually, thus traveling in a circle. Bats sleep head downward, hanging by their hind claws. Many animals of the cat species sleep with wide-open staring eyes. Elephants sleep standing up, their heads slowly swinging as if they were awake. Stories that some animals do not sleep are the result of these and other curious examples.

- 4
- A. Choose the best title for the paragraph.
 1 How Animals Sleep 2 Why Animals Sleep
 3 Animal Life.....A
- B. What animals sleep with their eyes open? 1 elephants
 2 some species of cats 3 all ducks.....B
- C. Ducks, when sleeping on the water, —
 1 sit perfectly still 2 drift toward shore
 3 paddle in a circle.....C

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

TEST 6. PARAGRAPH COMPREHENSION (Cont'd)

5. One of the most pressing economic problems of today is the securing of an adequate food supply. In the more densely populated parts of Asia an unfavorable growing season has for centuries meant famine and death for thousands of persons. The fact that the population of the earth is increasing far more rapidly than the food supply should give us an increased interest in plants, the primary source of all foods. When we realize further that our resources of lumber, fuel, fibers, paper pulp, oils, resin, rubber, and numerous other products come from plants, our absolute dependence on plant life is apparent.

- 5
- A. Choose the best title for the paragraph. A
 1 Natural Resources 2 Decreasing Food Supply
 3 Importance of Plant Life
- B. Why is the matter of an adequate food supply such an important economic problem? B
 1 increase in population exceeds growth in food supply 2 decrease in natural resources 3 wars and famines.
- C. The primary source from which all food for man comes is — C
 1 farms 2 animal life 3 plant life. . . C

1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮

6. Endurance on the wing is much more remarkable than the speed with which birds fly. Many birds seem to be continually in the air. During migrations a large variety undertake long journeys, which sometimes reach halfway around the world.

- 6
- A. Choose the best title for the paragraph. →
 1 Flight of Birds 2 Endurance of Birds
 3 Migration of Birds. A
- B. What makes it possible for birds to make such long and rapid migrations? B
 1 birds fly at great height 2 birds have unusual endurance in flight 3 birds fly at great speed. B
- C. Birds often go on migratory journeys which — C
 1 take them from one hemisphere to another
 2 keep them in the air for twenty-four hours 3 take them completely around the globe. C

1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮

13 →

7. Charles W. Eliot, formerly head of Harvard University, exercised an influence far beyond that of the usual college president. He was looked up to by hundreds of thousands of his fellow citizens as a guide, not merely in educational matters but in all of the great political, industrial, social, and moral questions. It is difficult to name another figure who so largely dominated our intellectual horizon.

- 7
- A. Choose the best title for the paragraph. →
 1 Influence of Eliot 2 People's Admiration of Eliot 3 Scholarship of Eliot. A
- B. Why was Charles W. Eliot so much admired by those who knew him? B
 1 he gave financial aid 2 he helped them secure employment 3 he gave sound and helpful advice B
- C. Eliot became famous chiefly because of — C
 1 his position 2 his service to his fellow men
 3 his writings. C

1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮

8. The Red Cross is an international agency which was organized primarily to care for the sick, the wounded, and prisoners in times of war. Recently it has shown a tendency to regard the alleviation of human suffering, whatever its source, as falling under its jurisdiction. The fundamental idea for the movement came as the result of the publication of a booklet by Henri Dunant in 1862.

- 8
- A. Choose the best title for the paragraph. →
 1 Organization of the Red Cross 2 Purposes of the Red Cross 3 Founder of the Red Cross. . . A
- B. What type of organization is the Red Cross? B
 1 international 2 national 3 local. B
- C. At the present time the Red Cross expends its efforts in — C
 1 caring for the injured in war areas
 2 caring for only the poor 3 relieving human suffering anywhere. C

1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮
1	2	3
⋮	⋮	⋮

Go right on to the next page.

TEST 6. PARAGRAPH COMPREHENSION (Cont'd)

9. When a number of bees gather in one place, they are called a swarm. The size of a bee swarm varies greatly. Two of the major factors influencing the size of the swarm are the strength of the hive from which it came and the time of the year. A weak swarm may not contain more than ten thousand bees, while a strong one may have as many as eighty thousand bees.

- 9
- A. Choose the best title for the paragraph. A
 1 Size of Bee Swarms 2 Size of Weak Swarms
 3 Size of Strong Swarms
- B. What is an important factor influencing the size of a bee swarm?
 1 kind of bees 2 time of year 3 location of hive
- C. The number of bees in a swarm sometimes exceeds —
 1 one hundred 2 ten thousand 3 one million

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

10. From the fields the rice is taken to the mills for threshing, cleaning, husking, and polishing. Finally, the rice is graded, weighed, and packed for the market. Many mills in the United States turn out from one thousand to ten thousand bushels of rice every twenty-four hours.

- 10
- A. Choose the best title for the paragraph. A
 1 Taking Rice to the Mills 2 Polishing Rice
 3 Marketing Rice
- B. How long does it take an American rice mill to turn out one thousand bushels of rice?
 1 one week 2 one day 3 three days
- C. Rice is taken direct to market from the —
 1 mill 2 field 3 storage elevators

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

14→

11. A large portion of the lead used in the United States is in the form of metallic lead and its alloys, but the largest and most important single use of lead is in the form of white lead, for which purpose about 150,000 tons are required annually in the United States alone. White lead has been the most important paint pigment for more than two thousand years, and most of the durable exterior paints contain white lead.

- 11
- A. Choose the best title for the paragraph. A
 1 Uses of White Lead 2 Making White Paint
 3 Lead and Its Alloys
- B. How long has white lead been used as a pigment for paint?
 1 since the discovery of America 2 less than 100 years
 3 more than 2000 years
- C. The United States uses about 150,000 tons of white lead each year for the manufacture of —
 1 paints 2 metallic lead 3 lead alloys

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

12. The United States is one of the leading agricultural countries of the world. Several causes have combined to encourage this industry. Among the more important of these are the cheapness of the land, the fertility of the soil, the wide variety of climate, the energy of the people, government encouragement of scientific agriculture, and the unrivaled transportation system for marketing crops.

- 12
- A. Choose the best title for the paragraph. A
 1 Transportation of Crops 2 Scientific Farming
 3 Factors Favoring Farming in the United States
- B. Why is the United States one of the greatest producers of agricultural crops?
 1 unlimited acres of fertile soil 2 convenience to market
 3 expensive farm machinery
- C. The use of improved methods and machinery in all sections of the United States has been encouraged most effectively by —
 1 agricultural colleges 2 manufacturers of farm machinery
 3 the United States government

1	2	3
1	1	1
1	2	3
1	1	1
1	2	3
1	1	1

Do not turn this page until you are told to do so.

NUMBER RIGHT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Standard Score	104	105	107	109	111	112	113	114	116	118	120	123	125	127	129	135	138	141	144	147	150	153	157	160	163	166	170	173	177	181	185	190	201	208	215	218	220

CALIFORNIA CAPACITY QUESTIONNAIRE—Form A
Devised by Elizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs

Do not open this booklet until you are told to do so.

INSTRUCTIONS

1. You will use a special answer sheet and pencil to record your answers for this test.
2. Fill in the personal information blanks on the answer sheet. Write plainly or print.
3. Check on the answer sheet the Form of the test you are taking, A or B as shown after the title on this booklet.
4. You are not to mark on this test booklet in any way.

The purpose of this test is to see how well you can understand a variety of situations. It contains questions or exercises of different kinds which you are to answer.

The questions or exercises are like the following:

EXAMPLE A. Which of these are "left" hands? Mark their numbers in the answer row.



The correct answers are 1, 4, and 5.

The answers are marked thus:

A.

1	2	3	4	5	6
	⋮	⋮			⋮

EXAMPLE B. Which word means the same or about the same as the first word? Mark its number in the answer row.

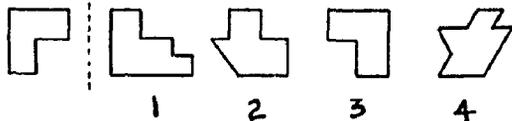
obtain 1 lose 2 get 3 sell 4 return

B.

1	2	3	4
⋮		⋮	⋮

The answer is "2", so you would mark "2" in the answer row.

EXAMPLE C. Which drawing is the same as the first drawing?



C.

1	2	3	4
⋮	⋮	⋮	⋮

 The answer is "3", so you would mark "3" in the answer row.

EXAMPLE D. Work this problem. Mark the letter of your answer in the answer row.

Sugar costs 7¢ a pound. How many pounds can you buy for 35¢?

Ans. a 3 b 5 c 28 d 42

D.

a	b	c	d
⋮	⋮	⋮	⋮

The answer is "b", so you would mark "b" in the answer row.

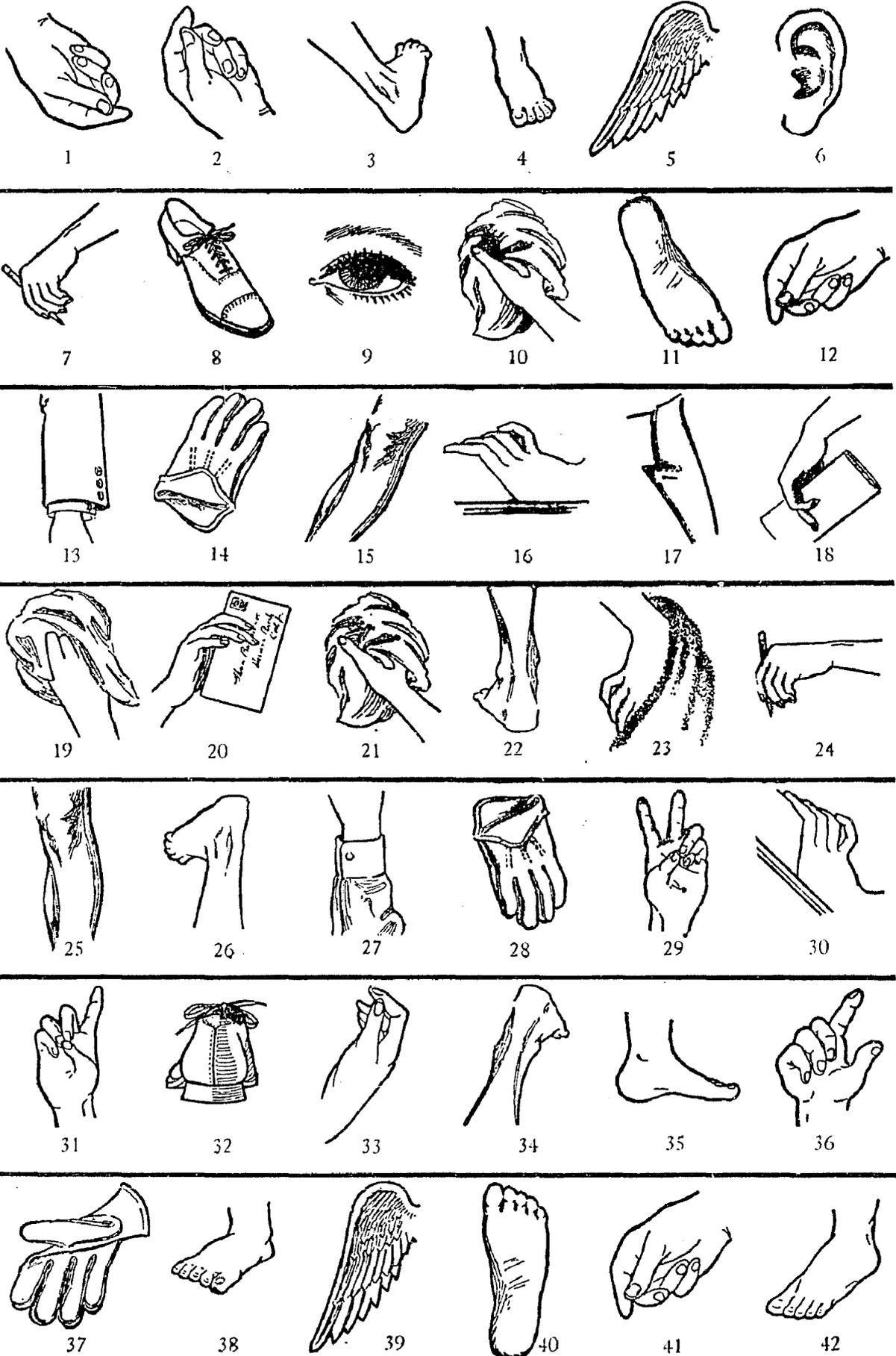
Read the directions on the answer sheet.

No one is expected to get all of the questions right. You will be allowed thirty minutes to do as many as you can. Work as rapidly as you can without making mistakes. If you cannot understand a problem, just omit it and go right on with the next.

Do not open this booklet until you are told to do so.

TEST 1.

Directions: The hands, feet, and other objects on this page are either rights or lefts. Mark on the answer sheet the number of each of the "lefts."



TEST 2.

Mark on the answer sheet the number of the word which means the same or about the same as the first word.

43. **ample** ¹ season ² plentiful
 ³ alive ⁴ autumn
44. **assist** ¹ consent ² help
 ³ agree ⁴ overlook
45. **fugitive** ¹ fetter ² accident
 ³ saddle ⁴ runaway
46. **eternal** ¹ worthy ² brief
 ³ endless ⁴ native
47. **acquire** ¹ agree ² conduct
 ³ obtain ⁴ conflict

Work these problems using scratch paper if needed. Mark on the answer sheet the letter of your answer.

48. If a freight train travels at the rate of 20 miles an hour, how many miles will it travel in 4 hours?
Ans.: ^a 5 ^b 24 ^c 80 ^d 60
49. How many one-inch cubes can be placed in a box 5 inches long, 4 inches wide, and 3 inches high?
Ans.: ^a 12 ^b 23 ^c 60 ^d 100
50. $2\frac{1}{2}$ times what number equals 40?
Ans.: ^a 16 ^b 8 ^c 15 ^d 17
51. On a road map each one-half inch represents 20 miles. How many miles are represented by 5 inches?
Ans.: ^a 10 ^b 20 ^c 100 ^d 200
52. How many $1\frac{1}{2}$ cent stamps would you give in even exchange for 30 one-half cent stamps?
Ans.: ^a 10 ^b 15 ^c 20 ^d 45

Read each group of statements and mark on the answer sheet the number of the correct answer.

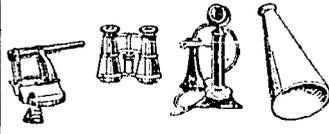
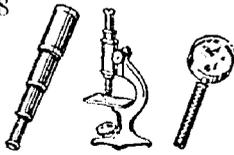
53. He is either foreign-born or a native. But, he is not foreign-born. Therefore
¹ He is a voter
² He is a native
³ He is a soldier
54. A weighs less than B. B weighs less than C. Therefore
¹ B weighs more than C
² A's weight is equal to B's and C's
³ A weighs less than C
55. No human beings are exempt from accidents. Automobile drivers are human beings. Therefore
¹ No human being is dependable
² No automobile drivers are exempt from accidents
³ Few human beings make safe automobile drivers
56. Jim has a better batting average than Ed. Ed has a better batting average than Bill. Which has the best batting average?
¹ Jim ² Bill ³ Ed
57. Three boys are on a mountain trail. Dick is farther up the trail than Dan. Frank is farther up than Dick. Which boy is in the middle position on the trail?
¹ Dick ² Dan ³ Frank
- Go right on to the next page.

TEST 3.

The first three objects in each row are alike in some way. Mark on the answer sheet the number of another object in the same row that belongs with them.

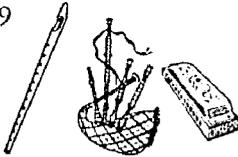
For each row, mark on the answer sheet the number of a drawing which is either the same or different views of the first drawing.

58



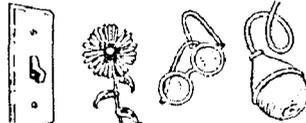
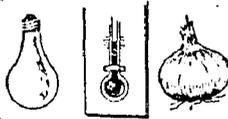
1 2 3 4

59



1 2 3 4

60



1 2 3 4

61



1 2 3 4

62



1 2 3 4

63



1 2 3 4

64



1 2 3 4

65



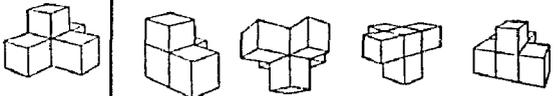
1 2 3 4

66



1 2 3 4

67



1 2 3 4

68



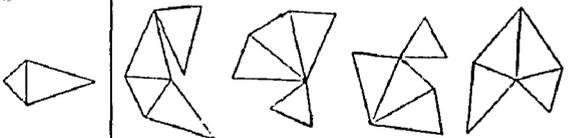
1 2 3 4

69



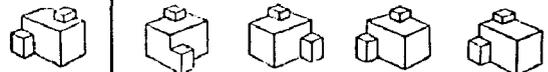
1 2 3 4

70



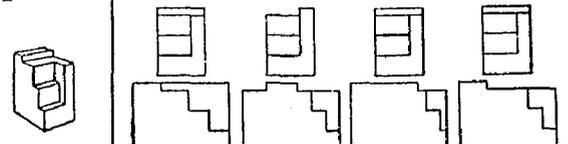
1 2 3 4

71



1 2 3 4

72



1 2 3 4

Go right on to the next page.

TEST 4.

Mark on the answer sheet the number of the word which means the same or about the same as the first word.

73. **detect** ¹ remove ² discover
 ³ overtake ⁴ apply
74. **reluctantly** ¹ gladly ² instantly
 ³ certainly ⁴ unwillingly
75. **invariably** ¹ probably ² sometimes
 ³ always ⁴ motionless
76. **deride** ¹ advance ² encourage
 ³ ennoble ⁴ ridicule
77. **concede** ¹ overrule ² engage
 ³ allow ⁴ endeavor

Work these problems using scratch paper if needed. Mark on the answer sheet the letter of your answer.

78. How many picture postal cards can you buy for 15 cents at the rate of 3 for 5 cents?
Ans.: ^a 9 ^b 3 ^c 15 ^d 34

79. A sample rug is 12 inches long and 9 inches wide. How long will a larger rug of the same proportions be if it is 36 inches wide?
Ans.: ^a 108in. ^b 48in. ^c 15in. ^d 36in.

80. What is the number which if divided by 4, is $\frac{1}{6}$ of 72?
Ans.: ^a 12 ^b 18 ^c 48 ^d 3

81. A circular flower bed 7 feet in diameter is to be bordered by plants set one foot apart. What will be the cost of the plants at the rate of 2 for 15 cents? (Circumference of a circle is about $3\frac{1}{7}$ times the diameter.)
Ans.: ^a 52¢ ^b \$1.65 ^c 70¢ ^d \$1.57 $\frac{1}{2}$

82. How many sheets of paper 7 inches by 10 inches can be cut from a sheet of paper 21 inches by 30 inches?
Ans.: ^a 3 ^b 6 ^c 9 ^d 34

Read each group of statements and mark on the answer sheet the number of the correct answer.

83. Either your sister is more intelligent than you, or as intelligent, or less intelligent. But, your sister

is not more intelligent, nor is she less intelligent. Therefore

- ¹ Your sister is less intelligent than you
² Your sister is as intelligent as you
³ Your sister is more intelligent than you

84. If the claim is unjust, refusal to permit its discussion before the Student Council is unwise. If the claim is just, refusal is inexcusable. But, the claim is either unjust or it is just. Therefore

- ¹ The refusal is justified
² The refusal is being discussed freely
³ The refusal is either unwise or inexcusable

85. Elm Street is parallel to Oak Street. Oak Street is parallel to Palm Avenue. Therefore

- ¹ Elm Street crosses Palm Avenue
² Palm Avenue is longer than Elm Street
³ Elm Street is parallel to Palm Avenue

86. If he steers toward the land he will be wrecked; and if he steers toward the open sea he will be wrecked; but, he must steer either toward the land or toward the open sea. Therefore

- ¹ He should head for the open sea
² The coast is dangerous for ships
³ He will be wrecked

87. If he is to complete his high school course, he must avoid wasting his energy and his money. But he will not avoid wasting his energy, or he will not avoid wasting his money. Therefore

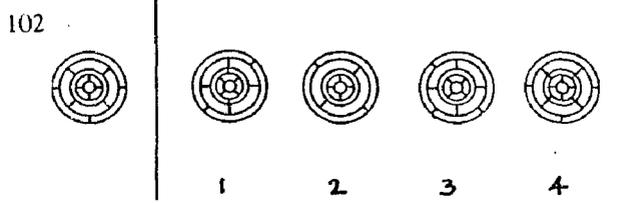
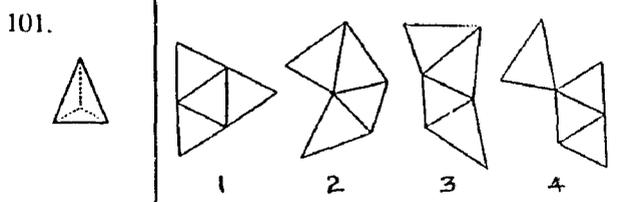
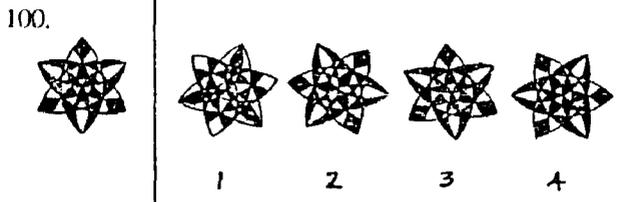
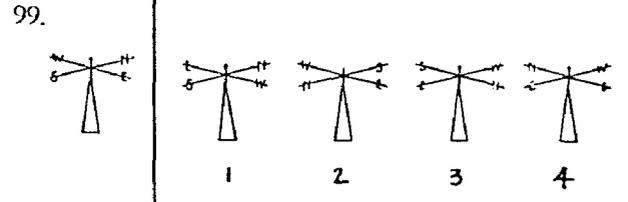
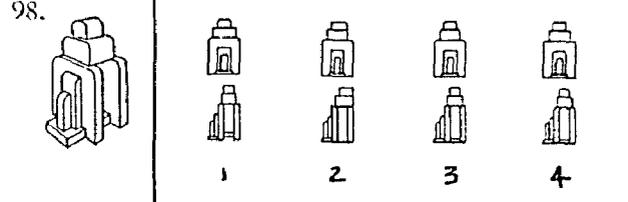
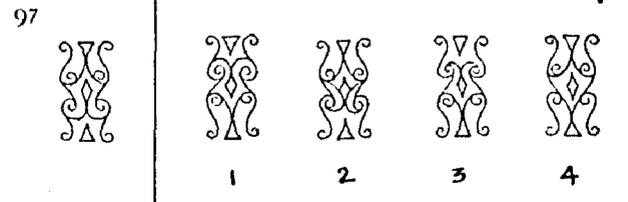
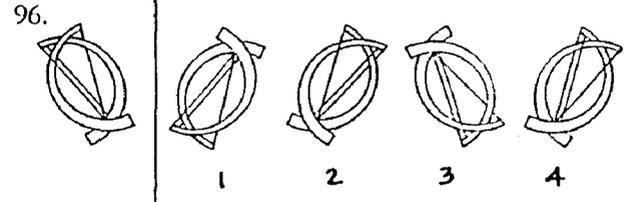
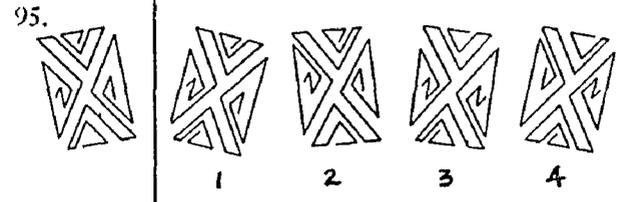
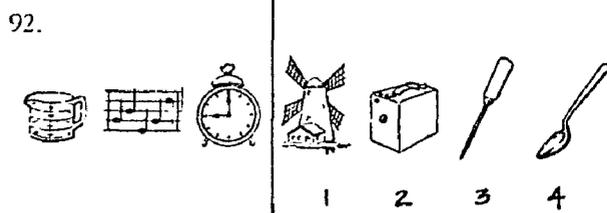
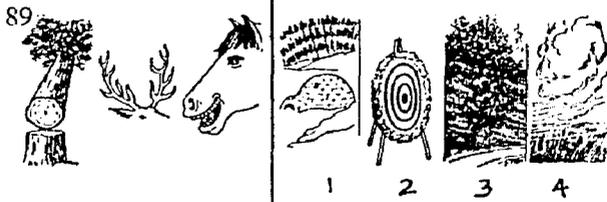
- ¹ He will not complete his high school course
² He will be sorry some day
³ He should be criticized for not doing better

Go right on to the next page.

TEST 5.

The first three objects in each row are alike in some way. Mark on the answer sheet the number of another object in the same row that belongs with them.

For each row, mark on the answer sheet the number of a drawing which is either the same or different views of the first drawing.



Go right on to the next page.

TEST 7.

Mark on the answer sheet the number of the word which means the same or about the same as the first word.

118. **tangent** 1 blend 2 agent 3 touching 4 sensing
119. **reciprocal** 1 charming 2 mutual 3 agreeable 4 meditative
120. **expedite** 1 expel 2 dictate 3 delay 4 hasten
121. **perfidious** 1 treacherous 2 fragrant 3 studious 4 responsible
122. **opulence** 1 jewel 2 generosity 3 wealth 4 honor
123. **travesty** 1 burlesque 2 tragedy 3 meeting 4 hotel
124. **anomaly** 1 ceremony 2 illness 3 irregularity 4 normal
125. **extraneous** 1 extra 2 foreign 3 transparent 4 noisy
126. **probity** 1 uprightness 2 interference 3 suspicious 4 weight
127. **corollary** 1 crown 2 inference 3 enclosure 4 supersede
128. **salient** 1 salty 2 outstanding 3 merciful 4 agreeable
129. **diurnal** 1 seasonable 2 occasional 3 timely 4 daily
130. **erudite** 1 crude 2 learned 3 rugged 4 polite
131. **obloquy** 1 disaster 2 blame 3 pride 4 obligation
132. **effete** 1 exhausted 2 festive 3 fragile 4 plentiful

OTIS QUICK-SCORING MENTAL ABILITY TESTS

By ARTHUR S. OTIS, PH.D.

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

Gamma
AM

GAMMA TEST: FORM AM

IQ.....

For Senior High Schools and Colleges

Score.....

Read this page. Do what it tells you to do.

Do not open this booklet, or turn it over, until you are told to do so.

Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name..... Age last birthday years
First name, initial, and last name

Birthday..... Teacher..... Date..... 19.....
Month Day

Grade..... School..... City.....

This is a test to see how well you can think. It contains questions of different kinds. Here are three sample questions. Five answers are given under each question. Read each question and decide which of the five answers below it is the right answer.

Sample a: Which one of the five things below is soft?
 ① glass ② stone ③ cotton ④ iron ⑤ ice.....
1 2 3 4 5

The right answer, of course, is *cotton*; so the word *cotton* is underlined. And the word *cotton* is No. 3; so a heavy mark has been put in the space under the 3 at the right. This is the way you are to answer the questions.

Try the next sample question yourself. Do not write the answer; just draw a line under it and then put a heavy mark in the space under the right number.

Sample b: A robin is a kind of —
 ⑥ plant ⑦ bird ⑧ worm ⑨ fish ⑩ flower....
6 7 8 9 10

The answer is *bird*; so you should have drawn a line under the word *bird*, and *bird* is No. 7; so you should have put a heavy mark in the space under the 7. Try this one:

Sample c: Which one of the five numbers below is larger than 55?
 ⑪ 53 ⑫ 48 ⑬ 29 ⑭ 57 ⑮ 16.....
11 12 13 14 15

The answer, of course, is 57; so you should have drawn a line under 57, and that is No. 14; so you should have put a heavy mark in the space under the 14.

The test contains 80 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

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 PRINTED IN U.S.A. GAMMA: AM-34

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ANSWER SHEET

Otis Quick-Scoring : Gamma : AM

Page **6**

	⊕				
	66	67	68	69	70
64	⋮	⋮	⋮	⋮	⋮
	71	72	73	74	75
65	⋮	⋮	⋮	⋮	⋮
	76	77	78	79	80
66	⋮	⋮	⋮	⋮	⋮



	1	2	3	4	5
67	⋮	⋮	⋮	⋮	⋮

	6	7	8	9	10
68	⋮	⋮	⋮	⋮	⋮

	11	12	13	14	15
69	⋮	⋮	⋮	⋮	⋮
	16	17	18	19	20
70	⋮	⋮	⋮	⋮	⋮

	21	22	23	24	25
71	⋮	⋮	⋮	⋮	⋮
	26	27	28	29	30
72	⋮	⋮	⋮	⋮	⋮



	31	32	33	34
73	⋮	⋮	⋮	⋮

	36	37	38	
74	⋮	⋮	⋮	
	41	42	43	44
75	⋮	⋮	⋮	⋮

	46	47	48	49	50
76	⋮	⋮	⋮	⋮	⋮

	51	52	53	54	55
77	⋮	⋮	⋮	⋮	⋮

	56	57	58	59	60
78	⋮	⋮	⋮	⋮	⋮



	61	62	63	64	65
79	⋮	⋮	⋮	⋮	⋮

	66	67	68	69	70
80	⋮	⋮	⋮	⋮	⋮

Page **5**

	66	67	68	69	70
46	⋮	⋮	⋮	⋮	⋮
	71	72	73	74	75
47	⋮	⋮	⋮	⋮	⋮
	76	77	78	79	80
48	⋮	⋮	⋮	⋮	⋮

	81	82	83	84	85
49	⋮	⋮	⋮	⋮	⋮



	86	87	88	89
50	⋮	⋮	⋮	⋮

	1	2	3		
51	⋮	⋮	⋮		
	6	7	8	9	10
52	⋮	⋮	⋮	⋮	⋮
	11	12	13	14	15
53	⋮	⋮	⋮	⋮	⋮



	16	17	18	19	20
54	⋮	⋮	⋮	⋮	⋮

	21	22	23	24	25
55	⋮	⋮	⋮	⋮	⋮
	26	27	28	29	
56	⋮	⋮	⋮	⋮	

	31	32	33	34	35
57	⋮	⋮	⋮	⋮	⋮

	36	37	38	39	40
58	⋮	⋮	⋮	⋮	⋮
	41	42	43	44	45
59	⋮	⋮	⋮	⋮	⋮



	46	47	48	49	50
60	⋮	⋮	⋮	⋮	⋮

	51	52	53	54
61	⋮	⋮	⋮	⋮

	56	57	58	59	60
62	⋮	⋮	⋮	⋮	⋮
	61	62	63	64	65
63	⋮	⋮	⋮	⋮	⋮

Page **4**

	26	27	28	29	30
22	⋮	⋮	⋮	⋮	⋮
	31	32	33	34	35
23	⋮	⋮	⋮	⋮	⋮
	36	37	38	39	40
24	⋮	⋮	⋮	⋮	⋮

	41	42	43
25	⋮	⋮	⋮



	46	47	48	49	50
26	⋮	⋮	⋮	⋮	⋮
	51	52	53	54	55
27	⋮	⋮	⋮	⋮	⋮
	56	57	58	59	60
28	⋮	⋮	⋮	⋮	⋮
	61	62	63	64	65
29	⋮	⋮	⋮	⋮	⋮
	66	67	68	69	70
30	⋮	⋮	⋮	⋮	⋮
	71	72	73	74	75
31	⋮	⋮	⋮	⋮	⋮
	76	77	78	79	80
32	⋮	⋮	⋮	⋮	⋮



	1	2	3	4	
33	⋮	⋮	⋮	⋮	
	6	7	8	9	10
34	⋮	⋮	⋮	⋮	⋮
	11	12	13	14	
35	⋮	⋮	⋮	⋮	
	16	17	18	19	20
36	⋮	⋮	⋮	⋮	⋮
	21	22	23		
37	⋮	⋮	⋮		
	26	27	28	29	30
38	⋮	⋮	⋮	⋮	⋮
	31	32	33	34	35
39	⋮	⋮	⋮	⋮	⋮
	36	37	38	39	40
40	⋮	⋮	⋮	⋮	⋮
	41	42	43	44	45
41	⋮	⋮	⋮	⋮	⋮
	46	47	48	49	50
42	⋮	⋮	⋮	⋮	⋮



	51	52	53		
43	⋮	⋮	⋮		
	56	57	58	59	60
44	⋮	⋮	⋮	⋮	⋮
	61	62	63	64	65
45	⋮	⋮	⋮	⋮	⋮

Page **3**

					⊕
	1	2	3	4	5
1	⋮	⋮	⋮	⋮	⋮
	6	7	8	9	10
2	⋮	⋮	⋮	⋮	⋮
	11	12	13	14	15
3	⋮	⋮	⋮	⋮	⋮
	16	17	18	19	20
4	⋮	⋮	⋮	⋮	⋮
	21	22	23	24	25
5	⋮	⋮	⋮	⋮	⋮
	26	27	28	29	30
6	⋮	⋮	⋮	⋮	⋮
	31	32	33	34	35
7	⋮	⋮	⋮	⋮	⋮



	36	37	38	39	
8	⋮	⋮	⋮	⋮	
	41	42	43	44	45
9	⋮	⋮	⋮	⋮	⋮
	46	47	48	49	50
10	⋮	⋮	⋮	⋮	⋮
	51	52	53	54	55
11	⋮	⋮	⋮	⋮	⋮



	56	57	58	59	60
12	⋮	⋮	⋮	⋮	⋮
	61	62	63	64	65
13	⋮	⋮	⋮	⋮	⋮
	66	67	68	69	70
14	⋮	⋮	⋮	⋮	⋮

	71	72	73	74	75
15	⋮	⋮	⋮	⋮	⋮
	76	77	78	79	80
16	⋮	⋮	⋮	⋮	⋮

	1	2	3	4	5
17	⋮	⋮	⋮	⋮	⋮
	6	7	8	9	10
18	⋮	⋮	⋮	⋮	⋮

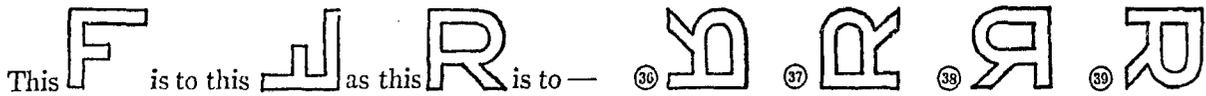


	11	12	13	14	
19	⋮	⋮	⋮	⋮	
	16	17	18	19	20
20	⋮	⋮	⋮	⋮	⋮

	21	22	23	24	25
21	⋮	⋮	⋮	⋮	⋮

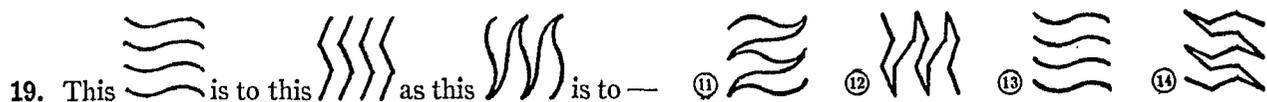
NOTE. This Answer Sheet is not intended for machine scoring. [2]

1. The opposite of hate is —
 ① enemy ② fear ③ love ④ friend ⑤ joy
2. If 2 pencils cost 5 cents, how many pencils can be bought for 50 cents?
 ⑥ 100 ⑦ 10 ⑧ 20 ⑨ 25 ⑩ 5
3. A dog does not always have —
 ⑪ eyes ⑫ bones ⑬ a nose ⑭ a collar ⑮ lungs
4. A recollection that is indefinite and uncertain may be said to be —
 ⑯ forgotten ⑰ secure ⑱ vague ⑲ imminent ⑳ fond
5. Which of these words would come first in the dictionary?
 ㉑ more ㉒ pile ㉓ mist ㉔ pick ㉕ mine
6. A fox most resembles a —
 ㉖ pig ㉗ goat ㉘ wolf ㉙ tiger ㉚ cat
7. Gold is more costly than silver because it is —
 ㉛ heavier ㉜ scarcer ㉝ yellower ㉞ harder ㉟ prettier
8. The first drawing below is related to the second in the same way that the third one is to one of the remaining four. Which one? ➔



9. A radio is related to a telephone in the same way that (?) is to a railroad train.
 ⑭ a highway ⑮ an airplane ⑯ gasoline ⑰ speed ⑱ noise
10. The opposite of wasteful is —
 ㉒ wealthy ㉓ quiet ㉔ stingy ㉕ economical ㉖ extravagant
11. A debate always involves —
 ㉗ an audience ㉘ judges ㉙ a prize ㉚ a controversy ㉛ an auditorium
12. A party consisted of a man and his wife, his two sons and their wives, and four children in each son's family. How many were there in the party?
 ㉜ 7 ㉝ 8 ㉞ 12 ㉟ 13 ㊱ 14
13. One number is wrong in the following series.
 1 5 2 6 3 7 4 9 5 9
 What should that number be? ➔
 ㊲ 9 ㊳ 7 ㊴ 8 ㊵ 10 ㊶ 5
14. A school is most likely to have —
 ㊷ maps ㊸ books ㊹ a janitor ㊺ a teacher ㊻ a blackboard

15. What letter in the word WASHINGTON is the same number in the word (counting from the beginning) as it is in the alphabet?
 ㊼ A ㊽ N ㊾ G ㊿ T ㋀ O
16. Which word makes the truest sentence? Fathers are (?) v-iser than their sons.
 ㋁ always ㋂ usually ㋃ much ㋄ rarely ㋅ never
17. Four of these five things are alike in some way. Which one is not like the other four?
 ① nut ② turnip ③ rose ④ apple ⑤ potatoes
18. The opposite of frequently is —
 ⑥ occasionally ⑦ seldom ⑧ never ⑨ periodically ⑩ often



19. At a dinner there is always —
 ⑮ soup ⑯ wine ⑰ food ⑱ waiters ⑲ dishes
21. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh?
 ㊿ 40 ㋁ 360 ㋂ 396 ㋃ 400 ㋄ 404

22. If a boy can run at the rate of 5 feet in $\frac{1}{2}$ of a second, how many feet can he run in 10 seconds? (26) 1 (27) 50 (28) 250 (29) 2 (30) 25
23. A thermometer is related to temperature as a speedometer is to — (31) fast (32) automobile (33) velocity (34) time (35) heat.....
24. "State of changing place" is a good definition for — (36) advancement (37) retardation (38) rotation (39) motion (40) revision
25. If the first two statements following are true, the third is (?).
All residents in this block are Republicans.
Smith is not a Republican. Smith resides in this block.
(41) true (42) false (43) not certain.....
26. If the words below were arranged to make a good sentence, with what letter would the second word of the sentence begin?
same means big large the as (46) a (47) b (48) m (49) s (50) t.....
27. Sunlight is to darkness as (?) is to stillness. (51) quiet (52) sound (53) dark (54) loud (55) moonlight.....
28. A grandmother is always (?) than her granddaughter. (56) smarter (57) more quiet (58) older (59) smaller (60) slower.....
29. Such things as looks, dress, likes, and dislikes indicate one's — (61) character (62) wisdom (63) personality (64) gossip (65) reputation
30. A tree always has — (66) leaves (67) fruit (68) buds (69) roots (70) a shadow
31. In general it is safest to judge a man's character by his — (71) voice (72) clothes (73) deeds (74) wealth (75) face.....
32. Which of these words is related to many as exceptional is to ordinary? (76) none (77) each (78) more (79) much (80) few.....
33. This  is to this  as this  is to — (1)  (2)  (3)  (4) 
34. What is related to a cube in the same way that a circle is related to a square? (6) circumference (7) corners (8) sphere (9) solid (10) thickness.....
35. Which one of these pairs of words is most unlike the other three? (11) run — fast (12) large — big (13) loan — lend (14) buy — purchase.....
36. The opposite of awkward is — (16) strong (17) pretty (18) graceful (19) short (20) swift.....
37. The two words superfluous and requisite mean — (21) the same (22) the opposite (23) neither same nor opposite.....
38. Of the five words below, four are alike in a certain way. Which one is not like these four? (26) push (27) hold (28) lift (29) drag (30) pull.....
39. The idea that the earth is flat is — (31) absurd (32) misleading (33) improbable (34) unfair (35) wicked.....
40. The opposite of loyal is — (36) treacherous (37) enemy (38) thief (39) coward (40) jealous.....
41. The moon is related to the earth as the earth is to — (41) Mars (42) the sun (43) clouds (44) stars (45) the universe
42. The opposite of sorrow is — (46) fun (47) success (48) joy (49) prosperity (50) hope.....
43. If the first two statements are true, the third is (?).
Frank is older than George. James is older than Frank.
George is younger than James.
(51) true (52) false (53) not certain.....
44. If $2\frac{1}{2}$ yards of cloth cost 30 cents, what will 10 yards cost? (56) \$1.20 (57) 75¢ (58) 40¢ (59) \$3.00 (60) $37\frac{1}{2}$ ¢.....
45. Congest means to bring together, condole means to grieve together.
Therefore con means — (61) to bring (62) together (63) to grieve (64) to bring or grieve together.....

46. The law of gravitation is —
 (66) obsolete (67) absolute (68) approximate (69) conditional (70) constitutional....

47. Oil is to toil as (?) is to hate.
 (71) love (72) work (73) boil (74) ate (75) hat.....

48. If $4\frac{1}{2}$ yards of cloth cost 90 cents, what will $3\frac{1}{2}$ yards cost?
 (76) \$3.15 (77) $86\frac{1}{2}$ ¢ (78) 70¢ (79) 89¢ (80) 35¢.....

49. Which number in this series appears a second time nearest the beginning?
 6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1
 (81) 9 (82) 0 (83) 8 (84) 6 (85) 5.....

50. This  is to this  as this  is to — (86)  (87)  (88)  (89) 

51. If the first two statements following are true, the third is (?).
 Some of our citizens are Methodists. Some of our citizens are doctors.
 Some of our citizens are Methodist doctors.
 (1) true (2) false (3) not certain.....

52. Which one of the five words below is most unlike the other four?
 (6) fast (7) agile (8) run (9) quick (10) speedy.....

53. One who says things he knows to be wrong is said to be —
 (11) careless (12) misled (13) conceited (14) untruthful (15) prejudiced.....

54. If the words below were arranged to make the *best* sentence,
 with what letter would the last word of the sentence end?
 sincerity traits courtesy character of desirable and are
 (16) r (17) y (18) s (19) e (20) d.....

55. If a strip of cloth 36 inches long will shrink to 33 inches when washed,
 how many inches long will a 48-inch strip be after shrinking?
 (21) 47 (22) 44 (23) 45 (24) 46 (25) $45\frac{1}{2}$

56. Which of these expressions is most unlike the other three?
 (26) draw pictures (27) clean house (28) come home (29) work problems.....

57. If the following words were seen on a wall by looking at a mirror on the opposite wall,
 which word would appear exactly the same as if seen directly?
 (31) MEET (32) ROTOR (33) MAMA (34) DEED (35) TOOT.....

58. Find the two letters in the word ACTOR which have just as many letters between them in
 the word as in the alphabet. Which one of these two letters comes first in the alphabet?
 (36) A (37) C (38) T (39) O (40) R.....

59. A surface is related to a line as a line is to a —
 (41) solid (42) plane (43) curve (44) point (45) string.....

60. One number is wrong in the following series.
 1 2 4 7 11 16 23
 What should that number be?
 (46) 3 (47) 6 (48) 10 (49) 16 (50) 22.....

61. This  is to this  as this  is to — (51)  (52)  (53)  (54) 

62. How many of the following words can be made from the letters in the word
 STRANGLE, using any letter any number of times?
 greatest, tangle, garage, stresses, related, grease, nearest, reeling
 (56) 7 (57) 6 (58) 3 (59) 4 (60) 5.....

63. Which of the following is a trait of character?
 (61) reputation (62) wealth (63) influence (64) fickleness (65) strength.....

64. A statement the meaning of which is not definite is said to be —
 (66) erroneous (67) doubtful (68) ambiguous (69) distorted (70) hypothetical.....
65. Evolution is to revolution as crawl is to —
 (71) baby (72) floor (73) stand (74) run (75) hands and knees.....
66. Coming is to came as now is to —
 (76) today (77) some time (78) tomorrow (79) before now (80) hereafter.....
67. One number is wrong in the following series.
 1 2 4 8 16 32 64 96
 What should that number be?
 (1) 3 (2) 6 (3) 12 (4) 48 (5) 128.....

68. If George can ride a bicycle 60 feet while Frank runs 40 feet, how many feet can George ride while Frank runs 30 feet?
 (6) 50 (7) 10 (8) 45 (9) 20 (10) 70.....
69. What letter is the fourth letter to the left of the letter which is midway between D and I in the word REPRODUCTION?
 (11) C (12) R (13) O (14) N (15) D.....
70. Which of the five things following is most like these three: ivory, snow, and milk?
 (16) butter (17) rain (18) cold (19) cotton (20) water.....

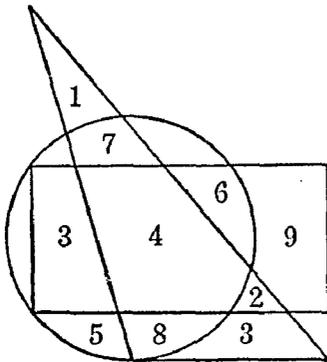
71. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of milk will it take to make 25 pints of the mixture?
 (21) 25 (22) $16\frac{2}{3}$ (23) 15 (24) $12\frac{1}{2}$ (25) 10.....
72. A man who spends his money lavishly for non-essentials is considered to be —
 (26) fortunate (27) thrifty (28) extravagant (29) generous (30) economical.....

73. This  is to this  as this  is to — (31)  (32)  (33)  (34) 

74. If the first two statements following are true, the third is (?).
 One cannot become a good violinist without much practice.
 Charles practices much on the violin. Charles will become a good violinist.
 (36) true (37) false (38) not certain.....

75. Which of these expressions is most unlike the other three?
 (41) small to tiny (42) pretty to beautiful (43) warm to hot (44) excellent to good.....

76. If the words below were rearranged to make a good sentence, the *fifth* word in the sentence would begin with what letter?
 life friends valuable to The make asset in a is ability
 (46) l (47) f (48) v (49) t (50) a.....



77. What number is in the space that is in the rectangle and in the triangle but not in the circle?
 (51) 1 (52) 2 (53) 3 (54) 4 (55) 5.....

78. What number is in the same geometrical figure or figures (and no others) as the number 6?
 (66) 1 (67) 2 (68) 3 (69) 4 (60) 5.....

79. How many numbers are there each of which is in two geometrical figures but only two?
 (61) 1 (62) 2 (63) 3 (64) 4 (65) 5.....

80. If a wire 40 inches long is to be cut so that one piece is $\frac{2}{3}$ as long as the other piece, how long must the shorter piece be?
 (66) $26\frac{2}{3}$ in. (67) $39\frac{1}{3}$ in. (68) 18 in. (69) 24 in. (70) 16 in.....

Essential High School Content Battery

FORM

A

by **DAVID P. HARRY**, Graduate School, Western Reserve University

and **WALTER N. DUROST**, School of Education, Boston University

DIRECTIONS:

Do not open this booklet until you are told to do so.

This booklet contains four tests: Test 1, Mathematics; Test 2, Science; Test 3, Social Studies; and Test 4, English. You will have one testing period (45 minutes) for each test except English, for which you will have two periods.

You are *not* expected to be able to answer all the questions in any test. Do not worry if you find a question on something you have not covered in class. Do the best you can, but do not spend too much time on any one question. Work as rapidly and as accurately as you can. When you finish a page, go on to the next page unless the directions at the bottom of the page tell you to stop.

Record your answers on the separate answer sheet. Make no marks of any kind on this test booklet. Use scratch paper when necessary for the Mathematics and Science tests.

Most of the questions in the Mathematics, Science, and Social Studies tests have five possible answers. (Whenever a different type of question is used, special directions are given within the test.) Read each question and decide which of the possible answers is best. When you are not quite sure what the answer is, make the best choice you can; but do not make wild guesses.

Study the sample questions below, and notice how the answers are to be marked on the separate answer sheet.

Sample 1

The sum of 10 plus 10 is —

- a. 0
- b. 15
- c. 17
- d. 20
- e. 100

Sample 2

What is the title of the Chief Executive of the United States?

- 1. Vice-President
- 2. Chief Justice
- 3. Secretary of State
- 4. President
- 5. none of the above

Sample 3

The electric light was discovered by —

- f. Bell.
- g. Faraday.
- h. Marconi.
- i. Morse.
- j. none of the above.

For Sample 1, the answer, of course, is "20," which is answer d. Now look at your answer sheet. On the right-hand side of the cover page there is a box labeled "Answer Spaces for Samples." In the five answer spaces after Sample 1, a heavy mark has been made filling the space (the pair of dotted lines) marked d. The correct answer for Sample 2 is "President," which is answer 4; so for Sample 2 you would answer by putting a heavy black mark that fills the fourth space, under the number 4. Do this now. Sometimes the correct answer is not shown among the choices. Sample 3 shows you how to mark questions of this kind. For Sample 3, the correct answer is "Edison." Since Edison is not given as one of the responses, you should make a mark in the fifth space, which is marked j, "none of the above." Do this now.

In the English test several different types of test questions are used for the different parts of the test. Special directions and samples for these are given at the beginning of each part. Study these directions and samples carefully before you start each part of the test.

When you are told to open your booklet, turn to Test 1, Mathematics, and begin. Read each question carefully and decide which one of the answers is best. Notice what number or letter corresponds to your choice. Then, on your separate answer sheet, opposite the question number, make a heavy black mark in the space under that letter or number. Always be sure that the question number in the test booklet and on the answer sheet agree. Erase carefully any answer mark you wish to change. Be careful not to make stray marks of any kind on your answer sheet. Ask no questions after the examination begins.

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TEST 1. MATHEMATICS

Part A

1. The sum of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{10}$ is —
 - a. $\frac{4}{30}$
 - b. $\frac{5}{8}$
 - c. $\frac{7}{8}$
 - d. $\frac{15}{10}$
 - e. none of the above
2. $\frac{3}{8}$ written as a decimal is —
 - f. .375
 - g. .625
 - h. 2.66 +
 - i. 3.8
 - j. none of the above
3. How many $\frac{3}{8}$ -inch distances are contained in a distance of $4\frac{1}{2}$ inches?
 - a. $\frac{1}{12}$
 - b. 9 +
 - c. 12
 - d. 24
 - e. none of the above
4. The product of $\frac{2}{3}$ and $\frac{3}{4}$ is —
 - f. $\frac{1}{2}$
 - g. $\frac{7}{4}$
 - h. $\frac{8}{9}$
 - i. $1\frac{5}{12}$
 - j. none of the above
5. $640 \div 0.04$ equals —
 - a. 160
 - b. 1600
 - c. 16,000
 - d. 160,000
 - e. none of the above
6. What is the square root of 196?
 - f. 14
 - g. 98
 - h. 392
 - i. 38,416
 - j. none of the above
7. What is $\frac{1}{2}\%$ of \$532?
 - a. \$266.00
 - b. \$26.60
 - c. \$2.66
 - d. \$.266
 - e. none of the above
8. What per cent of 300 is 12?
 - f. 0.4
 - g. 25
 - h. 36
 - i. 40
 - j. none of the above
9. What does $(a^4)^2$ equal?
 - a. a^2
 - b. $2a^4$
 - c. a^6
 - d. a^8
 - e. none of the above
10. The values of x and y which satisfy the equations $x + y = 7$ and $3x - 4y = 7$ are —
 - f. $x = 2, y = 5$
 - g. $x = -2, y = -5$
 - h. $x = 5, y = 2$
 - i. $x = 4, y = 3$
 - j. none of the above
11. If one angle in a right triangle equals 40° , what is the smaller of the other angles?
 - a. 40°
 - b. 50°
 - c. 90°
 - d. 140°
 - e. none of the above
12. The factors of $x^2 + 2x - 15$ are —
 - f. $(x - 5)(x + 3)$
 - g. $(x - 5)(x - 3)$
 - h. $(x + 5)(x - 3)$
 - i. $(-x + 5)(-x - 3)$
 - j. none of the above
13. What does $(3x^2)(-2x^3y)$ equal?
 - a. xy
 - b. $-6x^5y$
 - c. $-6x^6y$
 - d. $-18x^5y$
 - e. none of the above
14. In the equation $2x - 4(2 - 3x) = 27$, the value of x is —
 - f. 2.5
 - g. 3.5
 - h. 7
 - i. 35
 - j. none of the above
15. In the equation $5n - 8 = 2(n + 4)$, the value of n is —
 - a. 0
 - b. $2\frac{2}{7}$
 - c. 4
 - d. $5\frac{1}{3}$
 - e. none of the above
16. If the length of a radius of a circle is 20 inches, what is the length of the circumference? ($\pi = 3.14$)
 - f. 31.4
 - g. 62.8
 - h. 125.6
 - i. 1256
 - j. none of the above

TEST 1. MATHEMATICS (Cont'd)

17. The value of V in the equation $V = \frac{4}{3} \pi r^3$ when $\pi = 3\frac{1}{2}$ and $r = 3\frac{1}{2}$ is —

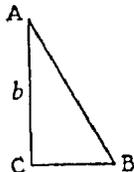
- a. $25\frac{2}{3}$
- b. 44
- c. $179\frac{2}{3}$
- d. 539
- e. none of the above

18. If $\log 4.254$ equals 0.6288 , what will $\log 425.4$ equal? (Common logs.)

- f. 1.6288
- g. 2.6288
- h. 6.2880
- i. 62.8800
- j. none of the above

19. What is the value of the hypotenuse of a right triangle whose perpendicular sides are 1.5 and 2.0?

- a. 2.5
- b. 3.5
- c. 6.25
- d. 12.25
- e. none of the above



20. If the hypotenuse of the right triangle in the figure above equals 8, and angle A equals 30° , what is the length of side b ?

- f. $\frac{1}{2}\sqrt{3}$
- g. $4\sqrt{3}$
- h. $\frac{1}{3}\sqrt{3}$
- i. $\frac{4}{3}\sqrt{3}$
- j. 4

Part B

21. What is the quantity obtained when two or more numbers are combined by multiplication?

- a. area
- b. product
- c. quotient
- d. ratio
- e. none of the above

22. A general answer, rule, or principle stated in mathematical language is called a —

- f. formula.
- g. function.
- h. locus.
- i. logarithm.
- j. binomial.

23. A quantity which may have different values during the same discussion is —

- a. a characteristic.
- b. a constant.
- c. a resultant.
- d. a variable.
- e. none of the above.

24. The integer at the right of and above a quantity indicating that the quantity is taken as a factor that many times is called the —

- f. coefficient.
- g. constant.
- h. factor.
- i. square.
- j. exponent.

25. The sum of the lengths of the sides of a polygon is the —

- a. apothem.
- b. area.
- c. perimeter.
- d. circumference.
- e. diagonal.

26. A quadrilateral with one and only one pair of parallel sides is a —

- f. pyramid.
- g. rectangle.
- h. rhombus.
- i. triangle.
- j. trapezoid.

27. What is the perpendicular distance from a vertex of a triangle to the opposite side?

- a. altitude
- b. apothem
- c. hypotenuse
- d. transversal
- e. none of the above

28. A solid bounded by six planes with its twelve edges all equal and its face angles all right angles is —

- f. a cube.
- g. a frustum.
- h. a cylinder.
- i. a pyramid.
- j. none of the above.

TEST 1. MATHEMATICS (Cont'd)

Part C

DIRECTIONS. In this part you are NOT to solve the problems, but you are to indicate which process or processes you would use to solve a given problem. The different processes are indicated (in the choices) by letters as follows:

- A — if you add.
 D — if you divide.
 M — if you multiply.
 S — if you subtract.

When several processes are used in a problem, the letters for all of them are given in the order that you would use them. For example, M-A-M would mean that you would first multiply, then add, and then multiply. After deciding upon the correct response, record your answer on the answer sheet in the same manner as you did in preceding sections.

29. To find how much change is due when more than the exact amount of the bill is offered in payment —
- A
 - A-S
 - M-A
 - S
 - none of the above
30. To find the time required for a car to travel a certain distance when the distance in miles and the rate in miles per hour are given —
- D
 - M
 - M-A
 - M-M
 - none of the above
31. To find the total amount to be paid if there is a percentage federal tax on the article bought —
- A
 - A-A
 - M-A
 - M-S
 - none of the above
32. To find the cost of laying linoleum on a rectangular kitchen floor if you know the dimensions and the cost per unit area —
- M-A
 - M-M
 - M-S
 - S-M
 - none of the above
33. To find the gross profit when the cost and the selling price are known —
- A
 - A-D
 - D
 - M
 - none of the above

34. To find the cost of a bill of goods, if discount is allowed for cash, when the total cost and the rate of discount are known —
- M
 - M-A
 - M-S-M
 - M-S-M-S
 - none of the above
35. To find the rate of taxation on a house when the assessed valuation and the tax bill are given —
- D
 - D-M
 - D-S
 - M
 - none of the above

Part D

DIRECTIONS. In this part you are to solve each problem.

36. What is the monthly bill for milk if 124 quarts were purchased at 23 cents per quart?
- \$27.52
 - \$28.52
 - \$55.04
 - \$57.04
 - none of the above
37. What is the bank discount on a note of \$144 for 90 days at 6 per cent?
- \$.72
 - \$1.44
 - \$2.16
 - \$7.20
 - none of the above
38. Mr. Black carried the following insurance on his car:
- Bodily injury liability* — \$10,000 each person and \$20,000 each accident. Premium \$26.45.
- Property damage liability* — \$5000 each accident. Premium \$3.50 per \$1000.
- Comprehensive (loss or damage by fire, theft, or windstorms)* — \$1000 at rate of \$1.60 per \$100.
- Collision or upset* — actual cash value less \$50. Premium \$46.00.
- Medical payments* — \$500 per person. Premium \$5.00.
- What was the total premium paid by Mr. Black?
- \$77.45
 - \$80.95
 - \$82.55
 - \$110.95
 - none of the above

TEST 1. MATHEMATICS (Cont'd)

39. An electricity bill listed the meter readings in kilowatt-hours as follows:

August 4	Sept. 2
5488	5644

If the bill was \$4.61, what was the approximate average cost per kilowatt-hour?

- a. \$.18
 - b. \$.08
 - c. \$.03
 - d. \$.02
 - e. none of the above
40. A baseball team won 78 of the 130 games played up to a certain date. If it wins 15 of the remaining 24 games, what is its final "percentage" carried to three decimals?

- f. .600
- g. .603
- h. .625
- i. .662
- j. none of the above

41. If a recipe calls for a mixture of 5 parts oil and 3 parts vinegar, how much vinegar will be needed to make 12 pints of the mixture?

- a. 4 pt.
- b. 5.5 pt.
- c. 7.5 pt.
- d. 8 pt.
- e. none of the above

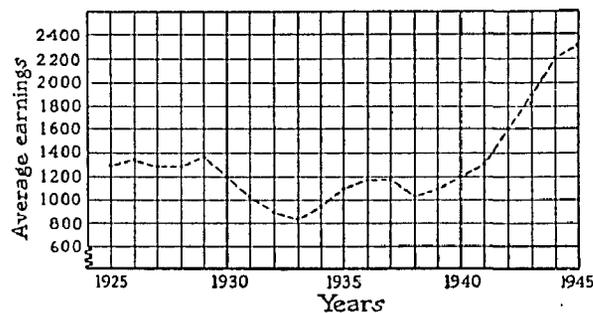
42. The assessed value of a man's house and lot was \$8400. The tax rates for city, school, and county purposes were 15.2, 12.3, and 2.5 mills per \$1.00 respectively. What was the annual tax bill?

- f. \$25.20
- g. \$126.00
- h. \$127.60
- i. \$252.00
- j. none of the above

43. A used radio was marked \$45, which the dealer said was at a discount of 40 per cent. What was the price before the discount?

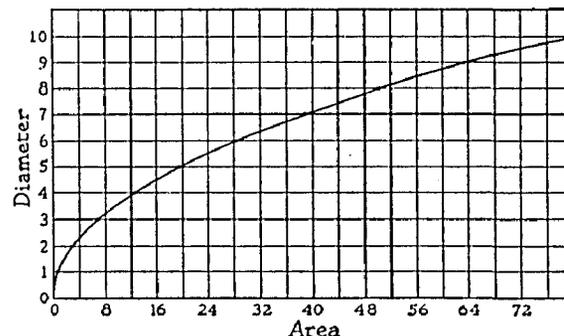
- a. \$63.00
- b. \$75.00
- c. \$85.00
- d. \$112.50
- e. none of the above

Part E



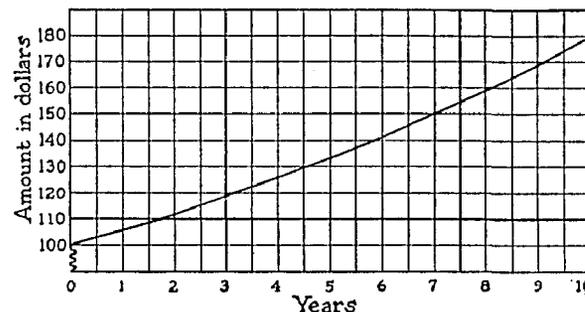
44. The line graph above represents average yearly earnings of industrial workers for the years 1925-1945 inclusive. What was the approximate average earning in 1943?

- f. \$1775
- g. \$1800
- h. \$1900
- i. \$2050
- j. none of the above



45. The line graph above represents the relationship between the length of the diameter and the area of a certain geometrical figure. What is the approximate length of the diameter when the area is exactly 60?

- a. 8.5
- b. 8.75
- c. 9
- d. 28
- e. none of the above



46. The line graph above represents the amount (principal plus interest) that would result if \$100 was invested at 6% interest compounded annually. What is the approximate amount to which \$100 would grow in 5 years?

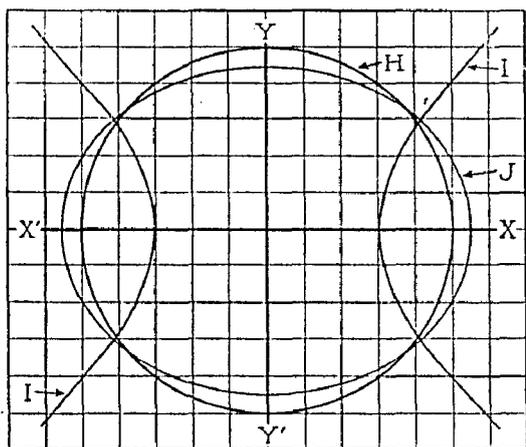
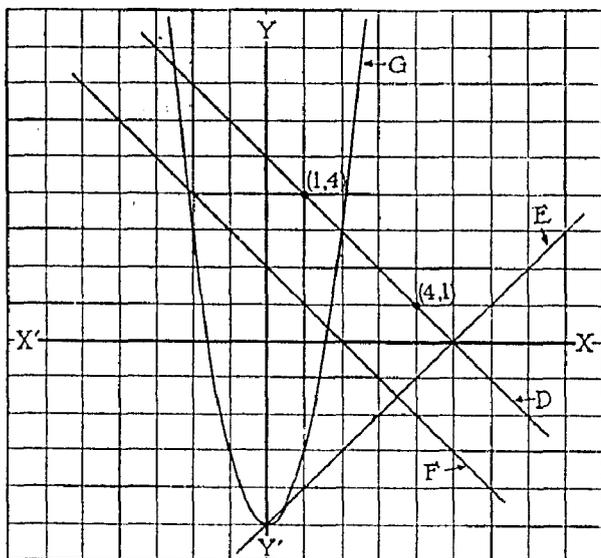
- f. \$130
- g. \$132
- h. \$134
- i. \$136
- j. none of the above

TEST 1. MATHEMATICS (Cont'd)

EQUATIONS

- E. $x - y = 5$ H. $x^2 + y^2 = 25$
 F. $x + y = 2$ I. $x^2 - y^2 = 9$
 G. $2x^2 - y = 5$ J. $2x^2 + 3y^2 = 60$

GRAPHS

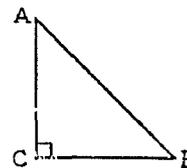


Questions 47 through 49 are based on the graphs and equations above.

47. Which of the following curves is a parabola?
 a. G b. H c. I
 d. J e. none of the above
48. Lines E and F intersect at what point? (See equations.)
 f. $x = 3.5, y = -1.5$ g. $x = 3.5, y = 1.5$
 h. $x = 1.5, y = 3.5$ i. $x = 1.5, y = -3.5$
 j. none of the above
49. In line D what is the value of x when $y = +2$?
 a. -3 b. -2 c. +2
 d. +7 e. none of the above

Part F

50. The number of degrees in the circumference of a circle is —
 f. 60
 g. 90
 h. 180
 i. 360
 j. none of the above
51. What is the perimeter of a rectangle whose base is r and whose altitude is h ?
 a. $2(r + h)$
 b. $2rh$
 c. $r + h$
 d. rh
 e. none of the above
52. What is the area of a circle whose radius is r ?
 f. $2\pi r$
 g. $2\pi r^2$
 h. $\frac{1}{4}\pi r^2$
 i. $\frac{4}{3}\pi r^2$
 j. none of the above
53. The number of cubic inches in one cubic foot is —
 a. 27
 b. 144
 c. 160
 d. 1728
 e. none of the above
54. What is the volume of a cube, each of whose 12 edges is r ?
 f. $12r$
 g. $12r^2$
 h. $3r$
 i. r^3
 j. none of the above
55. What is the perimeter of a regular hexagon inscribed in a circle whose radius is r ?
 a. $2\pi r$
 b. $\frac{1}{3}\pi r$
 c. $\frac{4}{3}\pi r$
 d. $4r$
 e. none of the above



56. The cosine of angle A in the isosceles right triangle above is —
 f. 1
 g. $\sqrt{2}$
 h. $\frac{1}{2}\sqrt{2}$
 i. $\frac{1}{2}\sqrt{3}$
 j. none of the above

TEST 1. MATHEMATICS (Cont'd)

Part G

TABLE OF SQUARES, CUBES, SQUARE ROOTS,
AND CUBE ROOTS

NUMBER n	n^2	n^3	\sqrt{n}	$\sqrt[3]{n}$
15	225	3375	3.8730	2.4662
20	400	8000	4.4721	2.7144
25	625	15625	5.0000	2.9240
30	900	27000	5.4772	3.1072
35	1225	42875	5.9161	3.2711
40	1600	64000	6.3246	3.4200
45	2025	91125	6.7082	3.5569
50	2500	125000	7.0711	3.6840

Questions 57 and 58 are based on the table above.

57. What is the square of 3.5?

- 5.9
- 12.25
- 122.5
- 1225
- none of the above

58. What is the approximate cube root of 15,000?

- 2.47
- 24.7
- 247
- 5000
- none of the above

TABLE SHOWING AMOUNTS THAT A PRINCIPAL OF \$1.00
WOULD EQUAL IF INTEREST WAS COMPOUNDED ANNUALLY

YEARS	$1\frac{1}{4}\%$	$1\frac{3}{4}\%$	$2\frac{1}{4}\%$	$2\frac{3}{4}\%$	$3\frac{1}{4}\%$
2	1.025	1.035	1.046	1.056	1.066
4	1.051	1.072	1.093	1.115	1.136
6	1.077	1.110	1.143	1.177	1.212
8	1.104	1.149	1.195	1.242	1.292
10	1.132	1.189	1.249	1.311	1.377
12	1.161	1.231	1.306	1.385	1.468
14	1.190	1.275	1.365	1.462	1.565
16	1.220	1.320	1.428	1.544	1.668

Questions 59 and 60 are based on the table above.

59. What would \$10 amount to if loaned at $2\frac{1}{4}\%$ per cent interest (compounded annually) for 8 years?

- \$1.195
- \$11.43
- \$11.95
- \$12.42
- none of the above

60. What rate of interest, approximately, if compounded annually for 12 years, would secure a return of \$38.50 interest on a loan of \$100?

- $3\frac{1}{4}\%$
- $2\frac{3}{4}\%$
- $2\frac{1}{4}\%$
- $1\frac{1}{2}\%$
- none of the above

Part H

DIRECTIONS. Read the geometric condition; then complete the statement by selecting from the five choices presented the result that could be proved.

61. If two parallel lines are cut by a transversal, not at right angles, the interior angles on the same side of the transversal are —

- complementary.
- equal.
- supplementary.
- similar.
- none of the above.

62. If a diameter of a circle bisects a chord which is not a diameter, it —

- is tangent to the circle.
- is perpendicular to the chord.
- is not perpendicular to the chord.
- forms an angle measured by the intercepted arc.
- none of the above.

63. If two right triangles have an acute angle of one equal to an acute angle of the other, the triangles are —

- congruent.
- corresponding.
- equal.
- similar.
- none of the above.

64. In a trapezoid, if a line is drawn from one of the non-parallel legs to the other, bisecting one of the legs and parallel to the bases, it equals —

- one half the sum of the bases.
- the sum of the bases.
- the sum of the squares of the legs.
- the sum of the legs.
- none of the above.

65. If two points are each equidistant from the ends of a segment of a line, they —

- are parallel.
- are perpendicular.
- cut off equal segments on any transversal.
- determine the perpendicular bisector.
- none of the above.

66. If a point on a sphere is at a quadrant's distance from each of two other points, not the extremities of a diameter, it —

- is the point of tangency.
- determines the perpendicular bisector.
- is a zone on the sphere.
- is the pole of a great circle through these points.
- none of the above.

TEST 2. SCIENCE

Part A. Science Information

Section I

1. The science which deals with the composition of substances is called —
 - a. chemistry.
 - b. ecology.
 - c. physics.
 - d. meteorology.
 - e. physiology.
2. Substances are broken down into simpler substances by the process of —
 - f. synthesis.
 - g. assimilation.
 - h. photosynthesis.
 - i. precipitation.
 - j. decomposition.
3. A substance composed of two or more elements that are united chemically and in definite proportions is called —
 - a. an alloy.
 - b. a compound.
 - c. a mixture.
 - d. an emulsion.
 - e. a solution.
4. All living matter consists of —
 - f. cytoplasm.
 - g. nucleus.
 - h. protoplasm.
 - i. chromatin.
 - j. plasma.
5. Which one of the following terms refers to the temperature, humidity, rainfall, wind, and sunlight, collectively, of a locality *over a long period of time*?
 - a. atmosphere
 - b. climate
 - c. season
 - d. weather
 - e. environment
6. Poisonous substances secreted by vegetable and animal organisms are called —
 - f. antitoxins.
 - g. enzymes.
 - h. antibodies.
 - i. toxins.
 - j. hormones.
7. The parts of a reproductive cell which carry the new organism's hereditary characteristics are called —
 - a. chloroplasts.
 - b. chromosomes.
 - c. ovules.
 - d. embryos.
 - e. spermatozoa.
8. Digested food is converted into living protoplasm by the process of —
 - f. assimilation.
 - g. catabolism.
 - h. excretion.
 - i. digestion.
 - j. respiration.
9. The change in direction of a ray of light as it passes from one medium to another is known as —
 - a. dispersion.
 - b. aberration.
 - c. distortion.
 - d. reflection.
 - e. refraction.
10. Carbon dioxide and water are converted into carbohydrates by the process of —
 - f. nutrition.
 - g. photosynthesis.
 - h. metabolism.
 - i. reduction.
 - j. digestion.
11. The process by which the nucleus of an atom splits is called —
 - a. fission.
 - b. chain reaction.
 - c. analysis.
 - d. radioactive decay.
 - e. reduction.
12. Atoms having the same atomic numbers and the same chemical properties but different atomic weights are called —
 - f. electrons.
 - g. aldehydes.
 - h. isotopes.
 - i. neutrons.
 - j. ions.
13. Necessary nutrient compounds containing nitrogen and made up of amino acids are called —
 - a. minerals.
 - b. fats.
 - c. proteins.
 - d. vitamins.
 - e. carbohydrates.
14. Under standard conditions, increasing the pressure applied to a typical gas causes it to —
 - f. occupy more space.
 - g. become cooler.
 - h. become denser.
 - i. change mass.
 - j. react in a manner which cannot be determined from the information given.
15. The force acting on an object, multiplied by the distance through which the object is moved, is a measure of —
 - a. energy.
 - b. power.
 - c. weight.
 - d. work.
 - e. efficiency.
16. What is taking place when molecules combine with each other to form larger and larger molecules that are exact multiples of the original molecules?
 - f. condensation
 - g. deliquescence
 - h. sublimation
 - i. polymerization
 - j. distillation

TEST 2. SCIENCE (Cont'd)

Section II

17. The velocity of light is approximately —
- 5280 miles per sec.
 - 186,000 miles per sec.
 - 240,000 miles per sec.
 - 1,100,000 miles per sec.
 - 93,000,000 miles per sec.
18. A compound whose water solution turns blue litmus red is —
- an acid.
 - a base.
 - the oxide of a metal.
 - a hydroxide.
 - an alkali.
19. Which of the following normally contains the most cellulose?
- the nucleus of a plant cell
 - the nucleus of an animal cell
 - the cytoplasm of a plant cell
 - the wall of an animal cell
 - the wall of a plant cell
20. Which of the following inventions contributed most to the development of a better understanding of contagious diseases?
- X-ray tube
 - clinical thermometer
 - compound microscope
 - stethoscope
 - sphygmomanometer
21. Which of the following inventions was the most crucial in the development of television from radio?
- vacuum tube
 - transformer
 - condenser
 - photoelectric cell
 - inductance coil
22. The usual unit for expressing the *intensity* of the light falling on a surface is a —
- frequency.
 - candle power.
 - foot-candle.
 - watt.
 - wave length.
23. In the metric system the basic unit of *weight* is the —
- gram.
 - pound.
 - meter.
 - liter.
 - centimeter.

24. In the metric system the basic unit of *volume* is the —
- centimeter.
 - gram.
 - liter.
 - meter.
 - cubic foot.
25. The basic unit used in expressing the amount of *electromotive force* is —
- an ampere.
 - a farad.
 - an ohm.
 - a volt.
 - a watt.
26. The chemical name for common baking soda is —
- sodium chloride.
 - sodium hydroxide.
 - sodium carbonate.
 - sodium bicarbonate.
 - sodium nitrate.

Questions 27 and 28 each consist of the common name of a substance. From the list at the right, select the chemical name of each substance and mark its letter on your answer sheet.

COMMON NAMES	CHEMICAL NAMES
27. rust	a. silver sulfide
	b. mercuric oxide
	c. ferric oxide
28. quicksilver	d. ferrous sulfate
	e. mercury

For questions 29 and 30, select from the list of organic acids the one which occurs characteristically in the common substance named.

COMMON SUBSTANCES	ORGANIC ACIDS
29. vinegar	a. acetic acid
	b. butyric acid
	c. citric acid
30. sour milk	d. lactic acid
	e. stearic acid

Each of questions 31 and 32 gives an illustration of heat transfer. From the methods of transfer listed beside the questions, select the one which describes the principal way in which the heat is transferred. On your answer sheet, opposite the question number, mark the space which has the same letter as your choice. (The same answer may be chosen for both questions.)

ILLUSTRATIONS	METHODS OF TRANSFER
31. Burning yourself by staying in the sun too long.	a. convection currents
	b. conduction
	c. diffusion
32. Burning your fingers on a hot electric grill.	d. radiation
	e. dispersion

TEST 2. SCIENCE (Cont'd)

Section III

Each of questions 33 through 37 is a descriptive statement which applies to a noted scientist. For each question select from the list of scientists the one to whom the statement applies. On your answer sheet, opposite the question number, mark the space which has the same letter as your choice. (The same scientist may be chosen for more than one statement.)

- | | |
|--|--|
| 33. He formulated the law of gravitation. | a. Archimedes
b. Copernicus
c. Darwin
d. Leeuwenhoek
e. Newton |
| 34. He invented the first workable compound microscope. | |
| ----- | |
| 35. He developed a method of killing harmful organisms in milk. | |
| 36. He was an American plant breeder, famous for the many new kinds of flowers, fruits, and vegetables he developed. | a. Burbank
b. Darwin
c. Jenner
d. Mendel
e. Pasteur |
| 37. He formulated the basic laws of heredity on dominant and recessive characteristics. | |

Section IV

For questions 38 through 42, use your knowledge of scientific experiments, facts, laws, and principles as a basis, and decide for each statement which of the following five categories best describes the degree of truth or falsity of the belief. On the answer sheet, mark —

- T — if it has been demonstrated clearly that the statement is *definitely true*.
- PT — if the evidence indicates that the statement is *probably true*, but does not clearly demonstrate this.
- I — if the statement is *indeterminate*, or if it is impossible to evaluate it from the available evidence.
- PF — if the evidence indicates that the statement is *probably false*, but does not clearly demonstrate this.
- F — if it has been demonstrated clearly that the statement is *definitely false*.

STATEMENTS

38. People born when certain planets are ascendant show the influence of the planets in their personalities.
39. One can tell the approximate age of a tree from the rings in the cross-section of its trunk.
40. Children of superior intelligence are more apt to be weak physically than are children of average intelligence.
41. The color red is more exciting to bulls than any other color.
42. Mothers know by intuition how to care for their children.

Part B. Using the Concepts of Science

Section I

DIRECTIONS. For each of questions 43 through 49, select from the list of principles just above the questions the one which is *most specifically* illustrated by the situation given in the question. On your answer sheet, mark the space which has the same letter as your choice. (The same principle may be used for more than one illustration.)

For questions 43 and 44, use the following principles:

- a. Even the most complex machines are combinations of one or more of the simple type machines.
- b. To change the rate or direction in which an object is moving requires the application of force.
- c. Liquids and gases transmit pressure equally in all directions.
- d. The kinetic energy of molecules determines the physical state of matter.
- e. A strong force, called gravity, tends to cause all objects in the universe to move toward each other.

ILLUSTRATIONS

43. "What goes up must come down."
44. The clutch pedal of an automobile operates on the principle of a lever.

For questions 45 through 47, use the following principles:

- a. Species have survived because of adaptations and adjustments which have fitted them to the conditions under which they live.
- b. Through interdependence of species and the struggle for existence, the many forms of life tend to maintain a balance in number and kind.
- c. There have been profound changes in the climate, not only of certain regions but also of the earth as a whole.
- d. The sun is the chief source of energy for the earth.
- e. Material substances and physical conditions are limiting factors to life.

ILLUSTRATIONS

45. Fossilized remains of tropical plants have been found in Greenland.
46. The Japanese beetle was introduced into America accidentally; a parasitic Japanese wasp was later introduced purposefully.
47. Gradual changes in the structure of birds are indicated by their fossil remains.

TEST 2. SCIENCE (Cont'd)

For questions 48 and 49, use the following principles:

- a. Matter and energy cannot be created.
- b. In chemical changes a definite quantitative relationship exists between the amounts of substances reacting and the amounts of the substances produced by the reaction.
- c. Chemical, electrical, and physical changes are manifestations of energy changes.
- d. All matter is probably electrical in structure.
- e. The properties of the different elements depend on the number and arrangement of the electrons, neutrons, and protons contained in their atoms.

ILLUSTRATIONS

48. The elements fall into natural families or groups.
49. The existence and characteristics of the element germanium were both predicted years before its discovery.

In each of questions 50 and 51, a common misconception is given. From the list of principles just above the questions, select the one which the stated misconception most clearly violates. Mark the answer space which has the same letter as your choice. (The same principle may be used for both misconceptions.)

PRINCIPLES VIOLATED

- a. All life comes from life and produces its own kind of living organism.
- b. Related persons are more apt to have recessive genes for the same desirable traits than are persons who are not related.
- c. Heredity determines both the differences and the resemblances among offspring and between offspring and their parents.
- d. Only the physical structure of an organism has been demonstrated to be controlled by genes.
- e. There is great variety in the size, structure, and habits of living things.

COMMON MISCONCEPTIONS

50. If particles of "mother" are allowed to float in vinegar, they will turn into the small threadworms known as "vinegar eels."
51. Tuberculosis can be inherited.

Section II

DIRECTIONS. Each of questions 52 through 61 states a problem from everyday life. From the generalizations listed above each group of questions, select the one which applies *most specifically* to the problem stated by the question. The best generalization does not necessarily solve the problem, but is the one most significantly related to it. On your answer sheet mark the space which has the same letter as your choice. (The same generalization may be used for more than one problem.)

For questions 52 through 54, use the following generalizations:

- a. Nutrition has important lasting effects on an organism's growth, physical energy, disposition, complexion, and resistance to diseases.
- b. Regulation of housing and working conditions that affect health has to be entrusted to public agencies.
- c. The physical health of an individual is closely related to the activities and well-being of other individuals.
- d. Many patent medicines contain drugs which dangerously upset the body's metabolism or are habit-forming.
- e. Communicable diseases are due to specific microorganisms or viruses that are carried from host to host in definite ways.

PROBLEMS

52. How does draining stagnant pools help control malarial fever?
53. Why does the Federal Communications Commission control the advertising of medicines on the radio?
54. What is the probable outcome if a nation or people exists on a substandard supply of food for a long time?

For questions 55 and 56, use the following generalizations:

- a. The laws that describe inheritance in plants and animals are essentially the same as those that describe inheritance in man.
- b. With respect to a given trait, there is considerably more variation between individuals within a given racial or similar group than there is between the averages of each of the groups.
- c. The response of an individual to any situation depends, in part, upon his previous experiences.
- d. Physical and psychological characteristics show a wide range of variation among individuals.
- e. The various organs of an individual develop at different rates and at different periods.

PROBLEMS

55. Should every individual be evaluated on the basis of his own demonstrated personality and ability instead of on his nationality or religion?
56. How can the physical changes which typically occur during adolescence be explained?

TEST 2. SCIENCE (Cont'd)

For questions 57 through 59, use the following generalizations:

- a. Agriculture may be carried on by methods which conserve the soil.
- b. Modern technology has brought about rapid growth of cities with corresponding decline in rural population.
- c. Application of the sciences has increased man's understanding of and control over plant and animal life.
- d. The development of processes for making synthetic materials from the more abundant raw materials is an aid to the conservation of natural resources.
- e. Many materials taken or made from the earth's crust are critically important for modern industry.

PROBLEMS

57. What is one of the basic reasons for rotating crops, allowing land to "rest," contour plowing, and planting cover crops?
58. Why are countries sometimes classified economically as the "have" and "have not" countries?
59. In the older countries, extensive erosion which has been occurring for centuries has caused much hardship and suffering. How could this have been prevented?

For questions 60 and 61, use the following generalizations:

- a. The application of scientific findings has brought about conditions such that no individual can be expert enough, even in basic areas, to look after all his needs.
- b. Extreme subdivision of work often leads to excessive strain through monotony as well as through the work done.
- c. In general, new inventions and scientific discoveries lead to new products and more jobs.
- d. Modern technology has brought about rapid growth of cities with corresponding decline in rural population.
- e. The character of a civilization is determined in large part by the availability and use of various raw materials.

PROBLEMS

60. Why are such things as the radio, television, and telephone, electric lights, automobiles, airplanes, and plastics important?
61. Why have the recreation industries been increasing so rapidly in recent years?

Part C. Using the Methods of Science

DIRECTIONS. In this part of the test a series of simple experiments and observations are described and one or more questions are asked about each set of data. For each question decide which one of the four answers is best. Then, on your answer sheet, opposite the question number, mark the space having the same letter as your choice.

Questions 62 through 64 are based on the following observations:

DATA. While swimming in a large lake, Tom noticed that, with his left ear in the water and his right ear in the air, he heard distant gunshots through the water (with his left ear) slightly *before* he heard them through the air (with his right ear). The temperature of the lake is about the same as that of the air.

62. These data indicate that —
 - a. his right ear is stopped up, possibly by some water.
 - b. sound travels faster in water than in air.
 - c. sound travels faster in the air than in water.
 - d. he probably has defective hearing on his right side.
63. The most probable explanation is that —
 - a. sound travels faster in denser than in rarer materials.
 - b. sound travels faster in rarer than in denser materials.
 - c. the medium directly involved in the production of a sound conducts the sound most rapidly.
 - d. Tom's ear or auditory nerve has been injured.
64. These data suggest that as the air becomes more dense, with a drop in temperature, the speed of sound in the air —
 - a. increases.
 - b. remains the same.
 - c. may either increase or decrease, depending on other pertinent factors.
 - d. decreases.

Question 65 is based on the following situation:

DATA. A speeding automobile skidded and turned over while going around a sharp curve.

65. What probably caused the car to turn over?
 - a. the force of gravity pulling the car downhill
 - b. a force tending to accelerate the forward motion of the car
 - c. a force tending to move the car in a straight line
 - d. a force tending to move the car toward the *inner* side of the curve

TEST 2. SCIENCE (Cont'd)

Questions 66 and 67 are based on the following experiment:

DATA. In studying traits X and Y, parent XX, which is "pure" for trait X, is crossed with parent YY, which is "pure" for corresponding trait Y. Some of their hybrid offspring (XY) are mated with other individuals as indicated in the table below.

MATING NUMBER	INDIVIDUALS MATED	CHARACTERISTICS VISIBLE IN GROUP OF OFFSPRING RESULTING FROM MATING
1	Two hybrids are mated	25% displayed trait X 75% displayed trait Y
2	A hybrid is mated with a pure YY	100% displayed trait Y
3	A hybrid is mated with a pure XX	50% displayed trait X 50% displayed trait Y

66. Which trait would geneticists call recessive?
- trait X
 - trait Y
 - neither trait
 - both traits
67. The 1 : 2 : 1 ratio (1 pure X, 1 pure Y, and 2 hybrids) would be illustrated by the offspring from —
- mating number 1
 - mating number 2
 - mating number 3
 - none of these matings

Questions 68 through 70 are based on the following experiment:

DATA. Match X ignited when scratched on any solid surface which caused friction, but match Y ignited only when it was scratched on a special surface. These items have the following characteristics:

- Match X's head consisted of an oxidizing agent, some easily combustible material, ground glass, glue, and a non-poisonous phosphorus compound with a low kindling point.
- Match Y's head consisted of an oxidizing agent, some easily combustible material, powdered glass, and glue.
- The special surface consisted of an oxidizing agent, powdered glass, red phosphorus, and glue.

68. Which one of the following can be concluded to be LEAST essential in the ignition of a match?
- friction-producing surfaces
 - an easily combustible material
 - a material with a low kindling point
 - ground glass
69. Match Y did NOT light when scratched on a brick because —
- a substance to cause friction was needed.
 - more oxygen was needed to allow combustion.
 - ground glass was needed to provide more friction than did the powdered glass.
 - a substance with a low kindling point was needed.
70. The purpose of the oxidizing agent was to provide —
- easily combustible material.
 - friction.
 - a substance with a low kindling point.
 - oxygen.

STOP! Do not go on to the next page.
Go back and check your answers to the
Science test only, pages 8-13.

TEST 3. SOCIAL STUDIES

Part A

1. In World War II, the leader of the American land forces struggling to win back the Philippines was —
 1. Claire Chennault.
 2. Dwight D. Eisenhower.
 3. Douglas MacArthur.
 4. Chester Nimitz.
 5. John J. Pershing.

2. The inventor of the reaper which enabled the North to feed its army during the War Between the States was —
 6. Cyrus W. Field.
 7. Robert Fulton.
 8. Elias Howe.
 9. Cyrus McCormick.
 10. Eli Whitney.

3. An author, scientist, diplomat, and philosopher who helped greatly in drawing up the United States Constitution was —
 1. Benjamin Franklin.
 2. Alexander Hamilton.
 3. Patrick Henry.
 4. George Washington.
 5. none of the above.

4. The President noted for interest in the conservation of the natural resources of this country, and responsible for United States control of the Panama Canal, was —
 6. Grover Cleveland.
 7. William McKinley.
 8. Theodore Roosevelt.
 9. William H. Taft.
 10. Woodrow Wilson.

5. The President of the United States who attended international conferences at Cairo, Teheran, and Yalta to plan collaboration among the allies after World War II, for the purpose of safeguarding peace, was —
 1. Herbert Hoover.
 2. George C. Marshall.
 3. Franklin D. Roosevelt.
 4. Harry S. Truman.
 5. none of the above.

6. During the naval action around the Solomon Islands in World War II, the leader of the American naval operations in the southwest Pacific was —
 6. Claire Chennault.
 7. James Doolittle.
 8. William Halsey.
 9. Douglas MacArthur.
 10. Jonathan Wainwright.

7. The Justice of the Supreme Court who was largely responsible for the establishment of the court's position in the government of the United States was —
 1. Alexander Hamilton.
 2. Thomas Jefferson.
 3. James Madison.
 4. John Marshall.
 5. none of the above.

8. The Virginian who was commander-in-chief of the Confederate Army was —
 6. John C. Calhoun.
 7. Ulysses S. Grant.
 8. "Stonewall" Jackson.
 9. Gilbert Charles Stuart.
 10. none of the above.

9. Which of the following was a Chief Justice of the Supreme Court, a Secretary of State, a Judge of the World Court, and an unsuccessful candidate for the presidency?
 1. James F. Byrnes
 2. Charles E. Hughes
 3. Cordell Hull
 4. Elihu Root
 5. none of the above

10. Which of the following was one of the chief framers of the United States Constitution, Secretary of State under Jefferson, and President for two terms?
 6. John Quincy Adams
 7. Andrew Jackson
 8. James Madison
 9. James Monroe
 10. none of the above

Part B

11. The last price control to be removed after World War II was on —
 1. automobiles.
 2. rent.
 3. meat.
 4. steel.
 5. none of the above.

12. The system of social insurance, financed by payroll taxes whereby the worker gets money payments for incapacity for normal employment due to an industrial accident, is called —
 6. health insurance.
 7. workmen's compensation insurance.
 8. unemployment insurance.
 9. payroll insurance.
 10. none of the above.

13. The ability to fix the price of an article or service because of having complete control of the supply is called —
 1. industrialism.
 2. laissez faire.
 3. a monopoly.
 4. political control.
 5. none of the above.

14. The main reason for the revolt of the Dixiecrats from the Democratic party in the presidential campaign of 1948 was —
 6. civil rights.
 7. the European recovery program.
 8. socialized medicine.
 9. taxation.
 10. none of the above.

TEST 3. SOCIAL STUDIES (Cont'd)

15. An estimate of expenditures and receipts for a period of time made by a government for the purpose of planning and administering a financial policy is called

1. an appropriation.
2. a balance sheet.
3. a budget.
4. standardization.
5. none of the above.

16. Which of the following is NOT provided for by the Federal Social Security Act?

6. federal aid to the states for maternal and child-health services
7. federal programs for welfare services for aged and blind
8. federal program of old-age benefits
9. federal program of unemployment compensation administered by the states
10. federal aid to the states for public elementary schools

17. A type of social security included within the platform of the Democratic party which has been opposed by the American Medical Association is —

1. aid for the crippled and blind.
2. disability insurance.
3. old-age insurance.
4. prepaid medical insurance.
5. none of the above.

18. Which of the following is NOT considered unethical in labor-management problems by the great body of Americans?

6. courts or labor boards which are biased toward labor or management
7. increased productivity resulting in lower consumer prices
8. jurisdictional disputes injuring other workers and other employers
9. placing of restrictions on memberships or the right to work
10. use of violence by labor or management

19. A labor organization composed of both skilled and unskilled workers employed in a business concern is called —

1. a company union.
2. a craft union.
3. an independent union.
4. an industrial union.
5. none of the above.

20. The action of employers in a labor dispute which closes down the industry to prevent unionization or to hinder union activities is known as —

6. a lockout.
7. a slowdown.
8. a boycott.
9. a sit-down strike.
10. an injunction.

Part C

21. The system, largely in force during the Middle Ages, based upon the relationship between the lord and his vassals, with the requirements of homage, military service, reliefs, and forfeitures was known as —

1. absolutism.
2. Calvinism.
3. feudalism.
4. humanism.
5. none of the above.

22. The act or process of granting the rights, privileges, and responsibilities of citizenship to an alien is known as —

6. certification.
7. deportation.
8. naturalization.
9. the "Open Door" policy.
10. none of the above.

23. The malicious destruction and waste of property for the purpose of lessening the production of an employer or an enemy is called —

1. boycott.
2. reprisal.
3. sabotage.
4. strike.
5. none of the above.

24. One in whom is vested absolute power over a state either by grant or seizure without effective constitutional or legislative limitations is called —

6. a governor.
7. an emperor.
8. a king.
9. a president.
10. a dictator.

25. Racial, religious, occupational, and other similar groups, who, because of numbers, need protection from the control of the rest of the population, are called —

1. castes.
2. foreigners.
3. majorities.
4. minorities.
5. none of the above.

26. The hearing, investigation, and settlement of a dispute by persons to whom the dispute has been submitted with the consent of the parties concerned is called —

6. conciliation.
7. armistice.
8. arbitration.
9. treaty.
10. none of the above.

27. An order of a court or of a Congressional committee requiring the attendance of a witness is called —

1. a writ of habeas corpus.
2. an injunction.
3. a mandamus.
4. a subpoena.
5. none of the above.

TEST 3. SOCIAL STUDIES (Cont'd)

28. The economic system in which the ownership of land and natural wealth, the production and exchange of goods, and the employment of labor are entrusted to enterprisers who compete with each other is called —
6. capitalism.
 7. a cartel.
 8. socialism.
 9. specialization.
 10. none of the above.
29. The right given by constitution or statute to certain individuals to participate in electing public officials is called —
1. citizenship.
 2. election.
 3. electorate.
 4. suffrage.
 5. none of the above.
30. A permanent form of business combination or organization which controls the policies and prices of a line of products of a number of establishments, generally by suppressing competition, is called a —
6. coöperative.
 7. corporation.
 8. public utility.
 9. trust.
 10. lobby.
-
- Part D**
31. The chief executive officer of each state of the United States is the —
1. chief justice of the state supreme court.
 2. comptroller.
 3. senior United States Senator from the state.
 4. United States Marshal.
 5. governor.
32. In the United States, the largest division of local government found within most states is the —
6. county.
 7. incorporated district.
 8. municipality.
 9. village.
 10. parish.
33. The presiding officer of the United States House of Representatives is called the —
1. majority leader.
 2. chairman.
 3. Chief Justice.
 4. Vice-President.
 5. Speaker.
34. The source from which most cities in the United States secure the right to govern themselves is —
6. a charter from the city council.
 7. a charter from the state legislature or Constitution.
 8. the Congress and Constitution of the United States.
 9. the vote of the people of the state.
 10. none of the above.
35. In order of official dignity, the highest executive department of the Federal government is the —
1. Department of Justice.
 2. Department of State.
 3. Treasury Department.
 4. Department of Labor.
 5. Department of the Interior.
36. In the United States, jurisdiction over complaints concerning violations of employees' rights is, in general, held by the —
6. Department of Justice.
 7. Department of Labor.
 8. Interstate Commerce Commission.
 9. National Labor Relations Board.
 10. Department of Commerce.
37. When there is no conflict with federal law, the supreme law of each state is derived from the —
1. constitution of the state.
 2. governor of the state.
 3. state senate.
 4. supreme court of the state.
 5. police power.
38. The powers and duties of most members of the President's Cabinet are determined by —
6. the Constitution.
 7. the Supreme Court.
 8. Congress.
 9. the wish of the President.
 10. none of the above.
39. United States Senators are elected for —
1. 2 years.
 2. 4 years.
 3. 8 years.
 4. life.
 5. none of the above.
-
- Part E**
40. "We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish . . ." is part of —
6. Amendment 10: United States Constitution.
 7. the American Bill of Rights.
 8. the Declaration of Independence.
 9. the Preamble to United States Constitution.
 10. none of the above.
41. "The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude." is part of —
1. Amendment 1: United States Constitution.
 2. Amendment 15: United States Constitution.
 3. the Emancipation Proclamation.
 4. the Zeal for Democracy.
 5. none of the above.

TEST 3. SOCIAL STUDIES (Cont'd)

42. "With malice toward none; with charity for all; with firmness in the right, as God gives us to see the right, let us strive on to finish the work we are in; to bind up the nation's wounds; . . . to do all which may achieve and cherish a just and a lasting peace among ourselves, and with all nations." is part of —

6. Lincoln's Second Inaugural Address.
7. the Northwest Ordinance of 1787.
8. Washington's Farewell Address.
9. Wilson's Fourteen Points.
10. none of the above.

43. "We, the peoples . . . to save succeeding generations from the scourge of wars . . .

To reaffirm faith in fundamental human rights, in the dignity and worth of the human person, . . .

To establish conditions under which justice and respect for the obligations arising from treaties . . . can be maintained, and

To promote social progress and better standards of life in larger freedom, . . ." is part of —

1. the Charter of the United Nations.
2. the Covenant of League of Nations.
3. the Declaration of Independence.
4. the World Court by-laws.
5. none of the above.

44. "The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it." is part of —

6. Amendment 19: United States Constitution.
7. the Communist Manifesto.
8. the Magna Carta.
9. the Preamble to United States Constitution.
10. none of the above.

Part F

45. Certain parts of South America are NOT suited for immigrants from northern Europe because —

1. there are few good harbors.
2. intense heat and uncontrolled tropical diseases threaten.
3. many of the immigrants are ignorant and would not make the most of the opportunity.
4. the mines and plantations are owned by wealthy men from the United States.
5. the weather is cold the year round.

46. Which country has been made the center of international problems because of its deposits of oil?

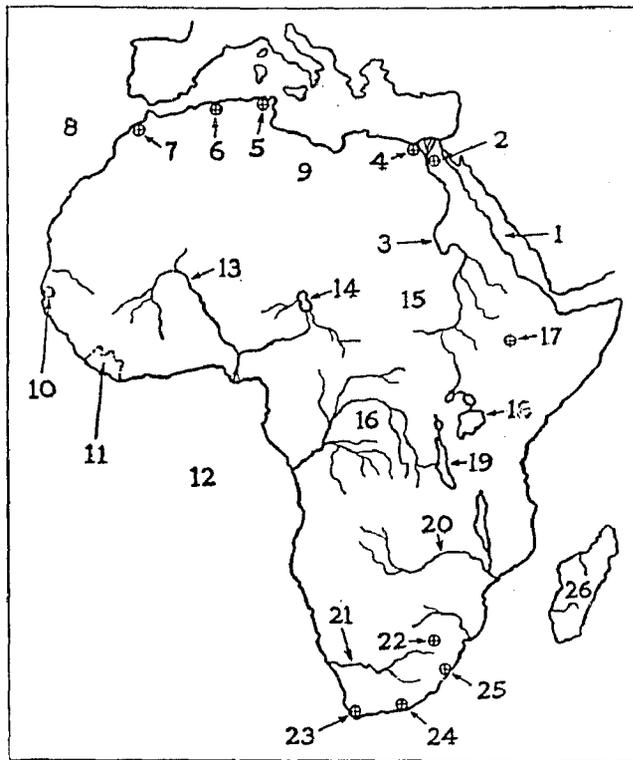
6. India
7. Iran
8. Korea
9. Manchuria
10. none of the above

47. Japan attempted to control Korea, Manchuria, and China because of the —

1. abundance of rain caused by monsoons.
2. many mineral resources and much water power.
3. need of land for food, raw materials, and colonization.
4. hot and moist summers.
5. wider range in latitude and altitude.

48. Due to the many rapids and waterfalls in Africa —

6. exploration has been made difficult.
7. there are few good harbors.
8. the narrow coastal plains are hot and moist.
9. the water power has made possible extensive manufacturing.
10. none of the above.



Questions 49 through 51 are based on the map above.

49. Which number on the map above identifies the Nile River?

1. 3
2. 13
3. 16
4. 20
5. none of the above

50. Which number identifies the capital of Ethiopia?

6. 4
7. 7
8. 17
9. 22
10. none of the above

51. Which number identifies the Belgian Congo?

1. 9
2. 13
3. 15
4. 16
5. none of the above

TEST 3. SOCIAL STUDIES (Cont'd)



Questions 52 through 55 are based on the map above.

52. Which number identifies the country most similar to the United States in climate and agriculture?

6. 5
7. 8
8. 10
9. 11
10. 13

53. Number 13 on the map above identifies the country of —

1. Colombia.
2. Panama.
3. Peru.
4. Venezuela.
5. none of the above.

54. Oil is a very important product of the country identified by the number —

6. 1
7. 5
8. 7
9. 9
10. none of the above

55. Which number identifies the largest country formed from lands which were once the center of Inca civilization?

1. 5
2. 10
3. 11
4. 13
5. none of the above

56. Which of the following countries is most noted for stock raising?

6. Burma
7. Chile
8. Italy
9. New Zealand
10. Venezuela

57. What great advantage does Argentina have over many other countries of South America?

1. The farms are large and the population small per square mile.
2. The government owns and leases natural resources.
3. Immigration is encouraged.
4. Irrigation projects have saved the water.
5. The laws provide for free and compulsory education.

Part G

58. The famous modern leader who struggled for the independence of India by the methods of non-violence, disobedience, and non-coöperation was —

6. Gautama Buddha.
7. Mohandas Gandhi.
8. Aga Khan.
9. Jawaharlal Nehru.
10. none of the above.

59. The cardinal of the Roman Catholic Church whose arrest and trial for defiance of the Hungarian government after World War II gave the West a view of Soviet justice was —

1. Antonescu.
2. Dollfuss.
3. Horthy.
4. Mindszenty.
5. none of the above.

60. Which one of the following is given credit for the invention of printing by use of movable metal type?

6. Copernicus
7. Erasmus
8. Hugo Grotius
9. Johannes Gutenberg
10. none of the above

61. The leader of the "Free French" movement who sought to organize all Frenchmen in the colonies to continue World War II as an ally of Britain was —

1. François Darlan.
2. Charles de Gaulle.
3. Pierre Laval.
4. Henri Pétain.
5. none of the above.

62. The leader and hero of the Spanish-American colonies in their revolt against Spain was —

6. Balboa.
7. Bolivar.
8. Garcia.
9. Garibaldi.
10. none of the above.

TEST 3. SOCIAL STUDIES (Cont'd)

63. The greatest leader of the Franks, who encouraged education of children, development of architecture, protection of learning and religion, and who became "Emperor of the Holy Roman Empire" was —
1. Charlemagne.
 2. Charles Martel.
 3. Clovis.
 4. Louis the Pious.
 5. none of the above.
64. The statesman under whose leadership Athens reached the "golden age" was —
6. Alexander.
 7. Pericles.
 8. Phidias.
 9. Plato.
 10. none of the above.
65. The German Socialist whose work *Das Kapital* greatly influenced the revolution in Russia was —
1. Bismarck.
 2. Marx.
 3. Tolstoy.
 4. Voltaire.
 5. Hitler.
66. The author of *The Institutes of the Christian Religion* and leader of Protestantism in Switzerland, France, Holland, and Scotland was —
6. John Calvin.
 7. John Huss.
 8. Martin Luther.
 9. John Wycliffe.
 10. none of the above.
67. The leader of the Turkish Nationalists who established a democratic republic in Turkey was —
1. Mustapha Kemal.
 2. Kublai Khan.
 3. Bela Kun.
 4. Ibn Saud.
 5. none of the above.
68. The President of Brazil who put down Communist-inspired strikes and riots and who broke off diplomatic relations with Russia was —
6. Oswaldo Aranha.
 7. Eurico Dutra.
 8. Romulo Gallegos.
 9. Juan Peron.
 10. none of the above.
-
- Part H**
69. The United States obtained the territory of Alaska by —
1. annexation.
 2. purchase from Denmark.
 3. purchase from Russia.
 4. treaty after the war with Spain.
 5. none of the above.
70. The following conferences after World War I were all connected with the attempt to maintain world peace by limitation of armaments EXCEPT the —
6. Havana Conference, 1945.
 7. Geneva Conference, 1932.
 8. London Conference, 1930.
 9. Geneva Conference, 1927.
 10. Washington Conference, 1921.
71. A territory generally uninhabited but possibly rich in minerals, which is claimed by Argentina, Australia, Chile, France, Great Britain, Norway, and the United States, is —
1. the Åland Islands.
 2. Antarctica.
 3. Tasmania.
 4. Tierra del Fuego.
 5. none of the above.
72. The "Open Door" policy in international affairs was concerned with —
6. eligibility of any nation to enter the United Nations.
 7. equality of opportunity in China in commercial matters.
 8. lack of immigration restrictions by South American countries.
 9. removal of all restrictions and tariffs on imports into Great Britain.
 10. none of the above.
73. Which of the following was NOT a major or minor cause of the American Revolution?
1. mercantile theory of commerce
 2. curtailment of self-government
 3. heavy duties on molasses and rum
 4. Intolerable Acts
 5. belief that Indians were purposely incited against the western frontier
74. The following were all connected with the establishment of Philippine independence EXCEPT the —
6. Organic Act of 1902.
 7. Philippine Independence Act of 1934.
 8. reports of commissions indicating unreadiness for self-government.
 9. starting of a popular assembly.
 10. surrender of Shantung peninsula to Japan.
75. The following places were all connected with the establishment of international arrangements by allied leaders during and after World War II EXCEPT —
1. Quebec.
 2. Cairo.
 3. Teheran.
 4. Versailles.
 5. Yalta.
76. A desire to unite the countries in an association under the benevolent leadership of the United States, and the desire to establish closer commercial contacts, were the principal reasons for —
6. calling the first Pan-American Conference.
 7. establishing reciprocal trade agreements.
 8. forming the North Atlantic Pact.
 9. forming the United Nations.
 10. none of the above.

TEST 3. SOCIAL STUDIES (Cont'd)

77. Which of the following was NOT a contributing factor to the issuance of the Monroe Doctrine?

1. desire of Americans to protect the Panama Canal
2. belief that France would attempt to seize Mexico
3. belief that Russia would attempt to colonize California
4. revolt of Spanish colonies in Latin America
5. threat of Holy Alliance to restore colonies to Spain

78. After World War II, which of the following was NOT a part of the foreign policy of the United States as a champion of democratic nations?

6. aid to Greece and Turkey
7. lend-lease to all our war allies
8. the North Atlantic Pact
9. refusal to give up atomic secret without inspection of all countries by a commission
10. private and governmental gifts of food

Part I

79. The last of the following political parties to be organized was the —

1. "Bull Moose" Progressive.
2. Communist.
3. Socialist.
4. Populist or People's Party.
5. State's Rights.

80. The first of the following steps or movements toward the independence of the Colonies was the —

6. Articles of Confederation.
7. Boston Port Act.
8. Declaration of Independence.
9. Boston Tea Party.
10. Second Continental Congress.

81. The last of the following in the extension of the rights of women was the —

1. amendments granting civil and political status to slaves.
2. Anti-Saloon League.
3. Nineteenth Amendment to the United States Constitution.
4. Women's Christian Temperance Union.
5. woman suffrage movement.

82. The last of the following groups to come into prominence with the rise of organized labor was the —

6. American Federation of Labor.
7. Socialist Party.
8. Industrial Workers of the World.
9. Knights of Labor.
10. Congress of Industrial Organizations.

83. The first of the following causes for the Westward movement was the —

1. discovery of gold in California.
2. failure of the revolution in Germany.
3. Homestead Act.
4. Louisiana Purchase.
5. upheaval caused by the War Between the States.

Part J

84. Which one of the following happened FIRST as part of World War II?

6. German invasion of Denmark
7. German invasion of Russia
8. German invasion of Poland
9. Russian invasion of East Poland
10. Russian invasion of Finland

85. In which of the following fields was the most outstanding contribution to civilization made by the ancient Hebrews?

1. agriculture
2. architecture
3. commercial organizations and trade
4. political organizations
5. moral codes

86. Which one of the following was NOT a provision of the Treaty of Versailles after World War I?

6. coal mines of the Saar basin ceded to France as reparations until plebiscite
7. German colonies given to various countries as mandates of League of Nations
8. Hitler and National Socialists placed in control by allies to keep order
9. loss of special economic interests and privileges around the world by Germany
10. merchant ships, animals, chemicals, dyestuffs lost as reparations by Germany

87. Which one of the following happened last in the development of British imperialism?

1. the Australian Commonwealth Act
2. establishment of the Dominion of Canada
3. formation of the Union of South Africa
4. making India a Crown Dominion
5. setting up of Ireland as a Free State

88. Which one of the following was NOT a major or minor cause of the growth of monasticism?

6. desire for study and learning
7. desire to escape manual labor
8. desire to escape wickedness and hardships of the world
9. dislike of fighting
10. devotion to religion

89. Which of the following was NOT a major or minor cause of the decline of the Roman Empire?

1. disappearance of small farms
2. heavy taxation
3. increase in slavery
4. rise of Christianity
5. rise of Athens

90. Which one of the following was NOT a major or minor cause of the early "period of exploration"?

6. advances in knowledge of geography
7. advances in the science of navigation
8. desire to break the commercial monopoly of the Venetians
9. desire to cut the costs of commerce
10. desire to plant colonies in the new world

TEST 4. ENGLISH

Part A. Reading for Information

DIRECTIONS. The first page of this test consists of several paragraphs on an interesting subject which you are to read and study in the same way you would prepare a lesson. You will have 10 minutes in which to do this. Then you will be told to turn the page and answer 15 questions on what you have just read *without referring back to the paragraphs.*

One cannot really imagine what the world is like without seeing it as a sphere. The customary flat maps of our geography books are very misleading in that they create false notions as to the outlines of the land masses of the earth. They also distort the relative positions of specified places with relation to each other.

The familiar global map, mounted on a pedestal and revolving freely on its axis, is a great help in correcting our impressions of distances and locations of places. The granddaddy of all such global maps is to be found in the lobby of the New York News Building on 42nd Street in New York City. Here is a globe twenty feet or more in diameter, mounted so that its axis parallels the axis of the earth. It revolves slowly, so that, as one stands at the railing of the huge pit in which it is situated, one can take a "trip around the world" in a few minutes. The boundaries of countries are shown and the location of all the principal cities can be seen easily. On the floor of the room, alongside the globe, are arrows pointing in the direction of the principal cities of the world, with the distances from New York City indicated.

However, even the global map does not fully create the correct impression of what the global sphere really is like. To get this impression one must go to Boston and visit the Mapparium in the Christian Science Publishing House just off Huntington Avenue. Nowhere else in the world is there such a room as this. Nearly three stories high, globular, fashioned in colored glass and brilliantly illuminated from the rear by powerful lights, it is a veritable magic world. The feeling of being poised at the very center of the earth is created when one stands inside this great globe on the bridge of glass which leads from side to side, and a mere turn of the head brings into view in its true perspective any place on the earth's surface. To make this globe, 608 separate sections of glass were cast in their proper contours, were painted and fired in pleasing colors, and then were fastened into a bronze web of 10-degree intervals to represent latitude and longitude. Clocks at the equator show the time simultaneously around the world.

The name Mapparium comes from the Latin words "mappa" meaning *map* and the suffix "arium" meaning *a place for*. The room was first opened in 1935 and is considered to be one of the finest examples of the functional use of colored glass in the world. Each section of glass is removable, so that political boundary lines can be kept up to date.

The Mapparium is not just a novelty. It has real educational value in that it brings home in an unforgettable manner some of the everyday truths to be found in geography books.

Perhaps most important of all is the fresh realization of the importance of air travel in a world made up of island continents. The true relation of these great land masses is vividly shown, as well as their relative size. For example, one cannot help but be impressed by the tremendous share of the earth's surface which comes within the framework of the Union of Soviet Socialist Republics. Also, one is impressed with the nearness of some of our neighbors when viewed from the center of the earth, so that transpolar distances take on their true significance. London and Boston appear much farther north than people expect and many are startled to find that New York City and Madrid are practically on the same parallel. Naples, Istanbul, and Jehol also fall on the same invisible line approximately 40 degrees north of the equator. Labrador, Great Britain, Kamchatka, and British Columbia are all equidistant from the equator. When this information is coupled with a knowledge of the substantial differences in the climate of these places, a fresh realization is gained of the great importance of influences on climate other than just the position of a place with respect to the poles—such influences as the great ocean currents, for example.

This is, indeed, "one world" in which we live, as the news of the day so often brings home to us most forcefully. What is more fitting than that these great globes should be made available to the public through the efforts of two outstanding newspapers?

STOP! Do not turn the page until you are told to do so.

TEST 4. ENGLISH (Cont'd)

Part A. Reading for Information (Cont'd)

DIRECTIONS. For each question four possible answers are given. Decide which answer is the best. Then on your separate answer sheet, opposite the question number, mark the space which has the same number as your choice. Study the sample question, which is marked correctly in the sample answer spaces at the right of the page.

Sample. The reading selection is about —

1. newspapers 2. Boston 3. maps 4. New York

SECTION OF AN ANSWER SHEET

1	2	3	4
⋮	⋮	█	⋮

1. Probably the largest freely revolving spherical map in the world is located in —
 1. Boston.
 2. London.
 3. New York.
 4. Paris.
2. When was the Mapparium opened?
 5. 1925
 6. 1935
 7. 1940
 8. 1945
3. How large is the Mapparium?
 1. It is large enough so that a small house could be put inside it.
 2. It is as large as a small home garage.
 3. It is as large as a good-sized church.
 4. This information is not given.
4. In what respect are Labrador, Great Britain, Kamchatka, and British Columbia alike?
 5. They are all islands.
 6. They are the same distance from the equator.
 7. They all have the same climate.
 8. They all are part of the British Empire, on which, it is said, the sun never sets.
5. What other information besides that on the big globe itself does this article say can be found in the lobby of the News Building?
 1. hourly bulletins of all the main news stories
 2. the temperature, barometric pressure, and weather forecast
 3. the exact time in New York and the corresponding time in the principal cities of the world
 4. the distances from New York to all the principal cities of the world
6. The bridge that leads to the center of the Mapparium is made of —
 5. steel.
 6. stone.
 7. glass.
 8. wood.
7. How are the pieces of glass forming the surface of the glass map held in place?
 1. by a network of bronze beams spaced at 10-degree intervals to correspond to the latitude and longitude lines
 2. by heavy wires running throughout the glass fastened together at the edges and held in place by guy wires running to the sides of the room
 3. by the pressure of air reinforcing the strength of the domed glass
 4. This information is not given.
8. When certain places are seen to be equidistant from the equator but are known to have quite different climates, the visitor to the Mapparium is impressed anew with —
 5. the nearness of some of our neighbors across the polar icecap.
 6. the effect of climate on the development of civilization.
 7. the importance of oceans as avenues of trade.
 8. the influence of other factors on climate, such as ocean currents.
9. Why are there a number of clocks around the circumference of the Mapparium?
 1. It is a convenience for the visitors to the Mapparium so they will know what time it is.
 2. To show that the time of day differs from one part of the world to another at any given moment.
 3. Some places have daylight-saving time.
 4. There is no particular reason except for decoration.
10. Which one of the following cities may be nearer the equator than New York?
 5. Istanbul
 6. Madrid
 7. Naples
 8. Shanghai
11. What is it about the Soviet Union that impresses visitors to the Mapparium?
 1. its nearness to the continental land mass of the United States
 2. the meagerness of its ocean outlets in comparison with ours
 3. the large areas of the earth's surface which it occupies
 4. the many different countries which are united to make it up
12. The customary flat maps of the earth, in contrast with spherical maps, give a misleading impression in which one of the following ways?
 5. They make places seem nearer together or farther apart than they really are.
 6. They do not show the real boundaries of countries as they now exist.
 7. They do not show where the mountains and the flat lands are.
 8. They do not show the countries in their true colors.
13. If "sol" means sun, what does "solarium" mean?
 1. a model of the solar system
 2. any room facing the south
 3. an observatory for studying the stars
 4. a place or room open to the sun
14. What, in the opinion of the author, makes it very appropriate that these globes should have been provided by newspapers?
 5. Newspapers usually have large buildings in which such huge objects can be housed.
 6. Modern means of communication make it possible for the newspaper of today to keep in touch constantly with happenings all over the world.
 7. People come from all over the world to visit the offices of the newspapers.
 8. Newspapers have the large incomes necessary to construct and maintain such expensive exhibits.
15. Which one of the following is the best title for this article?
 1. The World in New York and Boston
 2. How the Earth Looks from the Inside
 3. Seeing the World Inside and Out
 4. Proof that the Earth is Round

TEST 4. ENGLISH (Cont'd)

Part B. Vocabulary

DIRECTIONS. Each of the words in the column at the left-hand side of the page means the same, or very nearly the same, as one of the four numbered words which follow it. Select the word which means the same, or nearly the same, as each word in the column at the left. Mark your answers on the answer sheet in the same manner as you have in the first part of this test.

- | | | | | |
|------------------|--------------------------|--------------------|----------------------------|-------------------------|
| 16. notables — | 1. wealthy men | 2. ambassadors | 3. rascals | 4. distinguished people |
| 17. partition — | 5. defeat | 6. division | 7. destruction | 8. discovery |
| 18. kinsmen — | 1. politicians | 2. relatives | 3. allies | 4. escorts |
| 19. replica — | 5. blueprint | 6. photograph | 7. status | 8. copy |
| 20. invincible — | 1. unseen | 2. spirited | 3. unconquerable | 4. ineligible |
| 21. undaunted — | 5. unarmed | 6. stubborn | 7. unquenchable | 8. fearless |
| 22. dominant — | 1. chief | 2. ominous | 3. domestic | 4. costliest |
| 23. biased — | 5. forced | 6. trained | 7. prejudiced | 8. interested |
| 24. impassive — | 1. unmoved | 2. impatient | 3. eager | 4. peremptory |
| 25. barren — | 5. sumptuous | 6. unfruitful | 7. unplowed | 8. rocky |
| 26. phenomenal — | 1. in name only | 2. disgraceful | 3. serious | 4. remarkable |
| 27. brandish — | 5. stamp with a hot iron | 6. wave menacingly | 7. serve in a brandy sauce | 8. make new and bright |
| 28. begrudge — | 1. double-cross | 2. refuse | 3. give reluctantly | 4. demand |
| 29. unanimous — | 5. like-minded | 6. reserved | 7. impossible | 8. undefeated |
| 30. brevity — | 1. scope | 2. fearlessness | 3. shortness | 4. boldness |

Part C. Business Definitions

DIRECTIONS. For each of the following groups of statements in Column II you will find five possible responses in Column I. For each statement in Column II choose the word or phrase in the same group in Column I which corresponds to it. On the separate answer sheet locate the question number and make a heavy black mark under the letter corresponding to the response which you picked as correct. Study the sample question below.

- a. net price
b. discount
c. gross weight
d. quantity
e. grade

Sample. Amount of percentage subtracted from a quotation.

SECTION OF AN ANSWER SHEET

a	b	c	d	e
⋮	■	⋮	⋮	⋮

COLUMN I

- a. currency
b. specie
c. bank draft
d. promissory note
e. security
f. invoice
g. purchase order
h. inventory
i. catalogue
j. bill of lading
a. premium
b. policy
c. risk
d. annuity
e. indemnity
f. consignee
g. jobber
h. consignor
i. investor
j. broker

COLUMN II

31. Metal coins and paper money.
32. An order from one party to another directing the payment of money.
33. A written promise to pay a specified amount of money at a fixed future date.
34. A written record of goods shipped, issued by a common carrier.
35. A tabulation of charges for merchandise sent to a purchaser.
36. A requisition for goods made by an agent to a supplier.
37. Chance of loss.
38. Written agreement with an insurance company stating terms of protection against loss.
39. A consideration paid for an insurance contract.
40. A sender of goods to an agent.
41. A person who buys stocks and bonds for his own account.
42. An agent who buys securities for resale.

TEST 4. ENGLISH (Cont'd)

Part D. Use of References

DIRECTIONS. For each of the items in Column II you will find fifteen possible responses in Column I. For each item in Column II choose the proper answer from the sources in Column I. On the separate answer sheet locate the question number and make a heavy black mark under the letter corresponding to the source you have picked as correct. Notice that all letters (a, b, c, d, e, f, g, h, i, j, k, l, m, n, and o) are not given for each item. Only letters corresponding to five of the fifteen possible sources are entered on the answer sheet for each item and these five letters are marked over the answer spaces. Study the sample question at the top of Column II.

COLUMN I	COLUMN II												
a. <i>Concordance</i>	<i>Sample. Where would you go to find the number of chapters in a book?</i>												
b. <i>Readers' Guide to Periodical Literature</i>	<table border="0"> <tr> <td></td> <td>b</td> <td>k</td> <td>l</td> <td>m</td> <td>n</td> </tr> <tr> <td>SECTION OF AN ANSWER SHEET</td> <td> </td> <td> </td> <td> </td> <td>█</td> <td> </td> </tr> </table>		b	k	l	m	n	SECTION OF AN ANSWER SHEET				█	
	b	k	l	m	n								
SECTION OF AN ANSWER SHEET				█									
c. <i>World Almanac</i>	<i>Where would you go to find:</i>												
d. <i>New International Yearbook</i>	43. the number of books by John Galsworthy which are in your library?												
e. <i>Webster's Unabridged Dictionary</i>	44. both World Series records and a table of postal rates?												
f. <i>Hammond's New World Atlas</i>	45. an excerpt on a familiar theme such as "Wealth"?												
g. <i>Bartlett's Familiar Quotations</i>	46. the current magazines which have articles on the "United Nations"?												
h. <i>Encyclopædia Britannica</i>	47. a description of the processes in paper manufacture?												
i. <i>Who's Who in America</i>	48. the page on which there is a definition of "calorie" in <i>Feeding the Family</i> by Rose?												
j. <i>Current Biography</i>	49. the location and population of Fremont County in the state of Colorado?												
k. Index	50. a concise tabulation of personal information concerning an outstanding living American musician?												
l. Preface	51. the meaning of the word "consilience"?												
m. Table of Contents	52. a comprehensive list of words meaning the same or nearly the same as "dullness," other than in an unabridged dictionary?												
n. Card Catalogue	53. a concise summary of developments in the petroleum industry during the past year?												
o. <i>Rogel's Thesaurus</i>	54. in what book and verse of the Bible the words "exhort one another daily" appear?												

STOP! Do not go on to the next page.

TEST 4. ENGLISH (Cont'd)

Part E. Literature Acquaintance

DIRECTIONS. Each of the items in this part gives an incident from a book. For each incident there are given three possible literary selections, together with the name of the author, from which to choose. Read the incident carefully and decide from which of the selections it is taken. Then on your separate answer sheet, opposite the question number, mark the space which has the same number as your choice. If you have not read any of the selections, skip the question entirely and go on to the next one.

1. "His only alternative, to escape from the labor of the farm and the clamor of his wife, was to take gun in hand and stroll away into the woods."
 1. *Rip Van Winkle* — Washington Irving
 2. *Legend of Sleepy Hollow* — Washington Irving
 3. *The Luck of Roaring Camp* — Bret Harte
2. "Injun Joe lay stretched upon the ground, dead, with his face close to the crack of the door."
 4. *Life on the Mississippi* — Samuel L. Clemens
 5. *Huckleberry Finn* — Samuel L. Clemens
 6. *The Adventures of Tom Sawyer* — Samuel L. Clemens
3. "'Tomorrow I start for Bristol. In three weeks' time we'll have the best ship in England. Hawkins shall come as cabin boy. You, Livesey, are the ship's doctor; I am admiral.'"
 1. *Riders to the Sea* — John M. Synge
 2. *Treasure Island* — Robert Louis Stevenson
 3. *South by Thunderbird* — Hudson Strode
4. "'I shall marry whom I please, Aunt March, and you can leave your money to anyone you like.'"
 4. *Rose in Bloom* — Louisa May Alcott
 5. *Little Women* — Louisa May Alcott
 6. *An Old-Fashioned Girl* — Louisa May Alcott
5. "John Thornton stood over Buck, struggling to control himself. 'If you strike that dog again, I'll kill you,' he managed to say."
 1. *The Call of the Wild* — Jack London
 2. *Free Land* — Rose Wilder Lane
 3. *The Luck of Roaring Camp* — Bret Harte
6. "The Templar seized the terrified Rebecca, who filled the air with shrieks, and bore her out of the room in his arms, in spite of her cries, not regarding the menaces and defiance which the wounded knight thundered against him."
 4. *Ivanhoe* — Walter Scott
 5. *Kidnapped* — Robert Louis Stevenson
 6. *The Scottish Chiefs* — Jane Porter
7. "'Yes, sir,' said the boy meekly, 'Aunt Sarah gave me this slingshot this morning and told me to give it back to you. She said she took it from you thirty-five years ago.'"
 1. *Jeremy* — Hugh Walpole
 2. *The Varmint* — Owen Johnson
 3. *Penrod* — Booth Tarkington
8. "'You never stick to the point. I endeavor to show you how to run this house on a business basis, and you wind up jibbering and jabbering about everything under the sun.'"
 4. *Life with Father* — Howard Lindsay and Russel Crouse
 5. *Craig's Wife* — George Kelly
 6. *Dulcy* — George Kaufman and Marc Connelly
9. "For the first time since the war began, Atlanta could hear the sound of battle. In the early morning hours before the noises of the town awoke, the cannon at Kennesaw Mountain could be heard faintly, far away, a low dim booming that might have passed for summer thunder."
 1. *Janice Meredith* — Paul Leicester Ford
 2. *Gone with the Wind* — Margaret Mitchell
 3. *Hugh Wynne* — Silas Weir Mitchell
10. "Up came a little girl with her hand out, and a half shy, half merry look in her blue eyes, as she said, 'This is Tom, isn't it?'"
 4. *Little Women* — Louisa May Alcott
 5. *Seventeenth Summer* — Maureen Daly
 6. *An Old-Fashioned Girl* — Louisa May Alcott
11. "Lady Mary Carlisle would be the first to prefer the devil to a man of no birth, barber."
 1. *Beau Geste* — Percival C. Wren
 2. *Amateur Gentleman* — Jeffery Farnol
 3. *Monsieur Beaucaire* — Booth Tarkington
12. "I began to rain kicks and buffets on the door and to shout for Mr. Balfour. Then I heard a cough right overhead, and looking up, I beheld a man's head in a tall nightcap, and the bell mouth of a blunderbuss at one of the first-story windows."
 4. *Kidnapped* — Robert Louis Stevenson
 5. *Lorna Doone* — Richard Blackmore
 6. *The Sea-Wolf* — Jack London
13. "The night — its silence — its rest — was rent in twain by a savage, a sharp, shrill sound that ran from end to end of Thornfield Hall."
 1. *Northanger Abbey* — Jane Austen
 2. *Jane Eyre* — Charlotte Brontë
 3. *The Old Wives' Tale* — Arnold Bennett
14. "In Belmont is a lady richly left.
And she is fair, and, fairer than that word,
Of wondrous virtues. Sometimes from her eyes
I did receive fair, speechless messages."
 4. *The Winter's Tale* — William Shakespeare
 5. *The Taming of the Shrew* — William Shakespeare
 6. *The Merchant of Venice* — William Shakespeare
15. "'Good day, Mr. Murdstone,' said my aunt.
'Good day to you, too, ma'am. Let me see you riding a donkey over my green again and I'll knock your bonnet off.'"
 1. *David Copperfield* — Charles Dickens
 2. *Seasoned Timber* — Dorothy Canfield Fisher
 3. *The Mill on the Floss* — George Eliot

TEST 4. ENGLISH (Cont'd)

Part F. Language Usage

DIRECTIONS. Each sentence in this part of the test may or may not contain an error in language usage. Read each sentence and decide whether it is correct or incorrect. Then on your separate answer sheet, opposite the question number, put a heavy black mark under the letter "C" if the sentence is CORRECT and under the letter "I" if the sentence is INCORRECT. Study the sample questions, which are marked correctly in the sample answer spaces at the right of the page.

- Samples.* 1. I ain't seen her yet.
2. Aren't you going to the show?

SECTION OF AN ANSWER SHEET

	C	I
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	C	I
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>

16. I can't hardly wait.
17. We were only a short distance from the fire.
18. You haven't done nothing to deserve punishment.
19. Isn't Mrs. Jones any better?
20. You will not approve of his talking that way.
21. It was a question of Don's passing the eye test.
22. Bill's riding the motorcycle was foolish.
23. The problem of my riding to school is settled.
24. Be careful or you will fall off from the ladder.
25. The apples dropped off the tree.
26. The carpenter fell from the staging.
27. The child fell off of the chair.
28. *Lyrical Ballads* was written by Samuel Taylor Coleridge.
29. We stopped to look at the flock of sheep that were in the pasture.
30. The class scattered to their homes for the holiday.
31. The jury has stated its decision.
32. He raised from his chair as I entered the room.
33. He rose early and went to work.
34. She watched the steam raise from the teakettle.
35. The farmer sold the crops he raised.
36. She has did her work well all the year.
37. As we rode toward home, we saw a beautiful sunset.
38. Is this the first time you ever saw them?
39. She done every example correctly.
40. These are the pupils which have finished their lessons.
41. The girls that stayed at home were disappointed.
42. We went to our camp, which is located near a lake.
43. Mr. Jones is the man which lives next to you.
44. Dave seemed gladly to hear about the fishing trip.
45. The child looked up sad at the stranger.
46. I glanced quickly out the window.
47. He sure can play ball.
48. These kind of dresses are expensive.
49. I do not like this kind of poem.
50. This sort of vegetable is rare.
51. I will not read this sort of books.
52. Collect all copies of this magazine, if there is any.
53. There has been many rain and sleet storms this winter.
54. There was Mary and John waiting patiently.
55. There is no end to his talents.
56. Neither Jane nor her sisters is interested in sports.
57. The superintendent, as well as the principal and teachers, were present at the reception.
58. Neither Bob nor Tom was here.
59. Cake, as well as cookies and candy, was served to the guests.
60. Do you know the principles of algebra?
61. The principle crop was wheat.
62. Has he paid the interest on the principle?
63. Principal Brown spoke at the assembly.
64. She can sew better than you ever could or ever will sew.
65. One room was undamaged but all the rest were burned.
66. The dinner was cooked and the dishes washed.
67. He worked faster than the others have or will work.
68. We were surprised to see Judith and her at the game.
69. It was him who invited us.
70. There was an invitation for Carl and I.
71. We all considered the best student to be she.
72. While attending school, my interest in books increased.
73. To bake a cake properly, the recipe should be tested.
74. The captain watched the soldier standing at attention.
75. To join the club, one must be interested in art.

TEST 4. ENGLISH (Cont'd)

Part H. Spelling

DIRECTIONS. In each of the sentences below, there are three numbered words, one or more or none of which may be misspelled. Study each numbered word; decide whether it is spelled correctly or incorrectly. Then on your separate answer sheet, opposite the number of the word, put a heavy black mark under the letter "C" if the word is spelled CORRECTLY and under the letter "I" if the word is spelled INCORRECTLY. Study the words in the sample sentence, which are marked correctly in the sample answer spaces at the right of the page.

Sample. The ¹busie child ²playd soldier all ³morning.

SECTION OF AN ANSWER SHEET

	C	I
1	⋮	█
	C	I
2	⋮	█
	C	I
3	█	⋮

⁶¹The ⁶²finacial section is on page ⁶³fourteen of the ⁶⁴finel edision.

A ⁶⁴physician owns that ⁶⁵parsel of land of ⁶⁶ninety acres.

The ⁶⁷decission concerning the ⁶⁸legasy is already ⁶⁹made.

The ⁷⁰harassed executive ⁷¹sighed ⁷²deeply, longing for relief.

The ⁷³alleged ⁷⁴contraversy occurred in the arena ⁷⁵balcony.

Apparently you were ⁷⁶unaware of the ⁷⁷bankrupsey ⁷⁸proceedings.

The ⁷⁹anouncer was ⁸⁰agreeably ⁸¹surprised by the ⁸²enthuziasm.

When the police ⁸²finaly came, the ⁸³ruffin had ⁸⁴escaped.

⁸⁵Sprinkel one ⁸⁶tabelspoon of ⁸⁷cinnamon over the ⁸⁸piecrust.

The ⁸⁸impetuous freshmen ⁸⁹foolishly ⁹⁰forfeited their ⁹¹prieveleges.

The ⁹¹millionaire ⁹²cordially ⁹³welcomed his ⁹⁴neice.

A ⁹⁴sound ⁹⁵knowlege of ⁹⁶anatomy is ⁹⁷esential for a ⁹⁸surgeon.

It is ⁹⁷customery to ⁹⁸abreviate certain ⁹⁹words and ¹⁰⁰phrases.

The ¹⁰⁰insident reported in the ¹⁰¹bulletin ¹⁰²hapened in ¹⁰³February.

A ¹⁰³colorful ¹⁰⁴pamplet ¹⁰⁵advertised the ¹⁰⁶claims of the ¹⁰⁷organisation.

A ¹⁰⁶kangeroo is one of the most ¹⁰⁷interesting ¹⁰⁸specimens in the ¹⁰⁹museum.

My ¹⁰⁹legal ¹¹⁰adviser filed a ¹¹¹liable ¹¹²suit for ¹¹³perjury.

¹¹²Analisis of the ¹¹³debree ¹¹⁴confermed the ¹¹⁵charge of ¹¹⁶arson.

The ¹¹⁵frock, ¹¹⁶chic in its ¹¹⁷simplicity, is ¹¹⁸comparitively ¹¹⁹expensive.

A ¹¹⁸dilapitated ¹¹⁹magizine was found on the ¹²⁰lawn in front of the ¹²¹capital.

COOPERATIVE BIOLOGY TEST

FORM Y

TEST NUMBER 624-84-1

by

PAUL E. KAMBLY, University of Oregon

with the editorial assistance of

RALPH C. BENEDICT, Brooklyn College; PAUL J. BURKE, Graduate Record Office;
ROY L. GILMAN, Flushing High School; and CARL A. PEARSON, Southwest High School (Minneapolis)

Please print:

Name.....Date.....
Last First Middle

Grade or Class.....Age.....Date of Birth.....
Yrs. Mos.

School.....City.....Sex.....
M. or F.

Instructor.....

Number of years you have studied biology (One semester = 1/2 year; one quarter = 1/3 year.).....

General Directions: Do not turn this page until the examiner tells you to do so. This examination consists of two parts and requires 40 minutes of working time. The directions for each part are printed at the beginning of the part. Read them carefully and proceed at once to answer the questions. **DO NOT SPEND TOO MUCH TIME ON ANY ONE ITEM. ANSWER THE EASIER QUESTIONS FIRST;** then return to the harder ones if you have time. There is a time limit for each part. You are not expected to answer all the questions in any part in the time limit; but if you should, go on to the next part. If you have not finished Part I when the time is up, stop work on that part and proceed at once to Part II. If you finish Part II before the time is up, you may go back and work on either part. No questions may be asked after the examination has begun.

You may answer questions even when you are not perfectly sure that your answers are correct, but you should avoid **wild** guessing, since wrong answers will result in a subtraction from the number of your correct answers.

Part	I	II	Total
Minutes	20	20	40

Scaled Score	Percentile

COOPERATIVE TEST DIVISION
EDUCATIONAL TESTING SERVICE

Princeton, N. J.

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PART I

(20 minutes)

Directions: Each of the incomplete statements or questions below is followed by five choices. For each item, select the choice which best completes the statement or answers the question, and put its number in the parentheses at the right.

- 1. Which of the following organisms has the fewest specialized body parts?
 1-1 Man
 1-2 Bird
 1-3 Fish
 1-4 Sponge
 1-5 Insect1()
- 2. The belief that horsehairs become "horse-hair snakes" when placed in water is a
 2-1 fact.
 2-2 postulate.
 2-3 theory.
 2-4 hypothesis.
 2-5 superstition.2()
- 3. Which is the most common source of tape-worm infection for human beings?
 3-1 Raw oysters
 3-2 Raw or poorly cooked meat or fish
 3-3 Raw eggs
 3-4 Citrus fruits and wild berries
 3-5 Poultry3()
- 4. The ovary is the organ which produces
 4-1 eggs.
 4-2 red blood cells.
 4-3 milk.
 4-4 white blood cells.
 4-5 insulin.4()
- 5. The surroundings and conditions in which an organism lives make up
 5-1 a climate.
 5-2 a biosphere.
 5-3 a community.
 5-4 an environment.
 5-5 a habitation.5()
- 6. As a result of thermal regulation in human beings, normal body temperature is
 6-1 89.6°F.
 6-2 96.8°F.
 6-3 98.6°F.
 6-4 99.8°F.
 6-5 100°F.6()
- 7. An antiseptic is used on wounds to
 7-1 kill or weaken germs.
 7-2 form a protective layer over the wound.
 7-3 stimulate white blood cells.
 7-4 aid in the clotting of blood.
 7-5 cauterize the injured cells.7()
- 8. Which of the following elements is found in carbohydrates, fats, and proteins?
 8-1 Carbon
 8-2 Nitrogen
 8-3 Phosphorus
 8-4 Sulfur
 8-5 Potassium8()
- 9. Greatest competition among plants growing in a forest is caused by the need for
 9-1 light.
 9-2 water.
 9-3 space.
 9-4 minerals.
 9-5 shade.9()
- 10. Water and minerals in solution usually enter land plants through the
 10-1 broad, flat epidermal cells of roots.
 10-2 extensions of epidermal cells of roots.
 10-3 root cap.
 10-4 older parts of roots.
 10-5 cortex of roots.10()
- 11. Meals are said to be balanced if they
 11-1 include carbohydrates, fats, and proteins.
 11-2 include vitamins and minerals in adequate amounts.
 11-3 provide equal quantities of the necessary classes of foods.
 11-4 include milk and green vegetables.
 11-5 provide proper amounts of all necessary nutrients.11()
- 12. How can an animal such as a crayfish, which has an exoskeleton, grow in size?
 12-1 The animal molts periodically.
 12-2 The animal adds segments to its skeleton as it grows.
 12-3 The skeleton gradually gets larger.
 12-4 The skeleton is elastic.
 12-5 The animal absorbs the small skeleton and grows a larger one.12()
- 13. A female opossum transfers its young to a pouch on its abdomen immediately after they are born. This is necessary for the survival of the young chiefly because opossums
 13-1 have no home.
 13-2 travel long distances in search of food.
 13-3 are very immature when born.
 13-4 are very active when born.
 13-5 are migratory animals.13()
- 14. All fungi must obtain organic foods because they lack
 14-1 stems.
 14-2 a water-absorbing system.
 14-3 cellular organization.
 14-4 chlorophyll.
 14-5 protoplasm.14()

Go on to the next page.

15. A chemical substance often found in plants but *not* in animals is
15-1 glycogen.
15-2 fat.
15-3 cellulose.
15-4 protein.
15-5 calcium. 15()
16. The production of large numbers of eggs by certain fish is an adaptation that
16-1 results in the starvation of many young.
16-2 insures an adequate food supply for the young.
16-3 enables these fish to exterminate others.
16-4 increases the chances for survival of the species.
16-5 helps insure fertilization. 16()
17. The organisms which most often destroy the balance of nature are
17-1 foxes.
17-2 men.
17-3 beavers.
17-4 insects.
17-5 weeds. 17()
18. One reason why a bean plant is classified as a spermatophyte is that it
18-1 is an annual.
18-2 has broad leaves.
18-3 carries on photosynthesis.
18-4 produces seeds.
18-5 needs minerals from the soil. 18()
19. One characteristic that is universal among adult insects is
19-1 three pairs of legs.
19-2 membranous wings.
19-3 short antennae.
19-4 sucking mouth parts.
19-5 one pair of wings. 19()
20. Most scientists will agree with four of the following statements concerning evolution. With which of the following would there be *least* agreement?
20-1 Man had ancestors that were not like modern man.
20-2 Man descended in a direct line from monkeys.
20-3 Evolution is the racial history of organisms.
20-4 Evolution is going on today as it did in the past.
20-5 Man has been on the earth for thousands of years. 20()
21. An animal with long, sharp canine teeth and relatively short intestines is very likely
21-1 herbivorous.
21-2 omnivorous.
21-3 a ruminant.
21-4 cold-blooded.
21-5 carnivorous. 21()
22. The closest approximation to the number of calories needed daily by a typical high school boy or girl is
22-1 1,000
22-2 2,500
22-3 5,000
22-4 7,500
22-5 10,000 22()
23. The chief function of the mucus which is secreted by the lining of the nasal cavities is to
23-1 catch dust particles.
23-2 decrease friction.
23-3 increase air temperature.
23-4 kill bacteria.
23-5 form new cells. 23()
24. Because of its adaptations, an organism has
24-1 a high degree of specialization.
24-2 many body parts.
24-3 characters that enable it to meet successfully its problems of living.
24-4 the ability to change its structure to fit changing environments.
24-5 more competition from other organisms. 24()
25. Which of these organisms has an especially poorly developed digestive system?
25-1 Fish
25-2 Tapeworm
25-3 Bee
25-4 Oyster
25-5 Termite 25()
26. On the basis of what is known about the bending of light rays by a double convex lens, it must be true that images formed on the retina of a human eye are
26-1 enlarged.
26-2 distorted.
26-3 inverted.
26-4 right side up.
26-5 virtual. 26()
27. An important function of the red blood corpuscles in human blood is to
27-1 carry oxygen.
27-2 carry carbon dioxide.
27-3 destroy disease-causing organisms.
27-4 regulate temperature.
27-5 carry food materials. 27()
28. Of the following foods, the richest source of vitamin C is
28-1 baked beans.
28-2 tomato juice.
28-3 cucumbers.
28-4 celery.
28-5 cod liver oil. 28()
29. In the scientific name *Felis domestica angora*, the word *angora* names the
29-1 phylum.
29-2 class.
29-3 genus.
29-4 order.
29-5 variety. 29()

- 30. Which one of the following illustrates the principle of osmosis?
 - 30-1 Passage of water into root hairs
 - 30-2 Passage of water through stomates
 - 30-3 Entrance of oxygen into lung capillaries
 - 30-4 Hormone secretion
 - 30-5 Passage of white corpuscles through capillaries 30()

- 31. Since carbon monoxide poisoning results from the permanent combination of the carbon monoxide with the hemoglobin, what is the best treatment for a person recovering from such poisoning?
 - 31-1 Use of mild stimulants so that uncombined hemoglobin may circulate more rapidly through the body
 - 31-2 Use of a good patent medicine like "Ironized Yeast" to furnish the body with the iron necessary to replace the hemoglobin
 - 31-3 Regular use of laxatives to speed the rapid elimination of the useless hemoglobin
 - 31-4 A long period of rest so that new red blood corpuscles may be produced
 - 31-5 Injections of blood plasma 31()

- 32. A student placed 100 radish seeds in a glass-covered dish on moist blotting paper and placed the dish in the light. Another 100 seeds treated exactly the same way were set beside the first dish and covered with a cardboard box. Of the seeds in the light 94 germinated, and of those kept in the dark only 90 germinated. On the basis of this information, it may correctly be concluded that
 - 32-1 light is necessary for seed germination.
 - 32-2 water is necessary for seed germination.
 - 32-3 darkness is beneficial to seed germination.
 - 32-4 differences in temperature cause differences in per cent of germination.
 - 32-5 germination of radish seeds takes place in either light or darkness. . . 32()

- 33. All fungi must be either parasites or saprophytes because they
 - 33-1 do not have a vascular system.
 - 33-2 cannot absorb water directly from the soil.
 - 33-3 are organisms which cause disease and decay.
 - 33-4 cannot manufacture food from inorganic materials.
 - 33-5 cannot utilize food. 33()

- 34. What part of a mature dry seed is alive?
 - 34-1 The entire seed
 - 34-2 The part in which food is stored
 - 34-3 The embryo only
 - 34-4 The stored food
 - 34-5 The cotyledon only 34()

- 35. One function of the lymph in the spaces around cells is to
 - 35-1 enable cells to store food.
 - 35-2 replace worn-out protoplasm.
 - 35-3 digest food for cell use.
 - 35-4 act as a medium of exchange between the blood and the cells.
 - 35-5 receive food from the cells and change it into energy for the use of the cells. 35()

- 36. Pruning helps young trees to get established by
 - 36-1 decreasing the transpirational area.
 - 36-2 increasing the respirational area.
 - 36-3 increasing the transpirational area.
 - 36-4 increasing the photosynthetic area.
 - 36-5 decreasing the water intake. . . . 36()

- 37. The green color of the water in many ponds and small lakes is caused by
 - 37-1 reflection from shore plants.
 - 37-2 small organisms.
 - 37-3 peculiar rock formations.
 - 37-4 a species of bacteria.
 - 37-5 absorption of light by the leaves of plants growing on the bottom. . . 37()

- 38. What is the chief advantage of the large number of tiny air spaces in human lungs?
 - 38-1 The air is warmed before it reaches the lungs.
 - 38-2 The mechanical strength of the lungs is increased.
 - 38-3 Foreign particles are filtered out of the air before it reaches the lungs.
 - 38-4 The absorptive area of the lungs is increased.
 - 38-5 Oxygen molecules are filtered out of the air before it reaches the lungs. . 38()

- 39. Mammals are distinguished from all other animals by their
 - 39-1 large size.
 - 39-2 appendages.
 - 39-3 skeleton.
 - 39-4 food habits.
 - 39-5 hair. 39()

- 40. A change in the body characteristics of any organism that is caused by environmental conditions is called
 - 40-1 an acquired character.
 - 40-2 a mutation.
 - 40-3 a hereditary change.
 - 40-4 maturation.
 - 40-5 a permanent variation. 40()

- 41. The small diameter of blood capillaries is advantageous to an organism because
 - 41-1 a smaller volume of blood comes into contact with the cells.
 - 41-2 the blood is distributed more uniformly in the tissues.
 - 41-3 the heart can pump blood through the body with less effort.
 - 41-4 blood pressure in the arteries is decreased.
 - 41-5 the rate of blood flow is increased. . 41()

42. The life process which releases energy in cells is
42-1 digestion.
42-2 absorption.
42-3 respiration.
42-4 excretion.
42-5 locomotion. 42()
43. An animal that breathes by means of lungs and is covered with scales is classified as
43-1 an invertebrate and an amphibian.
43-2 an invertebrate and a reptile.
43-3 a vertebrate and a reptile.
43-4 a vertebrate and a fish.
43-5 a vertebrate and an amphibian. . . 43()
44. In the human body, the first enzyme action on most proteins takes place in the
44-1 pancreas.
44-2 liver.
44-3 small intestine.
44-4 mouth.
44-5 stomach. 44()
45. Specialization is an evolutionary process whereby organisms in a species
45-1 tend to produce varied offspring.
45-2 gain the ability to adjust to changes in the environment.
45-3 develop vestigial organs.
45-4 develop body parts which perform definite and different functions.
45-5 regress to an ancestral form. . . 45()
46. Which of the following elements is added to the elements found in carbohydrates in the synthesis of protein by green plants?
46-1 Nitrogen
46-2 Carbon
46-3 Oxygen
46-4 Hydrogen
46-5 Sodium 46()
47. Which of the following factors is of *least* importance in explaining the rise of water in tree trunks?
47-1 Capillarity
47-2 Adhesion
47-3 Atmospheric pressure
47-4 Cohesion
47-5 Root pressure 47()
48. The growing tissue that is responsible for any increase in the length of a tree twig is located
48-1 at the base of the twig.
48-2 a few inches back of the tip of the twig.
48-3 at the tip of the twig.
48-4 just under the lateral epidermis of the twig.
48-5 in the lateral buds of the twig. . . 48()
49. The system which conducts liquids up and down a mature corn stem is made up of
49-1 scattered vascular bundles.
49-2 cambium, phloem, and xylem.
49-3 tubes called trachea.
49-4 a ring of vascular bundles.
49-5 pith and xylem cells. 49()
50. The transportation agency for hormones in animal bodies is the
50-1 digestive system.
50-2 nervous system.
50-3 lymphatic system.
50-4 circulatory system.
50-5 muscular system. 50()
51. Vaccination helps to prevent the spread of smallpox by
51-1 killing smallpox germs.
51-2 stimulating the production of antibodies.
51-3 adding antibodies to the blood.
51-4 adding serum to the blood.
51-5 increasing the number of white corpuscles. 51()
52. Gardeners often grow apple trees or pear trees so that the trees appear to be vines. What makes it possible to grow these vine-like trees?
52-1 Pruning and training
52-2 Cross-pollination
52-3 Grafting
52-4 Using special fertilizers that dwarf growth
52-5 Cutting off all terminal buds . . . 52()
53. Which of the following organisms loses the most heat per unit of weight in a given time?
53-1 Bear
53-2 Rattlesnake
53-3 Humming bird
53-4 Rabbit
53-5 Elephant 53()
54. Darwin's theory of natural selection includes the concept of
54-1 inheritance of acquired characteristics.
54-2 use and disuse.
54-3 conservation of energy.
54-4 survival of the fittest.
54-5 selective breeding. 54()
55. Which of the following appendages are similar in function but different in origin and structure?
55-1 Front leg of a dog and arm of a man
55-2 Wing of a robin and wing of a wren
55-3 Wing of an insect and wing of a bird
55-4 Flipper of a whale and leg of a cat
55-5 Tail of a monkey and tail of a mouse 55()

PART II
(20 minutes)

Directions: This part consists of diagrams and passages, followed by several items concerning the diagram or passage. For each item, decide on the basis of the diagram or passage which one of the choices given below the incomplete statement or question best completes the meaning of the statement or answers the question. Put the number of your choice in the parentheses at the right of each item.

Items 1 through 6 refer to the passage below.

Certain studies of the behavior of animals have shed light on the question of man's nervous reactions. Experiments on reflex action have been valuable in this connection. When a newborn dog first tastes food, the saliva begins to flow. This is a reflex action, caused by the taste of the food. The food is said to be the stimulus which produces the reaction. A reflex action such as this is said to be unconditioned. As the animal grows older, the mere sight or smell of food can cause the saliva of the dog to flow. This is because the animal connects the sight and smell of food with the actual taste of food. Such a flow of saliva when not really caused by food in the mouth of the dog is called a conditioned reflex. Now it has been found that if a bell is rung whenever food is about to be brought to a dog, the dog, after many days, comes to associate the ringing of the bell with the taste of food, and hence the saliva flows even if the bell is rung and food is *not* brought. This is a kind of artificial conditioned reflex. It is believed that man's actions may be largely a series of conditioned reflexes. However, most of these are so complex that it is difficult to recognize their true nature.

- 1. The flow of saliva in a newborn dog is brought about by
 - 1-1 the smell of food.
 - 1-2 a conditioned reflex action.
 - 1-3 the sight of food.
 - 1-4 the taste of food.
 - 1-5 the ringing of a bell. 1()
- 2. If a bell were rung in the presence of an untrained dog, an observer would probably find that
 - 2-1 a conditioned reflex was produced in the dog.
 - 2-2 the dog's digestive reaction was not noticeably affected.
 - 2-3 the dog's saliva flowed.
 - 2-4 the dog's reflex action was changed.
 - 2-5 the dog sniffed for food. 2()
- 3. A conditioned reflex is evidently
 - 3-1 a reflex action where the normal cause is replaced by a substitute.
 - 3-2 the reaction of an animal to the taste of food.
 - 3-3 the reaction of an animal to any noise.
 - 3-4 a reflex action produced when an animal is eating.
 - 3-5 a reflex action which can only be produced in the laboratory. 3()
- 4. The word "stimulus" means
 - 4-1 food.
 - 4-2 a digestive juice.
 - 4-3 a reflex response.
 - 4-4 the act of eating.
 - 4-5 that which causes a nervous reaction. 4()
- 5. According to the author of this paragraph, the idea that man's behavior is a series of conditioned reflexes
 - 5-1 is fairly sound.
 - 5-2 is poorly conceived.
 - 5-3 was well known long ago.
 - 5-4 is definitely proved by this study.
 - 5-5 is untenable. 5()
- 6. The chief value of this study is that it
 - 6-1 proves that all animals can be easily trained if the right method is used.
 - 6-2 shows that dogs can be trained to respond in many ways.
 - 6-3 points out a way of making a dog's saliva flow without giving it food.
 - 6-4 shows that dogs can be trained to come for their food when a bell is rung.
 - 6-5 enables scientists to get a better understanding of the workings of the brain. 6()

Go on to the next page.

Items 7 through 11 refer to the passage below.

Ever since Pasteur and his contemporaries discovered that certain diseases are caused by bacteria, attempts have been made to find substances which will bring about the destruction of bacteria in the body without harming the patient. Even today exceedingly few such substances have been found, and among these few penicillin, derived from the fungus *Penicillium notatum*, occupies a unique position. From the days of Lister, who first successfully used antiseptics in surgical infections, hundreds of different substances have been found capable of killing bacteria. While many of them are suitable for sterilizing surgical instruments and for similar purposes, and some may be applied to local infections, none of them (except the group of sulfonamide drugs) is suitable for dealing with bacterial infections affecting the body as a whole. This is because they are as deadly to the tissues of the patient as to the bacteria. Penicillin stops the growth of bacteria either by killing or by preventing multiplication. Thus it checks the spread of the infection and permits the natural resources of the body to overcome it. The unique property of penicillin is that it combines this power to prevent the bacteria from multiplying with almost total lack of toxicity toward most human beings. Its use rarely has to be limited by the fear of giving a dangerous overdose. It is this fact, together with its exceptionally high activity against bacteria, which makes it so valuable.

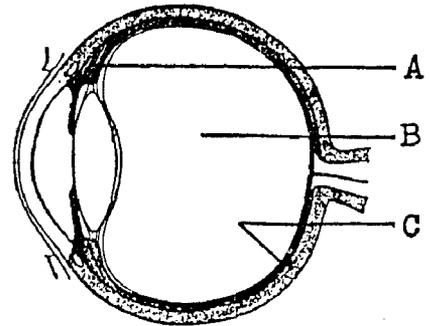
- 7. An ideal substance for use in the treatment of bacterial diseases of animals is *best* described as one which
 - 7-1 weakens or destroys bacteria.
 - 7-2 prevents the multiplication of bacteria in the body.
 - 7-3 destroys bacteria without injury to the patient.
 - 7-4 acts as an antiseptic.
 - 7-5 can be supplied in large quantities at low cost. 7()

- 8. According to this paragraph, penicillin may help a human being to get well by
 - 8-1 making it possible for the body to overcome an infection.
 - 8-2 stimulating tissues.
 - 8-3 causing rapid regeneration of diseased organs.
 - 8-4 supplying substances necessary to combat toxins.
 - 8-5 inhibiting the entry of bacteria. . . . 8()

- 9. Lister is usually given credit for the
 - 9-1 discovery of penicillin.
 - 9-2 making of antiseptics.
 - 9-3 discovery that bacteria cause disease.
 - 9-4 discovery that certain drugs control bacteria.
 - 9-5 first use of antiseptic surgery. . . . 9()

- 10. Penicillin is different from most antiseptic drugs in that it
 - 10-1 can be made very cheaply.
 - 10-2 kills bacteria very quickly.
 - 10-3 is not poisonous to the majority of human beings.
 - 10-4 checks the spread of infection.
 - 10-5 prevents the multiplication of bacteria. 10()

- 11. The name penicillin was applied to the drug because of
 - 11-1 the name of the man who discovered it.
 - 11-2 the name of the organism which produces it.
 - 11-3 its chemical composition.
 - 11-4 its action on bacteria.
 - 11-5 the locality in which it was first used. 11()



The diagram above represents a cross section of the human eye. Items 12 through 14 refer to this diagram.

- 12. What is the function of the structures shown at A?
 - 12-1 They support the iris.
 - 12-2 They change the shape of the lens.
 - 12-3 They change the size of the pupil.
 - 12-4 They connect the lens with the nerve cell.
 - 12-5 They change the length of the eyeball. 12()

- 13. What fills the space shown at B?
 - 13-1 Colorless tissue
 - 13-2 Vapor
 - 13-3 Semifluid mass
 - 13-4 Protoplasm
 - 13-5 Nerve endings 13()

- 14. The structure shown at C is the
 - 14-1 iris.
 - 14-2 lens.
 - 14-3 pupil.
 - 14-4 choroid layer.
 - 14-5 retina. 14()

Items 15 through 20 refer to the passage below.

The lungs in man are two spongy, elastic structures lying one on each side of the chest, with the heart between them. Each lung is enclosed in an elastic airtight sac (pleura). The walls of this sac are moistened with fluid, which lessens the friction caused by the lung movements.

It is estimated that each lung contains about four hundred million tiny air sacs. Each air sac has many small blood capillaries in its walls. Through the thin walls of the sacs, oxygen passes into the blood capillaries and carbon dioxide and water vapor pass from the capillaries into the sacs. It is estimated that the entire absorbing space of the lungs equals an area about fifty feet square.

We may think of the lungs enclosed in their sacs (the pleurae) as being in a box (the thorax). The sides are formed by the backbone, the breastbone, and the ribs, with the attached muscles. The bottom is formed by the diaphragm. This is a dome-shaped sheet of tissue separating the chest cavity from the abdominal cavity.

- 15. In this passage, the writer's main purpose is to
 - 15-1 show how large the human lungs are.
 - 15-2 explain how the lungs are protected.
 - 15-3 describe the muscular action involved in breathing.
 - 15-4 describe the human lungs.
 - 15-5 explain how the lungs are related to the heart. 15()

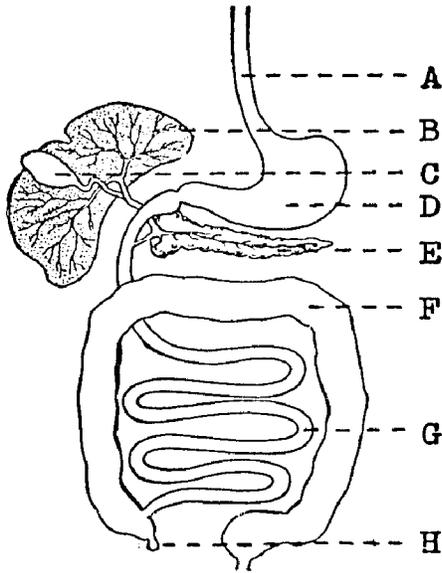
- 16. The passage states that the
 - 16-1 lungs are made up of millions of pleurae.
 - 16-2 lungs contain blood capillaries.
 - 16-3 lower part of the lungs is called the diaphragm.
 - 16-4 lower part of the lungs extends into the abdominal cavity.
 - 16-5 capillaries remove moisture from the lungs. 16()

- 17. Which one of these structures encloses the other four?
 - 17-1 The thorax
 - 17-2 The lungs
 - 17-3 The air sacs
 - 17-4 The pleurae
 - 17-5 The heart 17()

- 18. It is evident from the passage that the lungs
 - 18-1 are fastened to the heart.
 - 18-2 are particularly adapted for absorption.
 - 18-3 are filled with fluid to decrease loss of moisture.
 - 18-4 open into the chest cavity.
 - 18-5 have many openings into the other parts of the body. 18()

- 19. A word used in this passage that refers to both a large and a very small structure is
 - 19-1 thorax.
 - 19-2 capillary.
 - 19-3 pleura.
 - 19-4 sac.
 - 19-5 diaphragm. 19()

- 20. In an air sac one would *not* find
 - 20-1 water vapor.
 - 20-2 carbon dioxide.
 - 20-3 pleurae.
 - 20-4 air.
 - 20-5 oxygen. 20()



The diagram above illustrates the digestive system of man. Items 21 through 25 refer to this diagram.

21. Which structure is a gland?
 21-1 A
 21-2 D
 21-3 E
 21-4 F
 21-5 H 21()
22. The structure in which the villi are located is
 22-1 A.
 22-2 B.
 22-3 D.
 22-4 F.
 22-5 G. 22()
23. A hormone is secreted by
 23-1 B.
 23-2 C.
 23-3 D.
 23-4 E.
 23-5 G. 23()
24. The structure in which fats are digested is
 24-1 B.
 24-2 C.
 24-3 D.
 24-4 E.
 24-5 G. 24()
25. The structure which is a vestigial organ is
 25-1 A.
 25-2 B.
 25-3 C.
 25-4 G.
 25-5 H. 25()

Items 26 through 30 refer to the passage below.

The use of fertilizers to increase the productivity of the earth has been known and practiced for centuries. More recently it has been suggested that by applying similar methods to the sea a like increase in its food-producing capacity could be obtained.

For the purpose of testing this, an area of about eighteen acres was sealed off from the open sea by a dam and sluice. During the first year, a total of 600 pounds of sodium nitrate and 400 pounds of superphosphate was added to the area at approximately monthly intervals. During the second year, the quantities added were doubled.

When the water in the enclosed area was compared with that in the adjoining one, which was open to the sea, it was found that the plankton in the enclosed area was considerably richer. Owing to the fertilizers added, it was probably one of the richest plankton areas in existence. Similar results were found in the next link in the food chain—the bottom fauna. It was difficult to assess correctly this increase as the small fish population in the area had multiplied, and extensive stocking had taken place. Despite this, calculations made from observations showed that the quantity of fauna "useful" as food for fish had increased by over 200 per cent as compared with that of the previous summer.

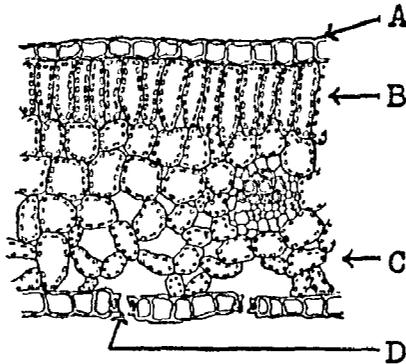
The figures for the increase in the growth rate of the fish were equally impressive. At one period after stocking (partly with marked fish), the fish population in the area was estimated to be 1,000 per acre; but even so the fish thrived.

Two main results were obtained: (1) It was found that growth continued during the winter months, although under natural conditions no growth takes place during this period; from this it seems that the cessation of growth in winter is mainly due to the relative scarcity of food. (2) Under the conditions of the experiment the fish in the area completed five or six years' growth in two years.

26. The first link in the food chain which ends with large fish is
 26-1 oxygen.
 26-2 small animals.
 26-3 small plants.
 26-4 bottom fauna.
 26-5 small fish. 26()
27. Fertilizer in proper amounts added to an enclosed body of water
 27-1 is used as food by fish.
 27-2 furnishes minerals for proper growth of fish.
 27-3 increases the organic compounds dissolved in the water.
 27-4 is used as food by fauna that live on the bottom.
 27-5 encourages the growth of tiny free-floating organisms. 27()

Go on to the next page.

28. Sodium nitrate added to the water increases the growth of plankton because it
- 28-1 contains nitrogen.
 - 28-2 contains sodium.
 - 28-3 is changed to organic food.
 - 28-4 increases the rate of photosynthesis.
 - 28-5 is changed to protoplasm. 28()
29. Fish grew more rapidly in the experiment described in this passage because they had plenty of food
- 29-1 of the right kind.
 - 29-2 in extremely large amounts.
 - 29-3 rich in mineral content.
 - 29-4 the year round.
 - 29-5 in a small area. 29()
30. The check used in the experiment described in this passage was
- 30-1 accurate data on previous conditions.
 - 30-2 a similar area open to the sea.
 - 30-3 accurate data concerning fertilizer and fish growth.
 - 30-4 an area of about eighteen acres.
 - 30-5 data accumulated during the second year. 30()



The diagram above shows the cross section of a leaf. Items 31 through 34 refer to this diagram.

31. A indicates the
- 31-1 upper epidermis.
 - 31-2 guard cells.
 - 31-3 chlorophyll.
 - 31-4 cuticle.
 - 31-5 cambium. 31()
32. B indicates the
- 32-1 pith.
 - 32-2 palisade layer.
 - 32-3 cotyledon.
 - 32-4 xylem.
 - 32-5 lower epidermis. 32()
33. C indicates the
- 33-1 receptacle.
 - 33-2 vein.
 - 33-3 spongy parenchyma.
 - 33-4 phloem.
 - 33-5 stipule. 33()
34. D indicates the
- 34-1 pith.
 - 34-2 vein.
 - 34-3 cambium.
 - 34-4 stoma.
 - 34-5 petiole. 34()

If you finish before the time is up, you may go back and work on either part.

Number wrong	0	3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63	67	71
Amount to be subtracted	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Number right _____
 Subtract _____
 (See table at left.)
 Raw Score = Difference _____
 Scaled Score _____
 (See table on key.)

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