CREATIVE CLASSROOM TESTING

10 designs for assessment and instruction

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Sybil B. Carlson

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Preface

Despite 40 years of considerable emphasis on better classroom tests, few improvements have been made. The call for "teachers' colleges to train teachers to write good examinations" can still be heard throughout the land. Essay, true-false, and multiple-choice—the usual formats of teacher-developed test items—do not always provide the most reliable, challenging, and fair assessment of a student's grasp of the subject matter.

Tests written in the 1930s and 1940s presented many additional types, such as master list (keylist), tabular (matrix), best/worst answer, greater-less-same, and rank order. But with the development of large-scale standardized testing, these options gradually disappeared. They are not presented in texts on item writing published during the 1960s and 1970s.

In a discussion with William Turnbull, a former president and now Distinguished Research Scholar at Educational Testing Service, we noted that despite growing concern, item writing by teachers has not improved. Turnbull agreed to set up a project to prepare one or more booklets that could be used to teach teachers to write good test items. Progress by the committee was rather slow until Sybil Carlson enlisted the aid of several local high school teachers who were interested in item writing and in relating their tests to their teaching, which resulted in the production of this book.

In considering the development of objective testing, it is interesting to note that during the later 1800s and early 1900s a number of studies were conducted regarding the reliability of teachers' marks, demonstrating that the same paper could receive widely different marks from different teachers; in some cases, marks on a zero to 100 scale for the same paper would range from 20 or 30, up to 70 or 80. As a reaction to this situation, objective items were developed in order to achieve greater reliability in scoring.

When Hutchins became president of the University of Chicago in the 1920s, one of his interests was actualized by setting up a more rigorous modern examination system for the college. It was decided that for the first two years of college, there would be five one-year courses—biological sciences, physical sciences, social sciences, English, and humanities—and that the grade in each of these one-year courses would be determined by the results of a six-hour examination at the end of each course in June. For students who had failed the examination, and also for those who wished to try the examination before they finished the course, the exams also were available at the beginning of the school year and midyear. Professor L. L. Thurstone wrote several memoranda to Dean Works indicating his suggestions for establishing a testing office, and in 1930 (approximately) was asked to be Chief University Examiner, a position he held until 1938. One of the rules he established in starting the Board of Examinations was, "The day after an examination is given, it goes on sale in the University of Chicago bookstore." He felt that this was necessary in order to prevent fraternities and sororities from giving their members an advantage by accumulating the examination questions and making them available to members. It is interesting to note that Thurstone's solution was not followed by testing organizations in general, until the recent flurry of laws requiring test disclosure.

Currently the emphasis is on the multiple-choice item as essentially the only item type that should be considered. It is said that other types of objective

items are merely trivial variants of multiple choice, which is the basic item type. In discussing item types with teachers, a common reaction is, "I can write a stem and a correct completion, but four plausible incorrect completions are extremely difficult and time consuming to devise." Texts on item writing also say that writing 10 items in a day is good productivity. Such a rate of productivity would, of course, make it essentially impossible for teachers to write such items for their testing purposes.

The solution of supplying a volume of several hundred items so that the teacher could scan it and pick the items suitable for a given section of the course is not one that would appeal to a good teacher. Items should be constructed that are appropriate for the reading material, lectures, and class discussions. Finding such material in items prepared by someone else is a highly impractical task, if not impossible.

When a teacher says that four plausible incorrect statements are impossibly time consuming, one can suggest that an easier approach is to list the distinctions that he or she hopes the students will be competent to make as a result of instruction. Perhaps the teacher feels that the students should know the differences between the views of Karl Marx, Adam Smith, and John Mills. In developing a test item, these names and perhaps others could be listed at the top of a page, numbered, and followed by a series of statements, *each* of them *true*, expressing the views of one or another person. A similar approach can be used to write items to distinguish among different schools of thought—Socialist, Communist, Labor, Tory. In psychology, a similar list might consist of such terms as the Oedipus complex, extrovert, introvert, narcissism, paranoia. It should be indicated, of course, that "Each statement applies to only one of the key words," or that "Some statements apply to only one concept, but others may be true of two or more."

The major point here is that there are various item types that do not require false statements to be prepared. All the statements are true. The problem is, "Is this statement true of Marx, or of Engels, or of both, or of neither?" Writing items of this type, a teacher who knows the field can write many items, not just 10, in six or eight hours.

It should be noted, however, that false statements are very appropriate and necessary in some situations. For example, in arithmetic items, certain wrong answers that students frequently might give should be used. One very good method is to ask a series of short-answer questions on a test, and note the wrong answers given by students, especially any wrong answers given by several students; then such answers can be used along with the correct ones in a subsequent test. Since the Chicago exams were given in two booklets—a three-hour morning exam, with a lunch break, followed by a three-hour afternoon exam—the short-answer question from a previous exam could be used in the morning session, and then the objective form could be given in the afternoon session, in order to get a comparison of the objective and free-answer forms of the same item. There was a high correlation between the objective and free-answer forms. This helped to convince the faculty that objective items could measure more than rote memory.

One very appropriate procedure in item writing is to ask, "What distinctions have I been teaching that I hope the students can make?" In psychology, for example, the student should know the difference between various mental disorders such as schizophrenia, paranoia, personality disorders, and neuroses. One type of item to test this knowledge would consist of giving the formal definition of each term and having the terms and definitions matched. Another approach would be to specify various symptoms that would characterize each

of the disorders. In testing for differentiation of concepts, it is probably desirable to use terms that check for a knowledge of the formal definition as well as items that illustrate the concept in order to be sure that the students can go beyond the formal definition in applying the concept. Again it should be noted that one is writing only true statements, and a person who knows the field can easily write 20 definitions, or illustrative examples, in an hour.

As one of the tests that should be used routinely in judging the value of an item, an experienced teacher in the field should be able to say, "Anyone who has studied items of that type, and as a result can answer a new set of such items, has learned exactly what I want him or her to learn about a particular point." Good items are an important and effective teaching device. They give students an accurate idea of what should be learned, and also inform them as to the expected degree of precision of that learning.

The other variations of item types in this handbook provide examples of how items can be designed to enhance the objectives of teaching and learning. Good instruction involves a creative interaction between the teacher and the learner. An important aspect of instruction is the evaluation of learning outcomes as a means of communication between the teacher and learner. Thus evaluation should be approached creatively as well, with the goal of achieving the best match between the objectives of instruction and the achievement of those objectives. This is what the handbook encourages teachers to do.

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Introduction

The purpose of this handbook is to introduce you to a variety of objective item types that can help you do a better job of constructing your own classroom tests. Although these item types are not new to testing, they usually do not appear in typical teacher-made tests, which generally are limited to essay, multiple-choice, and true-false questions. By using some of these types in your tests and quizzes, you will have a better understanding of what your students have achieved. In turn, your students will have a clearer understanding of what you expect them to learn.

This handbook describes the preparation of the items, with examples, and provides practice in writing them. It was not designed as a course in educational measurement; instead, it concentrates on only one aspect of the total process of testing—developing a collection of item types suitable to content and behavioral objectives. When you construct a test, the general principles of good measurement must, of course, be considered. The selected bibliography lists sources that give a detailed treatment of the principles of measurement.

The handbook is organized as follows:

1. This introduction, including
   a. a brief discussion of designing items to meet instructional objectives
   b. a list of descriptions of the sample items presented in Part A
2. Part A, containing 10 sections, each devoted to an item type; each section consists of discussions, examples, and worksheets
3. Separate parts (B-D) supplying sample items, prepared by high school instructors, in three subject matter areas—English, science, and social studies

Developing a Test

Any test development project should start with a plan, whether it is a ten-minute quiz, a final exam, or a nationally administered test. This does not imply, however, that a short quiz will require as formal and detailed a test plan as would a standardized test. It does mean that you should have clearly in mind what you want the test to do for you and your students.

The objectives of the test should match the instructional objectives. The purpose of testing in the classroom is to determine whether, or how well, the instructional objectives have been realized. The test is simply an opportunity for students to demonstrate that they have achieved those objectives. Mere technical perfection in a test question is of no value if the item does not reflect the purpose of instruction.

The instructional objectives of a test may be reflected in two complementary ways: one by representing the content that was covered, and the other by recognizing the different kinds of learning experiences the student is expected to demonstrate. With respect to course *content*, the test as a whole should be representative of the unit or course it covers. Those parts of the unit that are considered most important and that were emphasized in class should receive greater weight in the test. Portions emphasized less should be represented by fewer items. For a very short unit, it may be possible to cover all of the content material in the one quiz. With longer units, or an entire course, one test cannot

include everything. The items can be only a sample of all that could be asked. In such cases it is important that the sample be truly representative of the total unit or course. An objective appraisal of your lesson plans, assignments, and handouts should help you to determine the sample.

Besides representing the relative emphasis placed on course content, test items also need to reflect the kinds of *learned behaviors* that the instructor attempted to impart. For example, what aspects of the subject matter were covered in such depth that students would be expected to demonstrate good understanding, or application, or interpretation? In contrast, what areas were covered so superficially that students would be expected only to recognize or recall?

After the test has been administered and scored, you should examine the performance of students on individual items. These results can be interpreted through formal statistical analyses, which you may choose to apply if you are familiar with the techniques. Instead of feeling encumbered by more formal procedures, however, you can obtain very useful information by studying the responses to the items. As you inspect the items, you might ask:

> Which items were difficult?
>
> Which items were easy?
>
> Were there any items on which the higher-scoring students did not do as well as the average- or lower-scoring students?
>
> Did the students fail to learn what you expected? If so, did they not achieve the objective, or did the item turn out to be a poor way of measuring the objective?
>
> What could be done to improve the instructions or to improve the test items?

This kind of inspection can provide very useful information and raise interesting points for further consideration. Test results supply much more information than just total scores and should be used to improve both future tests and instructional methods.

In recent years, achievement testing has come to be associated with the multiple-choice format: items that typically present one correct answer and four plausible but incorrect answers (distractors). The predominance of multiple-choice items in standardized tests has perhaps conveyed the impression that these items are the most desirable and objective forms to be used in the construction of teacher-made tests; however, important differences exist between standardized tests and those that assess the achievement of teaching objectives in the classroom. Standardized tests employ multiple-choice formats largely because they are administered to large candidate populations. When the achievement of a large number of students needs to be evaluated, multiple-choice items can be scored easily and reliably at minimal costs. Standardized tests are equated so that any given score always means the same thing, no matter what test administration it comes from. In contrast, although classroom tests are designed to assess generally accepted standards of achievement in a subject matter, they are also geared to student ability levels and to the teacher's mode of instruction in a particular classroom or school. Teacher-made tests provide the advantage of more accurately reflecting learning objectives set by the individual teacher. Most importantly, standardized tests and classroom tests serve different purposes. Besides yielding information about degrees of achievement, *classroom tests are complementary to instruction.* Classroom tests serve as diagnostic tools—strengths and weaknesses are identified so that further instruction can be tailored to individual students. As an

extension of instruction, classroom tests help students pull together discrete items of information to achieve a more meaningful synthesis.

Textbooks on test development typically differentiate between two basic item formats—essay versus objective items. Essay items are usually disparaged for various reasons, particularly because subjectivity can influence their scoring. Despite their drawbacks, good essay items can be scored objectively and can provide measures of learning that would not be obtained as effectively with another item format. Still the scoring of essay items is difficult and is likely to be influenced by subjective factors, such as the halo effect. Frequently, good objective items can serve as more accurate measures of student attainment. The objective-format items described in test-development textbooks are the true-false, short-answer, matching, and multiple-choice types. The true-false item types are viewed as having limited value, since they are difficult to write without possible multiple interpretations, and they sample limited forms of student achievement. Similar drawbacks also characterize short-answer essay items. Well-designed multiple-choice items are difficult to construct because the instructor must create several plausible yet incorrect choices for every correct choice. Items written in this format tend to subdivide subject-matter content into areas that lend themselves well to the multiple-choice item format, rather than retaining the structure and interrelationships of the ideas to be learned. Instead of presenting an artificially constructed view of the subject, items should more closely parallel the behaviors that are expected to be observed when instructional objectives are being met.

A more intermediate item form of the objective test item types is the matching item, which can be used effectively to maintain the integrity of the subject matter as it was taught. While the matching item has been construed to have limited usefulness, since it requires a simple recognition of the correct answer, there are variations with greater potential than is usually recognized. Matching items can serve as extended multiple-choice items and can be developed to assess different levels of behavioral outcomes. This handbook is devoted to these variations.

Devoting this handbook to particular types of items does not mean that these variations on matching items are the only ones you should ever use. Essays, short answers, true-false, and other types all have their place. Standard multiple-choice questions clearly have their advantages, as indicated by ETS' extensive use of them. By using a variety of item types, you will have the flexibility you need to design well-constructed tests that assess the more diverse aspects of performance that you intend to measure.

Writing Items to Meet Instructional Objectives

Before you begin to write items to measure your students' achievements, you need to answer some important questions. First you will need to determine what content and behavioral objectives are necessary to student learning; these objectives should suggest the appropriate structures for your items. The types of items presented in the forthcoming sections provide the structures from which you will choose.

The three basic questions you will need to ask yourself as you build your items are:

1. *What* do my students need to know? (content objectives)
2. What should my students be able to *do* to demonstrate that they know these things? (behavioral objectives)

and

3. How can I build items to measure their achievement in terms of these content and behavioral objectives?

Content Objectives

As you review your lecture notes and the textbook materials, you should make an informal outline of the areas of content that your test items need to cover. In social studies, for instance, you might make a list such as the following:

Vocabulary (listing the items)
Historical events (listed)
Principles and concepts (listed)

In addition, you will need to reflect upon content areas of your subject matter that received different degrees of emphasis as you taught them. Your test should parallel your teaching by including more items about material that received more attention during class, and fewer items for material that received less attention. You will also need to determine the levels of difficulty that your students were expected to master. For some areas of the material you might expect them to be more thorough and to make fine discriminations, whereas in other areas you might expect only a superficial grasp of the content. Again, these expectations depend on the ways in which you communicated the content to your students.

Behavioral Objectives

Most teachers do a good job of specifying their content objectives and of expressing these objectives in their test items. Frequently, however, objectives of instruction are stated in general or subjective terms that do not specify clearly the learning outcomes that students are expected to demonstrate. You should be able to translate the content objectives into statements that designate behavioral outcomes that represent good evidence of the students' mastery. A "good" test item should reflect the kinds of learning that students should have experienced in class or in their assignments; your instructional methods communicate your expectations to them about what you intended for them to learn. Thus, the form in which the subject matter is presented should closely parallel the form of learning that took place as you directed that learning. For example, if you expect your students to be able to recall certain definitions of words, rather than merely to recognize them, their learning experiences should have focused on this achievement. Furthermore, if you expect students to go beyond simple definitions so that they can apply the vocabulary in your subject to new situations, they should be made aware of this expectation. Your expectations are communicated by your presentation of the material to them in class and by assignments and quizzes.

Good teaching should provide students with learning experiences that go beyond the lower-order skills of recall and recognition. Students should be stimulated to go beyond the level of rote knowledge of the subject matter to levels of skill that demonstrate interpretation, application to new materials, evaluation, and the production of a unique communication or plan. In other words, we anticipate that students use what they have learned in different ways. College students may be expected to use the knowledge they acquire in their courses more independently, in other situations, and with different per-

spectives. Secondary-school students, however, need more guidance in developing their abilities to deal with the subject matter beyond the rote level. Your tests, as extensions of your teaching, will help them do so.

An example of how a social studies teacher might have informally outlined the behavioral objectives for one test follows:

Comprehension of vocabulary by:	recognition of definitions recognition of situations recognition of synonyms
Comprehension of historical events by:	categorizing recognition of component parts (people to events, places to events) recognition of concepts understanding who, what, where, how reading maps, graphs, cartoons
Interpretation of historical events:	cause and effect sequences influences comparison why making assumptions and judgments maps, graphs, cartoons
Application of principles and concepts:	introduction of additional information

Note that this list includes behavioral items—recognition, categorizing, understanding, reading, interpretation, and application—applied to specific content areas. These skills have also been arranged in a sequence, or a hierarchy, beginning with the most elementary behaviors and concluding with a more complex learning outcome. The foundation for the acquisition of higher-order behaviors is laid first as the students acquire the more basic skills; for example, the recognition and comprehension of vocabulary terms must be acquired before students will be able to relate these terms to one another, or to apply them to new situations. The teacher should direct student learning with these hierarchical objectives in mind since these objectives determine specific approaches to the subject, and are thereby communicated to the students.

Although different teachers may teach a course with the same title, they typically emphasize somewhat different content and behavioral objectives. Thus, the individual teacher needs to be consciously aware of his of her objectives. The sample items that are offered in this handbook supply suggestions for items that you may write, but you are likely to adapt them to meet your objectives more appropriately. You are the best judge of how well the content and structure of an item will meet your instructional objectives. For example, a simple matching item of terms and their definitions might meet one teacher's objective of "recognition of terms and their definitions," if the teacher had provided students with a list of terms and definitions to memorize. For another teacher who did not supply such a list, the definitions may vary somewhat from the verbatim definitions in the textbook—students who are able to match those terms and definitions are demonstrating comprehension rather than rote recognition.

Often teachers write test items that do not differentiate behavioral expectations for their students. If these expectations are set too low, the students learn to expect less of themselves. Faced with time constraints and the difficulty of

writing multiple-choice items, teachers inevitably will write other types of objective items (usually matching) to evaluate lower-order skills, and then resort to essay items in an attempt to measure the more complex skills. Since the scoring of essay items requires a great deal of time, teachers usually do not employ a carefully planned scoring system that focuses on higher-order skills. As a result, the behaviors that are expected of students are not specifically communicated by the very items that assist in measuring student outcomes and that previously seemed difficult to measure in an objective format. As you develop these items, your initial attempts will take time, particularly as you familiarize yourself with a different way of structuring your subject matter. Eventually, these items will be easy to write as you become more familiar with their structures and find that items you had previously written can be readily adapted. Also, some of the new items are likely to be reusable because the behaviors required of the student are sufficiently complex. Even if the student knows the structure of the item beforehand, performance is a demonstration of that student's level of skill. For example, if you had announced that the test would cover the causes and effects of certain events, the student still would be required to understand the material and connect the appropriate associations on the test.

Since students have learned to expect certain teacher-made test formats over the years, do not be surprised if their first experience with new item types is "mind-boggling," resulting in inadequate performance. This reaction does not mean that the students are unable to meet higher-order learning objectives. Obviously, you should review the test with them after the test has been returned. Early in the course, a quiz written in a different format would indicate that your expectations may be different from those to which they are accustomed. Worksheets that help them to structure and deal with the material also will communicate your goals for their behaviors. Teachers who have used new item types have experienced this initial student reaction, even with preparation, because students have had such long experience with the usual forms of tests. By the second test, however, students become more aware of the expectations that you are communicating and manage to handle new item types with much less difficulty.

Again, remember that an item type should not be selected until behavioral and content objectives have been determined. The item format should be selected on the basis of its appropriateness for measuring specific objectives, and not just for the sake of using a unique item.

Developing an Item by Combining Content and Behavioral Objectives

The forms of items that you choose to write should follow readily from your content and behavioral objectives, coupled with your awareness of the different item formats. Frequently a list that combines behavioral and content objectives will prepare you to make these decisions. Another recommended approach to the planning of test items is to develop a table of specifications. This table can be prepared for each unit of a course for which you develop a test and can subsequently be used and revised each time you repeat a course. This table can also be prepared informally and need not become an awesome production. Since you have already listed the content and behavioral objectives for your course, these objectives can be cast in a table of specifications as follows:

Content Objectives	Behavioral Objectives					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Vocabulary						
Historical Events						
Principles & Concepts						

The cells of the table would contain either a check (✓), indicating the presence of an item, or a number, corresponding to the item number that focuses on the particular objective. The advantage to the table is that it can alert you to the omissions that have been made, either intentional or unintentional. The table also may suggest to you that certain objectives be combined in one item, particularly if this is how you want your students to deal with the subject matter. For example, an item that uses vocabulary terms and applies them to other situations is testing the students' knowledge and comprehension of terms, as well as the ability to apply these terms.

A Taxonomy of Behavioral Objectives

Many texts are available that have published lists of behavioral objectives that you might use as you develop instructional objectives. This handbook refers to Bloom's *Taxonomy of Educational Objectives: Cognitive Domain,* since his classification is one that is commonly used. The Taxonomy provides more detail and examples, but the following simplified list of behaviors will serve our purposes:

Knowledge

1.00 KNOWLEDGE (Remembering previously learned material)
- 1.10 Knowledge of specifics
  - 1.11 Knowledge of terms
  - 1.12 Knowledge of specific facts
- 1.20 Knowledge of ways and means of dealing with specifics
  - 1.21 Knowledge of conventions
  - 1.22 Knowledge of trends and sequences
  - 1.23 Knowledge of classifications and categories
  - 1.24 Knowledge of criteria
  - 1.25 Knowledge of methodology
- 1.30 Knowledge of the universals and abstractions in a field
  - 1.31 Knowledge of principles and generalizations
  - 1.32 Knowledge of theories and structures

Intellectual Abilities and Skills

2.00 COMPREHENSION (Grasping the meaning of material)
- 2.10 Translation (Converting from one form to another)
- 2.20 Interpretation (Explaining or summarizing material)
- 2.30 Extrapolation (Extending the meaning beyond the data)

3.00 APPLICATION (Using information in concrete situations)

4.00 ANALYSIS (Breaking down material into its parts)

- 4.10 Analysis of elements (Identifying the parts)
- 4.20 Analysis of relationships (Identifying the relationship)
- 4.30 Analysis of organizational principles (Identifying the way the parts are organized)

5.00 SYNTHESIS (Putting parts together into a whole)

- 5.10 Production of a unique communication
- 5.20 Production of a plan or proposed set of operations
- 5.30 Derivation of a set of abstract relations

6.00 EVALUATION (Judging the value of a thing for a given purpose using definite criteria)

- 6.10 Judgments in terms of internal evidence
- 6.20 Judgments in terms of external criteria

In the preceding taxonomy, behavioral outcomes are arranged in order of increasing complexity, beginning with the lowest level of knowledge and proceeding through more complex levels of intellectual skills to evaluation. For students to acquire the more complex levels of skills, the more basic skills first need to be developed. Each of the sample items in this handbook includes a statement of the content and behavioral objectives for that item. The terminology that is used in the statements of behavioral objectives is drawn from this taxonomy.

Basic Points About Item Construction

Each of the sample items in this handbook is preceded by a discussion, which occasionally refers to the parts of an item that are termed the "stem," "options," and "distractors." These terms serve to simplify the explanations, and are defined as follows:

stem —the question or incomplete statement that is the basis for the test item.

options —the possible responses that are presented in the item.

distractors—Among the options is one correct or desired answer. The other options, which are not the correct or desired answer, are called distractors.

Obviously, the quality of the distractors directly influences the quality of the item. We are all familiar with poorly constructed items that give the answer away through the simple process of elimination; the item becomes a test of logical thinking, rather than of actual achievement in the subject. Our discussions refer to parts of an item, therefore, to provide important information that will assist you in the construction of your own items. While you are writing an item, and after the item is completed, you might ask yourself the following questions regarding construction:

Stem

1. Is the problem clearly and completely stated?
   - —the language should be simple and direct
   - —the stem should contain only essential information
   - —the stem should be understandable without having to read the options
2. Is the basis for selection of options clearly evident?
3. Does the stem logically and grammatically fit the options?

Options

1. Are they clearly and concisely stated?
2. Are the options parallel to each other—of approximately the same grammatical structure and length, and having the same degree of precision or complexity?
3. Are the incorrect options clearly less appropriate than the correct option?
4. Are the incorrect options as plausible and attractive as the correct option?
5. Is there anything too obvious in the correct or incorrect options that would lead students to choose or to disregard them, respectively?

The entire item

1. Does the item accurately reflect the basic problem it was intended to represent?
2. Is this item expressed in the simplest possible form to assess the objective(s)?
3. Is this item at the appropriate level of difficulty?
4. Is this item at a suitable reading level?

Alternative Forms of Objective Test Items

Most of the sample items in Part A were developed for an introductory course in child development. This subject was selected in order to present items in an area that might be sufficiently familiar to instructors with different subject matter specializations. To some extent, as you read the samples, you will need to understand their content so that you can understand how each item was constructed. In addition, some of the subject matter in the examples is purposefully repetitive in order to acquaint you with the different ways in which the items can reflect different instructional objectives.

The particular form in which you cast the content of your subject matter communicates your behavioral expectations for your students. In the following samples, you will note that learning outcomes can be measured by varying (1) the item format and (2) the level of difficulty of the item. Furthermore, the level of difficulty of an item can be varied in two ways. One way of controlling the difficulty of an item is by requiring the student to make discriminations that vary from very broad categories of responses to very fine distinctions. Second, item difficulty is determined by the level of cognitive skill that the student is expected to demonstrate—the behavioral objectives ranging from simple recall or recognition (knowledge); through comprehension, application, analysis, and synthesis; to evaluation. The forthcoming examples show specifically what your students should *know* and *do* in order to demonstrate their achievements.

Sections 1 through 10 of this handbook contain sample items, comments about the items, and exercises for writing your own items. Parts B, C, and D provide examples of items written within three subject matter areas—English, science, and social studies. Different teachers, depending on their specific objectives of instruction, understandably will write different items. The samples, however, should serve as models to stimulate your thinking about your items.

The various forms presented here offer considerable flexibility as you develop items to reflect what you expect your students to learn. These item types include the following:

1. Matching
2. Master list or keylist
3. Tabular or matrix
4. Best answer
5. Greater-less-same
6. Rank order
7. Question and short answer
8. Statement and comment
9. Experiment/results
10. Experiment/results/interpretation

You may wish to flip briefly through Sections 1 through 10 of the handbook for an overview of the kinds of items we will be presenting. Note that each

example is numbered for easy reference and states both the content and behavioral objectives it is attempting to measure. Note also that the section numbers continue in sequence as you find the respective item type illustrated by subject matter; e.g., an example beginning with "5" is always a "greater-less-same" item type.

Each of the item types, described below, offers a format that enables you to communicate the kinds of cognitive skills the student is expected to demonstrate within a specified range of content.

1. *Matching*

This item format tends to address an area of the content in which the ability to make simple one-to-one associations is required of the student. The item can reflect simple memorization skills, or can demand more complex reasoning skills, in order to match a specific word or phrase to another word, phrase, or statement. Depending on the instructional objectives being addressed by the item, an item written in this format can be made more difficult in two ways: (1) by presenting material that demands that fine distinctions be made, and/or (2) by presenting material that requires a higher-level cognitive skill such as application or evaluation to achieve a match.

This item format certainly is not new to classroom test development. Items in this format, though, typically do not challenge the student to apply higher-level cognitive skills, but rather simple recognition that results from memorization. If the purpose of the item is to evaluate memorized material, then that is appropriate. However, a matching item should be designed with instructional objectives clearly in mind. If these objectives go beyond simple memory tasks, the item can be designed so that it requires more challenging performance from your students.

A more complex form of the matching item is the "double matching" format, which also can be varied in difficulty. This item type is appropriate to instruction in a content area that seeks to assist students in making dual associations. Much of what we learn that can be applied to future learning and to life experiences does not consist of simple one-to-one associations. Instead, our learning experiences tend to be organized mentally within more complex structures. The double matching item, as do some of the other item formats in this handbook, may better reflect the kinds of learning outcomes that will make classroom materials more useful and meaningful to students.

2. *Master list or keylist*

This item format represents a structure for the mental manipulation of content in which specific words or ideas can be classified in terms of a set of words or ideas (master list or keylist). The individual items which the student is expected to identify with one element of a keylist are specific cases of a more general category. Thus, students may employ both deductive and inductive reasoning processes in responding to the item as they determine the most appropriate relationship by moving back and forth between the general and specific levels of content. These relationships may be varied, depending on the instructional objectives, to design keylist items of different difficulty levels.

3. *Tabular or matrix*

If classroom materials and instruction focus on the ability to represent the structure of the content area by distinguishing among ideas in a

more complex way than by matching or by specific/general distinctions, the tabular item type may be the most appropriate. In the course of instruction, content material frequently is pulled together or summarized in tabular form, which may describe both qualitative and quantitative relationships. Again, depending on the depth of understanding expected of the students, tabular representation can be designed to vary in level of difficulty—the matrix can represent either simple or very complex interrelationships among the elements of the content area.

4. ***Best answer***

This format closely resembles the traditional multiple-choice item type. It consists of a stem followed by four or five statements, or distractors. It differs from a multiple-choice item, if well designed, when the distractors are all correct, very plausible choices, but one is the best. The "best" response is one about which students are expected to have acquired the knowledge or understanding through classroom instruction. This information may be transmitted to students either through instruction that directly presented and stated the most appropriate response among a set of responses, or that facilitated reasoning processes that would lead to that response. One teacher's version of a best answer may not be another teacher's choice; the correctness of that response can be determined only by the specific student-teacher interactions.

5. ***Greater-less-same***

One instructional outcome appropriate to the acquisition of certain areas of content may involve the ability to make distinctions involving classifications of "more than" or "less than," or some way of differentiating among three elements of the material that places one element in the middle and the other two elements at opposite extremes in relation to that central element. The relationships that are presented need not be quantitative, but also may represent qualitative degrees of relationships. These distinctions may consist of gross comparisons, or of fine gradations that create a logical separation of the content material. This type of item, as the others, can assess the achievement of lower-order or higher-order objectives, depending on the goals of instruction and the design of the item.

6. ***Rank order***

An aspect of the achievement of content and behavioral objectives may consist of the ability to organize one area of the material in some natural or preordained order. Perhaps it is necessary for students to be able to place a set of things in order before they are able to manipulate the content of the subject matter in more sophisticated ways. For example, knowing the order in which certain scientific equipment should be assembled is essential to conducting experiments with that equipment. The ordering of some elements of a subject may require more than memorization, demanding that the material be sufficiently understood so that ideas can be placed in an order that is determined by a specific rationale applied in the classroom. This kind of reasoning represents more complex mental skills—the power of this item format can be considerably greater than it appears superficially to be.

7. *Question and short answer*

This format, as do item types 8 through 10, represents a variation of the best-answer and keylist formats. The stem of this item type, however, poses a question, and the responses take the form of answers that can vary in length. The answers, if brief and representative of categories of responses, can be presented as a keylist. If the questions are discrete, in that one set of alternative responses apply only to one question, the item resembles the best-answer format. The answers and the stem can be designed to vary in level of difficulty to reflect the level of cognitive processing required of the students. The answers also can vary in length, from brief statements to full paragraphs. These variations, of course, are determined by the instructional objectives for the material. This item type, as well as the remaining item types described, can be effectively developed by obtaining actual responses to the questions written by representative students over a period of time. The resulting item "pool" then can be used to construct a considerable number of objective items that present a variety of combinations of stems and responses.

8. *Statement and comment*

The same comments apply to this format as to the preceding format. It differs from the other item types in that the stem is not posed as a question, but as a statement, for which the student is expected to select the best or most appropriate comment. This item format can assess low-order cognitive skills, but also lends itself nicely to higher-order reasoning skills such as evaluation and synthesis.

9. *Experiment/results*

Although this format appears to be most appropriate to the sciences, it may occasionally be used in other subject areas. The experiment can be construed as a "situation," which may lead to any number of results, with one result being the most likely, particularly if the student has mastered the classroom material. The content and mental processes that can be reflected in this format also can vary in difficulty from superficial cause-effect relationships to complex relationships that call for evaluation and/or synthesis of the subject area.

10. *Experiment/results/interpretation*

This format extends the experiment/results format and offers the possibility of considerable variation in levels of complexity. The experiment/result relationships, for example, may require simple knowledge of the material, but the interpretation may demand a greater leap of the imagination. Some of the interpretations may consist of a list of possible conclusions, to be evaluated as valid or invalid; another variation may require students to distinguish between criticisms and interpretations. If the content of the item presents material that is identical to the material surveyed in classroom activities, the level of thinking required may be less demanding than a similar-appearing item that presents a new situation that parallels one that was presented in the classroom. The latter requires the ability to apply what was learned.

The following pages provide an overview of the samples of item types that are presented in Sections 1 through 10. In reviewing the items, begin with Section 1, Matching and Double Matching, and read sequentially, since the comments regarding item writing and the connections between instruction and testing have been developed cumulatively through the subsequent parts. All items in this handbook are intended to stimulate your thinking about the kinds of items you can develop to meet your specific instructional objectives with the objective of enhancing the teaching/learning process.

Overview of Examples in Part A

Content and Form	Objectives
Section 1. ***Simple Matching***	
a. child development—stages of speech development	knowledge of terms knowledge of facts
b. child development—stages of speech development	knowledge of terms comprehension (translation) application
c. Greek history—groupings	knowledge of specifics comprehension
Double Matching	
d. child development—concepts of Freud, Erikson, and Piaget	knowledge of classifications by theorist and terms, facts, generalizations, and theories analysis of elements and principles
e. scenes of Grecian glory	knowledge of specific facts comprehension analysis of relationships
Section 2. ***Master List (Keylist)***	
a. child development—contrast of sensorimotor and preoperational stages (Piaget) —plus worksheet on developing the item	knowledge of specifics and theories comprehension analysis of elements
b. child development—Erikson, Freud	knowledge of facts and principles comprehension (translation) analysis of elements, relationships
c. child development—psychology of learning (classical conditioning relationships)	knowledge of methodology, conventions, and specifics (abbreviations) analysis of elements application of terms
Matching/Keylist combination	
d. child development—stages of speech development	knowledge of terms, facts comprehension (translation)
e. child development—genetic/teratogenic influences	knowledge of terms, classifications comprehension (translation) analysis of relationships

Content and Form	Objectives
f. Western civilization—Mycenaea and Minoa	knowledge of specifics, classifications
g. Biology—photosynthesis and respiration	knowledge of classifications, categories analysis of relationships
Section 3. *Tabular (Matrix)*	
a. child development—Piaget's stages (related to #2-a)	knowledge of classifications, principles, theories comprehension (translation and interpretation) analysis of elements and relationships
b. psychology of learning—theories and concepts associated with	knowledge of theories, classifications comprehension (translation and interpretation) analysis of relationships and organizing principles
c. (#3-b, extended)	(more difficult than #3-b)
Section 4. *Best Answer*	
a. child development—Piaget's sensorimotor stage (examples of behaviors)	knowledge of classifications, categories, theories comprehension application to concrete situations
b. child development—approaches to typical problems	knowledge of classifications, categories, theories comprehension (translation) application to concrete situations
c. English vocabulary	knowledge of specifics comprehension (translation)
Section 5. *Greater-Less-Same*	
a. child development—sequences of infant motor development	knowledge of trends, sequences comprehension (translation)
b. psychology of learning—Hull's theory	comprehension (translation) analysis of relationships
c. biology—human physiology	knowledge of specifics, principles, generalizations comprehension analysis of relationships
Section 6. *Rank Order*	
a. child development—Piaget's stages	knowledge of sequences comprehension (translation)
b. child development—speech development stages	knowledge of specific facts, terms, sequences
c. learning (child)—behavior modification hierarchy	knowledge of sequences comprehension application to concrete situations
d. social studies—order of leaders in ancient Egypt, contrasted to order of significant events in Egyptian history	knowledge of facts, sequences comprehension (translation)

Content and Form	Objectives
e. social studies—ancient Egyptian history (keylist type; contrast with #6-d)	knowledge of specific terms, facts, sequences comprehension (translation) analysis of relationships
Section 7. *Question and Short Answer*	
a. child development—typical development problems	knowledge of specifics, generalizations comprehension (translation) application synthesis evaluation
Section 8. *Statement and Comment*	
a. social studies—civilization	knowledge comprehension (interpretation, extrapolation) application evaluation
b. child development—evaluations of an adolescent case study	knowledge of specifics, criteria, principles, generalizations comprehension (interpretation) application to particular situations analysis of elements and relationships evaluation
c. child development—generalizations about adolescence	knowledge of specific facts, principles, generalizations comprehension (interpretation) application to particular situations
d. child development—recommendations for an adolescent case study	knowledge of specific facts, criteria, principles, generalizations comprehension (interpretation) application to particular situations
Section 9. *Experiment/Results*	
a. child development—influences on language development	knowledge of specifics comprehension (interpretation)
Section 10. *Experiment/Results/Interpretation*	
a. child development—influences of heredity and environment	knowledge of specifics, principles, generalizations comprehension (interpretation)
	contrasted to:
b. child development—influences of heredity and environment	knowledge of specifics, principles, generalizations comprehension (interpretation and extrapolation)
c. biology experiments	knowledge of specifics, methodology, principles comprehension (interpretation) application analysis of relationships

A. 10 Designs for Assessment and Instruction

1. Matching Items

Example 1-a

The familiar form of simple matching items involves two lists of nearly the same length. The list of options (a-m) to be matched to the stems, or statements (1-9), should be somewhat longer than the stem list so that the choices are not made by simple elimination. The length of each option should be kept to a minimum.

Ideally the items in the option list should be as homogeneous as possible, since any options that are too discrepant in form can be more readily associated with the appropriate stem. Likewise, the stems should have something in common with each other.

The length of stem and option lists are determined by the degree of complexity that the student is expected to handle. This option list requires relatively fine discriminations among substages of early speech development. If the student is not expected to make such fine distinctions, the list could be shortened to include broader categories of stages. The stems can also be varied with respect to level of difficulty, ranging from the simple recognition of a definition to the application of definitions to new situations. The foregoing decisions are determined by the behavioral objectives that you communicated during instruction.

The options have been alphabetized to facilitate the location of each correct option; this reduces the response time required for matching the options with stems. Occasionally a logical ordering of options is more suitable than alphabetical ordering, depending on the content of the item. Obviously the stems should not directly parallel the order in which the options appear, but rather should be arranged randomly.

You may also decide that it is appropriate for some of the options to be used more than once; if so, you should indicate this possibility in the instructions.

The stems should be simply and clearly worded. They should be reviewed to check for any obvious cues that would lead to the correct options—cues such as key words, sentence structure, plural or singular form, etc. You should also attempt to word the stems in language that was used in class and that is understandable to the student; however, avoid using verbatim statements from the text, since this practice encourages rote memorization at the expense of understanding.

As you prepare your item, make a list of terms that might be used in your option lists, particularly terms that students are likely to confuse (such as babbling, cooing, and lallation in this example). Frequently the resulting list is twice as long as the item you intend to prepare. In this case, you should select a sampling of terms that would provide sufficient indication to you that your students can make the required discriminations. The terms that are not used can be used in an alternate form of that item, which might be used for different class sections, or for test retakes.

The behavioral objectives for this item require *knowledge* of specific items (names of developmental stages) and of specific facts (descriptions of the stages), as well as the ability to discriminate among them. Since the descriptions in the stems are not word-for-word statements from the textbook, some amount of *comprehension* is also required, because the students need to convert their understanding of the material to a statement that matches their understanding (translation).

Multiple-choice items involve *recognition,* as opposed to *recall.* If the option list were omitted and the students were required to produce the correct name for each stage in a blank, the item would then be a measure of ability to *recall* the information. In this instance the instructor chose to evaluate the students' abilities to associate the correct name with its description through *recognition.* The expectations you have for your students should determine whether or not they should be able to produce the answers (recall), or to recognize them (recognition).

The next item is another example of the simple matching format.

Topic: Child Development

Content objective: Stages of speech development during infancy and early childhood

Behavioral objectives: Knowledge of terms (names of stages) and specific facts (descriptions of stages)

Stages of early speech development

Match the correct name (A-M) for each of the following stages of early speech development with the description of that stage.

A. babbling
B. cooing
C. differentiated crying
D. echolalia
E. egocentric speech
F. expressive jargon
G. grammatically correct verbal utterances
H. holophrases
I. lallation
J. primary social attachment speech
K. socialized speech
L. telegraphic speech
M. undifferentiated crying

____ 1. the use of one-word sentences

____ 2. the playful repeating of a variety of universal sounds

____ 3. the production of a string of utterances that sound like sentences, but are not communicative

____ 4. a reflex form of communication produced by the expiration of breath

____ 5. conscious imitation of the sounds made by others

____ 6. stringing together two or more words to make a sentence

____ 7. simple sounds (usually vowels) emitted when the child is happy and contented

____ 8. the accidental repetition of sounds the child has heard

____ 9. vocalization that expresses whether the child is hungry, sleepy, angry, or in pain

Example 1-b

The previous item is an example of assessment when the objective is simple recognition. The second example of this item type reflects the expectation that students go beyond simple recognition to understand the stages of speech development well enough to identify them when presented with actual situations.

In other subjects, definitions of terms to be used in the stems might likewise be converted to examples of new situations that the students have not yet encountered in order to assess their abilities to apply these terms. As you vary

the behavioral objectives, use different stem forms with the same list of terms that students need to differentiate.

Also note that each item has a *title* which may enable students to focus on the area of content included in the item. This is particularly important if the test contains items from several different content areas.

Topic: Child Development

Content objective: Stages of speech development during infancy and early childhood

Behavioral objectives: Knowledge of terms (names of stages); comprehension (translation of the understanding of the stage to its name); application (concrete examples)

Stages of early speech development

Match the correct name (A-M) for each of the following stages of early speech development with the correct example of the speech pattern that is expressed at that stage.

A. babbling
B. cooing
C. differentiated crying
D. echolalia
E. egocentric speech
F. expressive jargon
G. grammatically correct verbal utterances
H. holophrases
I. lallation
J. primary social attachment speech
K. socialized speech
L. telegraphic speech
M. undifferentiated crying

____ 1. The child asks for a snack by saying, "cookie" [or, says "out" to indicate "I want to go out," or "Mommy went out"].

____ 2. The infant spouts forth, "da-da-da-da," "bi, bi, bi, bi," or "ma-ma-ma-ma."

____ 3. The child says to another child, "Let's play a game."

____ 4. Without speaking to another person, the child may say, "Be quiet, thunder, you bother me."

____ 5. The child says, "All gone," "Me go," or "Baby cwy."

____ 6. The child might say, "We goed to the store."

____ 7. The child makes requests of others, such as, "More ice cream."

____ 8. The contented infant gurgles and squeals.

Example 1-c

This example in social studies provides groupings of areas of the subject matter. The format serves as an instructional device by pulling together the discrete items of information that were studied so that the student can grasp the cohesiveness of the content areas as a whole. In this case, the items serve not only as a device for evaluation, but also as a culmination of the student's learning outcomes.

This example also demonstrates that the degree of difficulty can be changed by varying the number of options.

Topic: Western Civilization—Greek History

Content objectives: Famous Greek leaders, battle sites, terminology, places

Behavioral objectives: Knowledge of specifics; comprehension

Place the appropriate letter in the blank to the left of each statement.

Famous Leaders

A. Lysander
B. Xerxes
C. Darius
D. Socrates
E. Alcibiades
F. Leonidas
G. Themistocles
H. Phidias

____ 1. Persian leader in the first war against Greece

____ 2. Athenian leader who urged the building of a strong Navy and then used it to trap the Persians at Salamis

____ 3. the Persian emperor during the second war with the Greeks

____ 4. the Spartan general who sacrificed himself and his body guards at Thermopylae

____ 5. a Greek philosopher and teacher

____ 6. the Spartan admiral who defeated the Athenian Army and thereby helped cause the fall of Athens

____ 7. the Athenian who turned traitor to both Sparta and Persia and then came back to fight for Athens, but lost

Battle Sites

A. Salamis
B. Syracuse
C. Thermopylae
D. Marathon
E. Plateau
F. Corinth

____ 8. Athenian victory over Persia in the first Persian war

____ 9. Persian victory over an allied Greek army in the second Persian war

____ 10. Greek naval victory over the Persians near Athens

____ 11. final land defeat of the Persians in Greece

____ 12. lost by Athens' navy in its attempt to invade Sicily

Terminology

A. Holots
B. Polis
C. Galley
D. Olympiad
E. Immortals
F. Pankration
G. Triremes
H. Pentathlon
I. Joplite

____ 13. a Spartan soldier

____ 14. a period of four years

____ 15. a group of five athletic contests

____ 16. any ship propelled by oars and a sail

____ 17. the body guards of the Persian emperor

____ 18. a ship with three banks of oars, a sail, and a battering ram

____ 19. people forced into being serfs for the Spartans

____ 20. a Greek word for city-state

Places

____ 21.	important commercial city on the narrow isthmus bearing its name	A. Corinth B. Athens C. Sparta D. Olympia E. Delphi
____ 22.	the leader in the first war against the Persians and later the home of Pericles and Socrates	
____ 23.	the militaristic city-state	
____ 24.	the city known for its luxurious and pleasurable living	
____ 25.	the city where soldiers were told to return "with their shields or on them"	

Example 1-d

A variation of the simple matching item is one which presents two lists of options to be matched to a list of statements.

In this example, the option list for "Who" might have been expanded to other persons who had developed theories about development. The item requires the students to match concepts they have learned with the names of the concepts, as well as with the theorist who originated the concept. Each of the stems might have been placed in separate multiple-choice formats; the options would have been limited to the usual four or five. Instead, this item pulls the ideas together, and the options are less limited; the item more closely parallels the form in which students are likely to use the concepts when the course is completed, and when they are using them in the "real" world. The variety of behaviors that are reflected by the objectives takes the students beyond an oversimplified treatment of the subject matter.

As in the earlier example, the difficulty level of this form may be varied by altering the length of the option or stem lists, the degree of discrimination among options that is required, and the content of the list of stems. In this item, the "Who" option list simplifies the number of choices to be made by offering only three options. As a consequence, you may choose to assign a differential number of points to the options in the different lists—making sure that the students are aware of the scoring (as indicated in parentheses).

Note also that option headings and parallel headings are used for the answer columns to prevent any confusion about where the answers should be placed.

Each stem in this form of item should provide sufficient information for the student to be able to identify the best option. If a blank is used, as in items 4, 5, 6, 8, and 10, it should be placed as close to the end of the stem as possible; blanks that appear too early in the stem can be misleading or difficult to interpret.

Topic: Child Development

Content objective: Concepts developed by Freud, Erikson, and Piaget

Behavioral objectives: Knowledge of terms and facts associated with Freud's, Erikson's, and Piaget's theories

Knowledge of classifications of theoretical ideas, by theorist

Knowledge of generalizations and theories

Analysis of the elements and principles of each theory, in order to be able to discriminate among them

Theoretical Ideas of Freud, Erikson, and Piaget

In the blanks in the column on the *left*, place the letters E, F, or P to identify

the person to whom the idea belongs. In each blank to the *right*, place a letter (A-X) to identify each concept (or stage) by its name.

Who (1 point each)

E Erikson
F Freud
P Piaget

Concepts (2 points each)

A. accommodation
B. adaptation
C. anal
D. assimilation
E. ego
F. equilibrium
G. erogenous zones
H. fixation
I. functional invariants
J. genital
K. id
L. industry vs. inferiority
M. initiative vs. guilt
N. integrity vs. despair
O. object permanence
P. oral
Q. phallic
R. psychosexual
S. psychosocial
T. regression
U. repression
V. schema
W. superego
X. trust vs. mistrust

Who!		*Concept*
____	1. when an infant is able to understand that an object continues to exist, even when not in sight	____
____	2. a stage of personality development in which the child receives pleasure from putting things in the mouth	____
____	3. mental organizations, or structures, that are developed as the child interacts with the environment	____
____	4. a child's psychosocial stages of development, which place emphasis on the development of the _____	____
____	5. a child's psychosexual stages of development, which place emphasis on the impulses of the _____	____
____	6. a child's personality development, which is determined by sensitive, developing areas of the body called the _____	____
____	7. when a child makes a *change* in his or her existing mental structures as a result of a new experience	____
____	8. The first *crisis* an individual experiences, when the parent should respond to and satisfy all of the child's needs, is a stage called _____.	____
____	9. an unconscious rejection (forgetting) of anxiety-producing situations	____
____	10. Two principles that influence cognitive development through all stages and consist of organization and adaptation are (together) called _____.	____

Example 1-e

A variation of the double matching item extends the possibilities of the item type further by including map-reading skills. Charts or diagrams also can be used in a double option matching item or in a single option matching item.

This social studies item reflects instruction that communicated particular behavioral expectations to the students. The particular instructor who developed this item provided handouts that listed names and locations for the students to identify while reading their course materials. Next, the students received maps on which to locate the places; these maps were used in class

discussion about the places that played a role in the history of ancient Greece. The learning objectives were specified clearly, and the students could be expected to transfer their skills to the test item.

Topic: Scenes of Grecian Glory

Content objective: To be able to locate and identify the places that played a role in the history of ancient Greece

Behavioral objectives: Knowledge of specific facts; comprehension (translating from one form to another, skill in interpreting maps); analysis of relationships.

Scenes of Grecian Glory

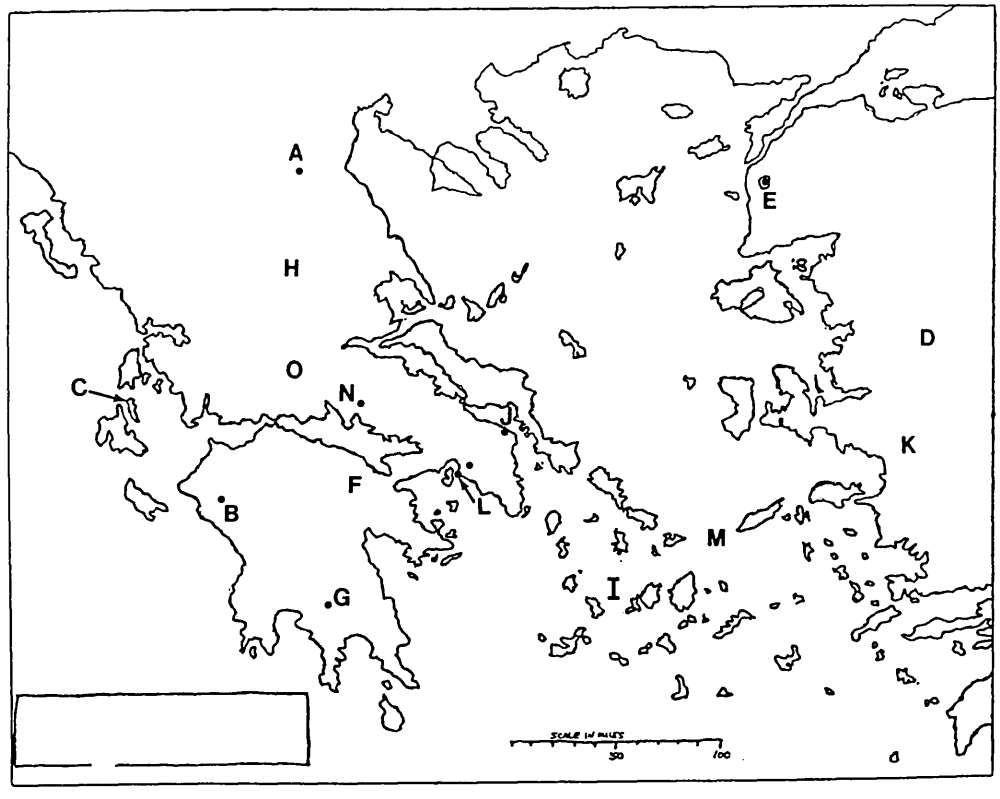
Identify each location on the *map* by placing the appropriate map letter (A-O) in the blank to the *left* of its description.

Identify the *name* of the location from the list below by placing the appropriate letter (a-o) in the blank to the *right* of its description.

Names of Locations

a. Corinth
b. Clyclades
c. Delphi
d. Delos
e. Ionia
f. Ithaca
g. Marathon
h. Mount Olympus
i. Olympia
j. Persian Empire
k. Salamis
l. Sparta
m. Thermopylae
n. Thessaly
o. Troy

Location on Map (A-O)	*Description of Place*	*Name of Location (a-o)*
____	1. home of the Greek gods	____
____	2. the warrior, military state	____



____	3. the area that Athens helped try to break away from Persian control	____
____	4. where the Mycenaean Greeks fought the Trojans	____
____	5. the home of the hero Odysseus	____
____	6. the battle in which Athens' navy defeated the navy of Xerxes	____
____	7. the battle where the Spartans were destroyed by the army of Xerxes	____
____	8. where the first Olympic games were held	____
____	9. the battle in which Athens defeated the army of Darius	____
____	10. a major seaport and commercial city	____

EXERCISE: Writing a Simple Matching Item

This exercise is intended to give you some experience in writing a simple matching item. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheets on pages 31 and 32 for your notes):

1. List the specific aspects of the content within that area that might be included in your instructions. In other words, you are listing your *content objectives.*
2. Next choose a related set of content objectives that might comprise an item—those could be checked (✓) on the list you have already made. For each of these specific areas of content, ask yourself, "What kinds of distinctions or discriminations should my students be able to make?" Then summarize each discrimination with a key word or phrase. Some or all of this list of key words or phrases will serve as your *options.*
3. Now list cases or examples that have been covered in class or in the assigned reading for each of the key words or phrases. Consider whether other examples have been covered; if so, list them.

   These examples are likely to measure knowledge and/or comprehension of course material.

   You will need to decide the degree of mastery, or *behavioral outcomes,* that you expect of your students, and that they understand you are expecting of them.

   If knowledge and comprehension are the highest level of mastery you expect of your students for this area of the subject, then the statements you will write as stems should reflect these objectives.

   If, however, you expect your students to behave at a somewhat more sophisticated level of skill, decide how to construct the stems to aim at that level.

   For example, if you decide that your students should be able to *apply* the specific areas of the content that you listed, your stems should contain new situations that they have not specifically encountered in class or in their reading.

   Now write the statements (*stems*) that appropriately match your list of

key words or phrases and that appropriately match your behavioral expectations of your students.

4. At this point you will have the parts for your item. Using the worksheet on page 32:

   First alphabetize the options, or put them in a logical order. Assign letters of the alphabet to these options, so that the letters can be used as responses.

   Assign numbers to each of the statements (stems) you have written, using a numerical order that is a rearrangement of the order of the options.

   Eliminate one or two of the stems, or add one or two options, so that the option list is longer than the list of stems. You may also prefer to use statements for which an option is used more than once.

   Also consider the length of the item with regard to difficulty level—perhaps the lists of stems and options need to be shortened or lengthened.

5. Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item, if appropriate.

6. Refer to the item-writing tips on page 14 of the introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise, where necessary.

7. Using the next page, put your title, instructions, options, and stems together in a matching format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Simple Matching Item

Content area:
Content objectives (specifics):

(Check related options that might comprise an item)

Options (Key words or phrases assigned to content):

(Alphabetize, or place in logical order)

Stems (Statements about options):

(number)

Format for the Simple Matching Item

_____
(title)

(instructions)

(option list)

A.	H.
B.	I.
C.	J.
D.	K.
E.	L.
F.	M.
G.	N.

(stems)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

____ 9.

____ 10.

Example 2-a

The master list (or keylist) form of item is very flexible and therefore has wide applicability. This form is really an extension of the simple checklist. In general the term *master list* is used to apply to subject matter in which judgments can be made repeatedly with respect to a limited number of alternatives. This item type can take various forms, such as tables (see tabular form), true-false, completion, etc. It is useful for placing items in categories, recognizing cause-and-effect relationships, and for providing explanations. The subject matter itself may suggest other possibilities to you that are not specifically offered here.

The alternatives to be considered by the student are coded so that the response can be simply made with a number or a letter. Numerical responses may be more easily scored, but the use of a suggestive letter such as an initial of a category may facilitate student response.

The first example requires the student to make distinctions between two stages of early mental development, according to Piaget's theory. Since the characteristics of thinking that differentiate each stage are quite distinct, students should be able to identify these (knowledge of theory). Certain characteristics are also evidenced by children in both stages, and other characteristics do not emerge until much later in development. Thus this item serves to measure how well the student has sorted out the characteristics that pertain to each of the two stages (analysis). The item might have been developed for a lower level of difficulty by using only two options (the two stages), and with stems that pertain to one or the other stage. The instructor chose this level of difficulty, however, because class discussion had focused on comparisons of the two stages as well as on kinds of thinking that children do *not* exhibit in these stages because these abilities develop later. These behavioral expectations were communicated to the students; therefore, the item is structured to measure these objectives.

The stems also require knowledge of specifics, in that the students need to know the definitions of certain terms such as "conservation," "egocentrism," "operations," etc. Other stems require comprehension, because statements such as those made in items 1, 2, 5, 7, and others are not quoted directly from the textbook, nor are they in precise words used by the instructor in class.

Topic: Child Development

Content objective: Contrasts of sensorimotor and preoperational thinking (Piaget)

Behavioral objectives: Knowledge of specifics and theories; comprehension; analysis of elements

Differences in Sensorimotor and Preoperational Thinking (Piaget)

For each of the following descriptions, use letters to indicate whether the form of thinking characterizes:

S the Sensorimotor Stage only
P the Preoperational Stage only
B *both* the Sensorimotor and Preoperational Stages
N neither the Sensorimotor nor the Preoperational Stage

____ 1. manipulates symbols that represent the environment

____ 2. when the environment effects a change in the internal structure

____ 3. focus on states

____ 4. conservation

____ 5. can reflect on own behavior as it relates to a goal

____ 6. formulates hypotheses

____ 7. when thinking involves direct interactions with the environment

____ 8. egocentrism

____ 9. transductive reasoning

____ 10. symbolic manipulation

____ 11. symbolic meaning

____ 12. motor meaning

____ 13. deferred imitation

____ 14. when operations are performed on operations

____ 15. when perceptions of reality include the past, present, and future

Example 2-a (continued discussion)

The following example shows how the instructor developed the first keylist item in this section. Although the worksheet is typed for readability, the instructor actually prepared an informally written list. She first listed the specific, related, characteristics that differentiate each stage. Then, she made lists of characteristics that both stages have in common ("Both"), and some characteristics that are not evidenced in either stage ("Neither"). All of the listed characteristics represent the specific content objectives with which the students should be familiar.

Whenever you prepare a test, you are faced with the recognition that everything that your students should have learned cannot possibly be presented in any one test. A test, therefore, needs to include a representative *sampling* of your students' learning outcomes. The instructor, in developing Example 2-a, selected a reasonable sample from the potential list of stems. For example, "focus on states" (Sensorimotor Stage) was selected, whereas "transformations of state" (Preoperational Stage) was omitted. If the student can specifically identify "focus on states" as a characteristic of the Sensorimotor Stage, the instructor might assume that the student is aware that the alternative, "transformations of state," would be associated with the Preoperational Stage.

Teacher's Worksheet to prepare item (Differences in Sensorimotor and Preoperational Thinking)

S = Sensorimotor
P = Preoperational

7. S when thinking involves direct interactions with the environment
1. P manipulates symbols that represent the environment (internalization of symbols)
12. S motor meaning
11. S symbolic meaning
10. P symbolic manipulation
P differentiates signifiers from significates
S action oriented; concrete goals
5. P can reflect on own behavior as it relates to goal
S perceptions of reality as primarily concrete objects
15. P perceptions of reality as including the past, present, and future

3. S focus on states
   P transformations of state
   S irreversibility
4. P conservation (a sign of reversibility)
9. S transductive reasoning
   P structures take the form of groupings

Both Preoperational and Sensorimotor:

   assimilation
2. accommodation—use the definition
8. egocentrism
   capable of imitation
   object permanence
13. deferred imitation

Neither Sensorimotor nor Preoperational (in next stage—Formal Operations):

14. performs operations on operations
6. formulates hypotheses
   when cognition is independent of concrete reality

Example 2-b

With this item type, the options offered to the student can consist of a list of single words, names, places, or a table or graph. This item differs from the simple matching type in that the choice list is usually short, whereas the number of items is determined by the number of decisions the student should be able to make.

This item type is particularly useful when the students are expected to have learned to make discriminations among distinguishable aspects of the subject matter. Note that each statement calls for a response from the student, rather than requiring the student to study four or five statements before making a response.

All of the alternatives that this item offers are correct for one or more of the statements in the stem. In contrast, the standard multiple-choice item offers distractor options that are either untrue or irrelevant with regard to one stem. Although the stem and the correct answer can be written with ease, several plausible distractors are difficult to write. Instead, several stems that contain related information and the correct answers for these stems can be turned into a master list item. For example, the following multiple-choice item more readily and appropriately takes the keylist form:

Which personality theorist stresses the importance of the elementary school years for the development of self esteem?

a. Erikson		a. Erikson
b. Freud		b. Freud
c. Rogers	or	c. both Freud & Erikson
d. Piaget		d. neither Freud nor Erikson
e. Bandura		

Other multiple-choice items would be similarly constructed, with the several items that cover a topic combined, using a master list.

Although this item is similar to the item in Example 2-a, it was written to emphasize more depth of comprehension than simple knowledge of specifics. The stems, in particular, require students to translate the statements into their understanding of the theories before selecting an option.

Topic: Child Development

Content objective: Theoretical views of Freud and Erikson

Behavioral objectives: Knowledge of facts and principles, comprehension (translation) of concepts, analysis of elements and relationships

Theories of Freud and Erikson

Most of the following statements represent the theoretical ideas of Freud and Erikson; some of these ideas were shared by both. Mark each statement according to the following key:

F. refers to Freud and *not* Erikson
E. refers to Erikson and *not* Freud
B. refers to *both* Freud and Erikson
N. refers to *neither* Freud nor Erikson

____ 1. The early feeding experiences are important to the infant's personality development.

____ 2. The elementary school years are crucial for the development of self-esteem (competence).

____ 3. Intellectual growth proceeds through qualitatively different stages as experiences are accommodated and assimilated.

____ 4. The theory emphasizes pathological factors.

____ 5. The theory emphasizes healthy and positive aspects of growth.

____ 6. Personality growth is essentially over by the age of 6 or 7.

Example 2-c

This item covers a basic area of understanding, the acquisition of classically conditioned behavior, that students are expected to acquire in any course that deals with human psychological behavior. This item, which may be difficult to follow, requires very basic discriminations for students who have studied classical conditioning.

During several years of teaching about classical conditioning, the instructor had used items that required students to match the terms with their definitions, assessing knowledge of specifics. The instructor eventually recognized, however, that students knew the definitions, but did not understand the concepts. As a result, this item was developed toward a more realistic behavioral objective that expected students to apply the concepts to real situations. This item continues to measure knowledge of specifics, methodology, and conventions. In addition, it asks students to analyze the basic elements of a classical learning situation and to apply these elements to new situations.

Students were prepared for the teacher's expectations of their behaviors (particularly application and analysis) through a homework assignment and class discussion. They were asked to construct their own examples of classical learning, drawn from their experience, for the next class period. During class, these examples were shared, and the words and accompanying symbols (CS, UCS, CR) were placed on the board. The test item provides similar but new situations, situations that students had been provoked to think about and to

analyze—clearly a closer match of behavioral objectives and a measure of those objectives.

The keylist options are the logical letters that students learned to use, and that are conventionally used, in analyzing classically conditioned behaviors.

Topic: Psychology of learning

Content objective: Classical conditioning paradigms

Behavioral objectives: Knowledge of specifics, methodology, and conventions; analysis of elements; application of terms

In each of the following examples, identify the conditioned stimulus (CS) the unconditioned stimulus (UCS), and the conditioned response (CR) by placing the letters CS, UCS, and CR on the line next to the appropriate choice.

1. You experience sensations of hunger whenever you are given the opportunity to eat pizza; eventually even a commercial that advertises pizza triggers your appetite for pizza.

   _____ pizza

   _____ pizza commercial

   _____ sensations of hunger, appetite

2. A child experiences pain and shuts her eyes when she gets soap in them. Thereafter, whenever soap gets *near* her eyes again, she closes them first.

   _____ closing of eyes

   _____ soap in eyes

   _____ soap *near* eyes

3. The clock makes a mechanical "click" just before its alarm sounds. You eventually learn to wake up and turn off the clock before the alarm goes off.

   _____ waking up before the alarm

   _____ sound of the alarm (bell)

   _____ "click" before the alarm

4. A person withdraws and laughs when being tickled; eventually the person learns to withdraw and laugh at the approach of tickling hands.

   _____ being tickled

   _____ approach of tickling hands

   _____ withdrawal, laughter

5. Being with friends creates pleasant feelings; your friends wear purple sneakers. Wearing purple sneakers makes you feel terrific even when you are not with your friends.

   _____ pleasant feelings

   _____ friends

   _____ purple sneakers

Example 2-d

This example, as in Examples 1-a and 1-b, deals with the early stages of speech development. The same list of options and stems that were used in Example 1-a are used, with the addition of a brief keylist option (prelinguistic or linguistic speech). A simple matching example can be extended in this way, if relevant to the objectives, by also including a keylist. With the addition of the keylist in this item, more comprehension is involved because the students need to understand the stages of speech sufficiently so that they can identify certain characteristics as being either not actual language or true language.

If the stems that were used in Example 1-b had been used in this item instead, the item also would measure application to new situations.

Topic: Child Development

Content objective: Stages of speech development during infancy and early childhood

Behavioral objectives: Knowledge of terms (names of stages) and specific facts (stage descriptions); comprehension (translation)

Stages of early speech development

Match the correct name (A-M) for each of the following stages of early speech development with the description of that stage. Also place the letter P *(prelinguistic speech)* or L *(linguistic speech)* in the blank to the right of each description.

A. babbling
B. cooing
C. differentiated crying
D. echolalia
E. egocentric speech
F. expressive jargon
G. grammatically correct verbal utterances
H. holophrases
I. lallation
J. primary social attachment speech
K. socialized speech
L. telegraphic speech
M. undifferentiated crying

Stage	*P or L*
____ 1. the use of one-word sentences	____
____ 2. the playful repeating of a variety of universal sounds	____
____ 3. the production of a string of utterances that sound like sentences but are not communicative	____
____ 4. a reflex form of communication produced by the expiration of breath	____
____ 5. conscious imitation of the sounds made by others	____
____ 6. stringing together two or more words to make a sentence	____
____ 7. simple sounds (usually vowels) emitted when the child is happy and contented	____
____ 8. the accidental repetition of sounds the child has heard	____
____ 9. vocalization that expresses whether the child is hungry, sleepy, angry, or in pain	____

Example 2-e

The options in this item had originally been used in the standard multiple-choice format, which meant that students were asked to deal with a small sampling of the various influences on fetal development as discrete items. In terms of long-range behavioral outcomes that would benefit students beyond the course, they need to be able to recognize and analyze the many possible influences as an aggregate. This more comprehensive item more realistically reflects how the students are expected to deal with this content, since the separate topics can be viewed as the relationships that exist to the whole, rather than in discrete parts.

The list of matching options is inclusive—nearly all of the abnormalities covered in this unit of the course appear here. The keylist reflects the two divisions of the unit on fetal influences—environmentally produced and genetically produced defects.

The instructor originally developed a much longer list of stems—as many as there are options. Some of those stems are used in this item, and the remaining stems comprise an item with identical keylist and matching items that serve as an alternate form.

This format provides the opportunity to combine several discrete items into one encompassing item, with the additional benefit that the student can concentrate on the one item rather than having to make mental leaps from one separate topic to another every 30 seconds.

Topic: Child Development

Content objective: Genetic and teratogenic (environmental) factors that influence prenatal development

Behavioral objectives: Knowledge of terms and classifications; comprehension (translation); analysis of relationships

Genetic and Teratogenic Influences on the Fetus

The following are descriptions of fetal abnormalities; match each of these to the defect being described by placing the correct letter (A-V) in the blank to the *left* of each number. Also indicate whether the abnormality is caused by a genetic defect (G), by a teratogenic influence (T), or by both teratogenic and genetic influences (B) by placing the letter G, T, or B in the blank to the *right* of each description.

Abnormalities

A. cat-cry syndrome
B. cervical tract syndrome
C. color blindness
D. cretinism
E. Down's syndrome
F. fetal alcohol syndrome
G. hemophilia
H. Huntington's chorea
I. Kinfelter's syndrome
J. male trisomy
K. inadequate brain myelination
L. partial sex reversal
M. phocomelia
N. PKU
O. Rh factor
P. rubella
Q. schizophrenia
R. sickle-cell anemia
S. spina bifida
T. Tay-Sachs disease
U. toxoplasmosis
V. Turner's syndrome

Causes

G genetic defect
T teratogenic influence
B both genetic and teratogenic influences

Abnormality (A-V)	*Cause (G, T, or B)*
____ 1. infant limb defects produced by thalidomide	____
____ 2. infant receives 47 chromosomes, resulting in retardation	____
____ 3. retardation which can be prevented at birth if a low phenylalanine diet is prescribed	____
____ 4. a crippling, fatal disease that strikes mainly Black people	____
____ 5. blood-clotting disorder; the "royal" disease	____
____ 6. retarded sexual and mental development in males; XXY	____
____ 7. physical and mental defects caused by lack of iodine	____
____ 8. disease transmitted by uncooked meat or by cat feces	____
____ 9. a complex of mental disorders marked by an escape from reality	____
____ 10. diethylstilbesterol (DES) affects female and male fetuses in the first trimester	____

Example 2-f

This example presents two brief keylist items in the area of social studies. The behavioral expectation is that the students should be able to classify certain characteristics as corresponding to two different civilizations. In the second item, they are asked to match the acts with the men who accomplished them.

A more complex learning outcome might have been measured by the first item by presenting different ideological viewpoints of the two contrasting cultures as stems. Level of difficulty might be increased by increasing the number of stems or by requiring finer discriminations among the items.

A further modification of this item might include stems that present cultural characteristics that were shared by *both* civilizations, or by *neither.* The keylist would thus contain the "both" and "neither" options. A keylist in this form, or a keylist which included one additional civilization, might serve as a bridge with an earlier unit that focused on another civilization.

Of course the characteristics of the civilizations that are presented in the stems should cite important differences rather than trivial ones; your judgment will help you to make this determination.

Topic: Western Civilization

Content objective: Mycenaean and Minoan Culture

Behavioral objectives: Knowledge of specifics and classifications

Match the items below with the culture with which they are associated:

____ 1. war with Troy	
____ 2. Royal Shaft Graves	
____ 3. Theseus and the Minotaur	
____ 4. Linear B	A. MYCENAEAN CIVILIZATION
____ 5. Royal Bull Games	B. MINOAN CIVILIZATION

_____ 6. Knossos

_____ 7. sent messages from town to town by signal fire

_____ 8. the Lion Gate

_____ 9. Odysseus

_____ 10. records kept on clay and written by scribes

A. MYCENAEAN CIVILIZATION
B. MINOAN CIVILIZATION

Match the acts below with the men who achieved them:

_____ 11. excavated Knossos

_____ 12. discovered Troy

_____ 13. deciphered "Linear B"

_____ 14. excavated Mycenae

_____ 15. discovered the Minoan civilization

_____ 16. proved the Trojan War could have been more than a myth

A. HEINRICH SCHLIEMANN
B. MICHAEL VENTRIS
C. SIR ARTHUR EVANS

Example 2-g

This final keylist example demonstrates how this item type can be adapted in the sciences. Rather than asking the students to respond to items concerned with discrete questions about photosynthesis and respiration, it provides a more realistic total view of the subject. Since photosynthesis and respiration differ significantly in some respects, yet share some common functions, this keylist more realistically approaches the behavioral objectives for this topic.

Topic: Biology

Content objective: Photosynthesis and Respiration in Plants

Behavioral objectives: Knowledge of classifications; categories; analysis of relationships

In the blank before each statement below, write

A. if it is true of respiration but *not* photosynthesis
B. if it is true of photosynthesis but *not* respiration
C. if it is true of *both* photosynthesis and respiration
D. if it is true of *neither*

_____ 1. stores energy

_____ 2. forms water as a byproduct

_____ 3. builds up carbohydrates

_____ 4. requires the presence of light rays

_____ 5. takes place only at night

_____ 6. liberates energy stored in food

_____ 7. occurs in green living cells

_____ 8. takes place in a dormant seed

_____ 9. uses free oxygen

_____ 10. occurs in the daytime

_____ 11. combines carbon dioxide and water

_____ 12. occurs in the female gametophyte of seed plants

_____ 13. liberates oxygen

_____ 14. occurs in growing root tips

from the files of Harold Gulliksen

EXERCISE: Writing a Master List (Keylist) Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives. Many of the following steps are the same steps you would take to write a Simple Matching item.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheet on pages 45 and 46 for your notes):

1. List the specific aspects of the content within that area that might be included in your instruction. In other words, you are listing your *content objectives.*
   You might also refer to the worksheet for Example 2-a on page 35.

2. Next choose a related set of content objectives that might comprise an item—those could be checked (✓) on the list you have already made. For each of these specific areas of content, ask yourself, "What kinds of distinctions or discriminations should my students be able to make?" Then summarize each discrimination with a key word or phrase.
   These key words or phrases will serve as your list of *options,* or your *keylist.* Typically, the keylist will contain from two to four options. (If it is longer, it is more likely to be a matching item.)
   Consider whether the keylist could be represented by something other than words—by a graph, a picture, a diagram, etc. If so, sketch what these would be.

3. Now list cases or examples that have been covered in class or in the assigned reading for each of the key words or phrases. Consider whether other examples have been covered; if so, list them.
   These examples are likely to measure knowledge and/or comprehension of course material.
   You will need to decide the degree of mastery, or *behavioral outcomes,* that you expect of your students, and that they understand you are expecting of them.
   If knowledge and comprehension are the highest level of mastery you expect of your students for this area of the subject, then the statements you will write as stems should reflect these objectives.
   If, however, you expect your students to behave at a somewhat more

sophisticated level of skill, you should consider how the stems should be constructed in order to aim at that level.

For example, if you decide that your students should be able to *apply* the specific areas of the content that you listed, your stems should contain new situations that they have not specifically encountered in class or in their reading.

Now write the statements *(stems)* that appropriately match your keylist and that appropriately match your behavioral expectations.

Since you are offering a limited set of options that will be used more than once, you will need many more stems than options.

4. At this point you will have the parts for your item. Using the worksheet on page 46:

   First alphabetize the options, or put them in a logical order. Assign letters of the alphabet to these options, so that the letters can be used as responses.

   Assign numbers to each of the statements (stems) you have written, using a numerical order that is a rearrangement of the order of the options.

   Consider the length of the item with regard to difficulty level—perhaps the lists of stems and options need to be shortened or lengthened.

5. Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item, if appropriate.

6. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise where necessary.

7. Using the next page, put your title, instructions, options, and stems in a keylist format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Master List (Keylist) Item

Content area:
Content objectives (specifics):

(Check related options that might comprise an item)

Options (Key words or phrases assigned to content):

(Alphabetize, or place in logical order)

Stems (Statements about options):

(number)

Format for the Master List (Keylist) Item

_____

(title)

(instructions)

(keylist)

A.

B.

C.

D.

(stems)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

____ 9.

____ 10.

Example 3-a

In a number of situations where matching questions could be used, there is no simple one-to-one match for the items in your lists of stems and options; an item in your list of stems may be matched with several items in your list of options. There is no reason for excluding such a question, in an objective format, in your classroom exam. It is possible to construct a format to take advantage of this characteristic of your subject matter content.

In this case you can set up a table or matrix with the stems listed vertically and the options listed horizontally across the top. The student is instructed to check each cell in which the option across the top is true of each of the stems along the side:

	A	B	C	D
1		X		
2	X		X	
3			X	X
4	X	X		X
.				
.				
.				

This format can take a variety of forms, depending on the structure of the content you are representing. It extends the range of topics for which questions can be posed.

Just as the level of difficulty and the content and behavioral objectives for the item can be controlled by the decisions you make as you match the item to your instruction, your representation of the content by the stems and items that you write will determine what you would like the item to measure.

The examples presented here are in the areas of Child Development and Psychology. You may wish to refer also to the example matrix items in the different subject matter areas, since they represent quite a range of diversity.

Obviously, you should *first* consider your objectives before determining that your material is well suited to this format.

This example refers again to Piaget's stages of mental development. The earlier example (Example 2-a) that used Piaget's stages referred to the two early stages of development, and was structured in a keylist format. The objectives for this item lend themselves to the tabular format, particularly since several options might be selected for any one stem. In the final exam, this item served as an appropriate measure of the student's overall grasp of the abilities that represent each stage of mental development. In contrast to Example 2-a, the stems (1-15) in this item require less precise discrimination among descriptions of abilities. Because these stems are so brief, they require a well-developed ability—students must translate their understanding to the terminology in Piaget's theory (comprehension). Because the elements of the theory are represented in this table as a structural whole, the item also requires the analysis of elements of the theory and the relationships among those elements.

Note that the options across the top have been placed on a slant rather than vertically for ease of reading.

Topic: Child Development

Content objective: Differences in thinking in Piaget's major stages

Behavioral objectives: Knowledge of classifications, principles and generalizations, theories and structures; comprehension (translation and interpretation); analysis of elements and relationships

Piaget's Stages of Thinking

Place an X in the appropriate squares to indicate the forms of thinking that are characteristic of, or make their appearance during, each stage of mental development. (It is possible to check the squares for more than one stage.)

	Sensorimotor I	*Preoperational* II	*Concrete Operations* III	*Formal Operations* IV
1. focus on states		X		
2. formulates hypotheses				X
3. egocentrism	X	X	X	X
4. irreversibility		X		
5. decentering			X	
6. object permanence	X			
7. true imitation	X			
8. the symbolic function		X		
9. accommodation	X	X	X	X
10. memory	X			
11. deferred imitation	X			
12. transformations of state			X	
13. operations on operations				X
14. transductive reasoning		X		
15. conservation			X	

Example 3-b

This item encompasses several behavioral objectives as it summarizes the terms and concepts that a student would be expected to acquire at the conclusion of a unit of instruction that compared and contrasted various theories of learning. Knowledge is assessed in columns A and B since the student should be able to associate the names of theorists with the names and classifications of their theories. Column C requires knowledge of the definitions of the terms, as well as a comprehension of the definitions in order to associate the terms with the types of theories. If the terms in column C had been directly supplied by the instructor in class, this column would have tested the student's knowl-

edge; however, since other terms were also discussed in connection with each theory, students are more likely to make the appropriate match on the basis of understanding.

The interrelationships of the theorists (stems) and columns A, B, and C require the student to be able to analyze relationships. The learning principles proposed by the different theories also facilitate correct matching of the options with the stems.

Although this item appears to be overly complex, it conveniently summarizes relatively basic learning outcomes; responding to this item, since it compresses a great deal of information, is probably less difficult than responding to several pages of discrete items. The material is logically organized in a form in which students are more likely to have organized it for themselves, with effectively organized instruction.

The previous item format asked students to respond by checking the appropriate boxes in the matrix, whereas this item asks them to fill in numbers. Occasionally a student may copy the wrong number by mistake. Note that the options are numbered sequentially from 1-24, to avoid confusion. If each set of options had been numbered starting with 1, a student who confused the columns might have chosen the correct answer but would have marked it in error if the number were placed in the wrong column on the matrix.

The level of difficulty is greater in this item than in Example 3-a because of the amount of reading that is required.

Topic: Psychology of Learning

Content objective: Theories and concepts

Behavioral objectives: Knowledge of theories, classifications, and structures; comprehension (translation and interpretation); analysis of relationships and organizing principles

Using lists A, B, and C to correspond to columns A, B, and C, write the appropriate number in each space. Numbers may be used more than once.

A. Name of theory	*B. Classification of theory*	*C. Concept originating with the theorist*
1. behaviorism	10. associationist	15. cognitive map
2. classical conditioning	11. cognitivist	16. habit-family hierarchy
3. connectionism	12. cognitive/ behaviorist	17. law of effect
4. contiguity	13. functionalist	18. Markov process
5. field	14. none of the above	19. no-trial learning
6. hypothetical-deductive		20. one-trial learning
7. purposive behaviorism		21. paired associates
8. social learning		22. perceptual constancies
9. stimulus sampling		23. schedules of reinforcement
		24. spontaneous recovery

Theorist	A Name of Theory	B Classification	C Concept
Pavlov			
Skinner			
Hull			
Tolman			
Kohler			
Bandura & Walters			

Example 3-c

This matrix is a further extension of the previous item. Each theorist's view of learning has been added (column B), which requires greater depth of comprehension than does Example 3-b.

Scoring

To score this item type, you can count entries that are incorrectly placed. A slightly different procedure consists of counting only the correct answers and ignoring the errors. This type of item, therefore, does not have the statistical simplicity of multiple choice or other questions with only one correct answer, but it substantially extends the range of topics for which items can be prepared. Thus, the item might provide better coverage of the material, and a test that more fully represents your objectives of instruction.

Topic: Psychology of learning

Content objective: Theories and concepts

Behavioral objectives: Knowledge of theories, classifications, and structures; comprehension (translation and interpretation); analysis of relationships and organizing principles

Using lists A, B, C, and D to correspond to columns A, B, C, and D, write the appropriate number in each space. Numbers may be used more than once.

A. Name of theory

1. behaviorism
2. classical conditioning
3. connectionism
4. contiguity
5. field
6. hypothetical-deductive
7. purposive behaviorism
8. social learning
9. stimulus sampling

B. View of learning (emphasis)

10. a process of discovering what leads to what
11. S and R are held together by a neural bond
12. a R becomes conditioned to a S after repeated pairings
13. a R becomes associated with different elements of the S on each trial
14. the imitation of significant others
15. a pattern of stimuli is experienced along with a response
16. gaining insight into the solution of the problem
17. any R that is followed by a reward tends to be repeated

C. View of reinforcement

18. not essential for learning
19. drive reduction
20. learning to learn
21. contiguity of UCS and CS
22. cognitive balance
23. reward
24. confirmation of expectancies

D. Concept originating with the theorist

25. cognitive map
26. habit-family hierarchy
27. law of effect
28. Markov process
29. one-trial learning
30. perceptual constancies
31. schedules of reinforcement
32. spontaneous recovery
33. vicarious reinforcement

Theorist	A Name of Theory	B View of Learning	C View of Reinforcement	D Concept
Pavlov				
Guthrie				
Thorndike				
Skinner				
Hull				
Tolman				
Kohler				
Bandura & Walters				

EXERCISE: Writing the Tabular (Matrix) Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives. Many of the following steps are the same steps you would take to write a Simple Matching item.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheet on pages 54 and 55 for your notes):

1. List the specific aspects of the content within that area that might be included in your instruction. In other words, you are listing your *content objectives.*
2. Next choose a related set of content objectives that might comprise an item—those could be checked (√) on the list you have already made. For each of these specific areas of content, ask yourself, "What kinds of distinctions or discriminations should my students be able to make?" Then summarize each discrimination with a key word or phrase. Some or all of this list of key words or phrases will serve as your *options.*
3. Now list cases or examples that have been covered in class or in the assigned reading for each of the key words or phrases. Consider whether other examples have been covered; if so, list them.

   These examples are likely to measure knowledge and/or comprehension of course material.

   You will need to decide the degree of mastery, or *behavioral outcomes,*

that you expect of your students, and that they understand you are expecting of them.

If knowledge and comprehension are the highest level of mastery you expect of your students for this area of the subject, then the statements you will write as stems should reflect these objectives.

If, however, you expect your students to behave at a somewhat more sophisticated level of skill, you should consider how the stems should be constructed in order to aim at that level.

For example, if you decide that your students should be able to *apply* the specific areas of the content that you listed, your stems should contain new situations that they have not specifically encountered in class or in their reading.

Now write the statements *(stems)* that appropriately match your list of key words or phrases, and that appropriately match your behavioral objectives.

4. At this point you will have the parts for your item. Using the worksheet on page 55:

   First alphabetize the options, or put them in a logical order.

   Assign numbers to each of the statements (stems) you have written, using a numerical order that is a rearrangement of the order of the options.

   Your stem list, depending on what you are including in the item, may or may not be longer than the list of options. You may also prefer to use statements for which an option is used more than once. If a particular option/stem match is confusing or not relevant, you may wish to darken or write "omit" in that box on the matrix.

   Also consider the length of the item with regard to difficulty level—perhaps the lists of stems and options need to be shortened or lengthened.

5. Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item, if appropriate.
6. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise, where necessary.
7. Using the next page, put your title, instructions, options, and stems together in a tabular format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Tabular (Matrix) Item

Content area:
Content objectives (specifics):

(Check related options that might comprise an item)

Options (Key words or phrases assigned to content):

(Alphabetize, or place in logical order)

Stems (Statements about options):

(number)

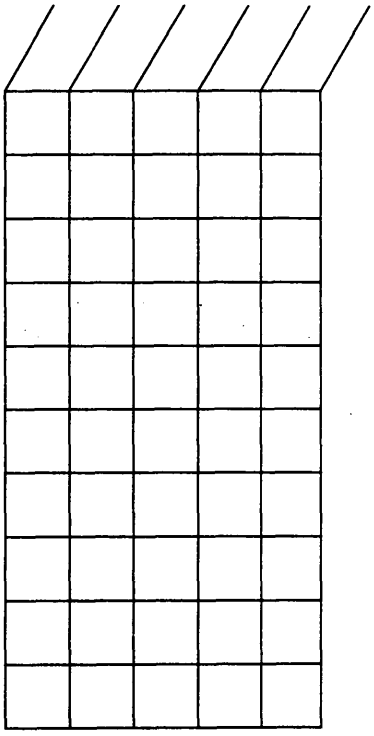
Format for the Tabular Item (Example 3-a Format)

_____

(title)

(instructions)

(options)



(stems)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

____ 9.

____ 10.

Format for the Tabular Item

_____

(title)

(instructions)

(options)

A. _____ B. _____ C. _____

1.

2.

3.

4.

5.

(stems)	(option columns)		
	A	B	C

(Place titles at the top of each column to correspond to the type of stem and the titles for option lists A, B, and C.)

Example 4-a

This item type resembles the multiple-choice format, but differs in that all of the options are reasonably correct answers, with one answer being clearly the best. This example offers only three options, but more options can be used, depending on the content material. All of the options legitimately pertain to the stem. They are concepts that might typically be confused by the students, since *fine* discriminations exist among them.

This kind of item requires considerable depth of understanding in order to make the fine discriminations. Class discussions focused on these concepts and used examples of behaviors that were indicative of these developments in mental functioning. In order to select the best option, the student also needs to know Piaget's theory and classifications of mental development, since the terminology is quite specific. The item also measures application, since the behavioral situations are new to the student, although similar to other examples discussed in class.

In this item, several of the same distractors were used repeatedly, because the student is expected to differentiate among these basic "landmarks" of mental development. Other Best Answer items need not use similar distractors.

When writing the distractors for this item type, you must keep in mind that all of the distractors are acceptable answers, but that one, on the basis of what the student is expected to know, is the *best*. Depending on the expected capabilities of the students, you will need to determine the appropriate degree of discrimination that is required of your students. The distractors should consist of related items of information that are likely to be confused, and may or may not require fine discriminations.

The distractors should be brief and concise, and equivalently plausible. The stem should provide sufficient, yet not obvious, information that would permit the student to select the best answer. You should also attempt to write options that are of the same length—often the best answer turns out to be the most complete, therefore the longest. For this item, good distractors are not easy to write; once they are written, however, different stems can be substituted so that you will have a variety of items to reuse in different combinations in the future.

The Best Answer item assumes a variety of forms and levels of discrimination that are required of the student, depending on your objectives. For an overview of the different forms that this item takes, also consult the examples in the different subject areas.

Topic: Child Development: Piaget's Sensorimotor Stage

Content objective: Piaget's Sensorimotor Stage of Development

Behavioral objectives: Knowledge of classifications, categories, and theories; comprehension; application to concrete situations

Intellectual Development—Sensorimotor Stage (Piaget)

The following are examples of children's behaviors that are considered by Piaget to be indicative of intellectual development. For each example, choose the one *best* answer by placing a plus (+) on the line to the left of that answer.

1. An infant is banging her rattle on the table. When a spoon is placed in her hand, she proceeds to bang the spoon on the table. This behavior signifies:

_____ a. the clear separation of means from ends

_____ b. the incorporation of new objects into existing schemata

_____ c. the exercising of a primary circular reaction

2. A box is blocking the infant's path to a toy duck. The infant pushes the box, but it does not move. The infant looks around the box at the duck, and proceeds to crawl around the box to reach the duck. This behavior signifies:

_____ a. the acquisition of object permanence

_____ b. the separation of means and ends

_____ c. the incorporation of new objects into existing schemata

3. An infant begins to play with the ashtray on the coffee table. Her mother takes the ashtray as the child watches, and places it in the cabinet. The child immediately goes to the cabinet to get the ashtray. This behavior signifies:

_____ a. the incorporation of new objects into existing schemata

_____ b. the separation of means and ends

_____ c. the acquisition of object permanence

Example 4-b

This example is similar to the previous item in that application to new situations is required. The discriminations among the distractors are less fine, however.

These items cover materials in the chapter that involved lengthy discussions of topics such as toilet training, the match of optimal environments and the needs of the developing child, and tolerance for frustration in learning situations. These topics were covered extensively and each of the options was discussed within each topic. For example, in item 1, some of the factors that need to be considered in toilet training are emotional disturbances, the physical maturation of the bladder, and the occurrence of lapses in control. The best option to match the description in the stem is the most reasonable hypothesis for Susie's problem, since lapses are common for a three-year-old. If the child were younger, the second option may have been the best choice. The stem gives no information about Susie's emotional state, but a student who did not carefully sort out and consider the materials and discussion may have selected option a; this student would have made the selection on the basis of partial information—that most girls are bladder trained by age three.

This item is particularly useful when extensive discussions that appear in the text do not suggest any clear options or stems for matching, keylist, or other objective formats. These items are likely to appear on the test as short-answer essay questions. When the material is placed in a Best Answer format, the teacher can determine to what extent the student is able to pull together the discrete information in a discussion and to apply the information appropriately. In an essay question, the student is likely to include everything that seemed pertinent, and the teacher may not necessarily be able to tell how well the material has been understood.

Topic: Child Development

Content objective: Approaches to typical problems of development

Behavioral objectives: Knowledge of classifications, categories, theories; comprehension; application to concrete situations

Each of the following statements is a common situation that would be encountered during the development of a child. For each question that follows a statement, place a plus (+) to the left of the *best* answer.

1. Susie is a three-year-old who has been bladder trained. Even though she had managed to stay dry at night, she has recently begun to wet the bed. What is the best explanation for this situation?

_____ a. Susie may be emotionally disturbed by something.

_____ b. Susie is not maturationally ready to achieve bladder control.

_____ c. A lapse in bladder control is not unusual at this age.

2. Bobby, age two-and-one-half, is an intensely active child. In despair, his mother frequently places him in a small, fenced-in play area. Why should his mother refrain from restraining him too often? What is the best reason?

_____ a. The child needs to develop his muscles.

_____ b. The child needs to begin to learn to move about in his environment.

_____ c. The child needs to learn to discriminate between safe and unsafe situations.

3. Patty's friend manages to climb to the top of a tall slide. Patty is typically reluctant to try, so she remains at the bottom and cries. What is the best approach that her parents might take?

_____ a. When she is frustrated, her parents should be ready to provide help and emotional support.

_____ b. Her parents should encourage her to try, and praise her when she succeeds.

_____ c. Her parents should reward her when she seeks approval.

Example 4-c

This example presents a more simplified format for this item type. Again, the student is expected to make fine discriminations among options that are likely to be confused before choosing the best answer.

The item here requires a knowledge of the fine shades of meaning of vocabulary words. This quiz would follow an assignment containing a longer list of vocabulary words that students were asked to look up in the dictionary, and for which they were instructed to find the closest synonym. During class, these synonyms and their variations would have been discussed.

Topic: English

Content objective: Vocabulary

Behavioral objectives: Knowledge of specifics; comprehension (translation)

Vocabulary Quiz

For each item, select the word that is the *closest* in meaning to the word at the left, and put the *letter* in the space to the left of the number.

Example: ____ please A-tickle B-rejoice C-gratify D-regale

____ 1. hurl A-toss B-fling C-cast D-pitch

____ 2. satiate A-sate B-surfeit C-glut D-gorge

____ 3. fealty A-fidelity B-loyalty C-allegiance D-devotion

____ 4. commend A-recommend B-praise C-approve D-compliment

____ 5. prodigal A-wastrel B-profligate C-libertine D-spendthrift

____ 6. infallible A-inevitable B-impeccable C-unerring D-inerrant

____ 7. indefatigable A-untiring B-tireless C-unwearied D-unflagging

____ 8. proficient A-expert B-masterly C-skilled D-adept

EXERCISE: Writing a Best Answer Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives. Many of the following steps are the same steps you would take to write a Simple Matching item.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheet on pages 63 and 64 for your notes):

1. List the specific aspects of the content within that area that might be included in your instruction. In other words, you are listing your *content objectives*.

2. Next choose a related set of content objectives that might comprise an item—those could be checked (√) on the list you have already made. For each of these specific areas of content, ask yourself, "What kinds of distinctions or discriminations should my students be able to make?" Then summarize each discrimination with a key word or phrase. Some or all of this list of key words or phrases will serve as your *options*.

3. Now list cases or examples that have been covered in class or in the assigned reading for each of the key words or phrases. Consider whether other examples have been covered; if so, list them. These will serve as your *stems*.

   These examples are likely to measure knowledge and/or comprehension of course material.

   You will need to decide the degree of mastery, or *behavioral outcomes*, that you expect of your students, and that they understand you are expecting of them.

If knowledge and comprehension are the highest level of mastery you expect of your students for this area of the subject, then the statements you will write as stems should reflect these objectives.

If, however, you expect your students to behave at a somewhat more sophisticated level of skill, you should consider how the stems should be constructed in order to aim at that level.

For example, if you decide that your students should be able to *apply* the specific areas of the content that you listed, your stems should contain new situations that they have not specifically encountered in class or in their reading.

4. As in examples 4-a (page 58) and 4-b (page 59), you may need to repeat steps two and three to write items that cover different areas of the subject matter.

5. Using the worksheet on page 64, now write the statements *(stems)* that appropriately match your list of key words or phrases, and that appropriately match your behavioral expectations of your students.

   At this point you will have the parts for your item.

   First put the options in order.

   Assign numbers to each of the statements *(stems)* you have written.

   Consider the length of the item with regard to difficulty level—perhaps the lists of stems and options need to be shortened or lengthened.

6. Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item, if appropriate.

7. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise, where necessary.

8. Using either page 65 or 66, put your title, instructions, options, and stems together in a Best Answer format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Best Answer Item

Content area:

Related content objectives (for a specific area):

Related content objectives (for another specific area):

Related content objectives (for another specific area):

(Check options that will be used in each item)

Stem

options (list)

Stem

options (list)

(Continue, depending on the number of items you are writing)

Format for the Best Answer Item

(as in examples 4-a and 4-b)

_____

(title)

(instructions)

1.

a.
b.
c.
.
.
.

2.

a.
b.
c.
.
.
.

3.

a.
b.
c.
.
.
.

Format for the Best Answer Item

(as in examples 4-a and 4-b)

_____

(title)

(instructions)

Example:

1. 1- 2- 3-

4- 5- ____

2. 1- 2- 3-

4- 5- ____

3. 1- 2- 3-

4- 5- ____

4. 1- 2- 3-

4- 5- ____

5. 1- 2- 3-

4- 5- ____

6. 1- 2- 3-

4- 5- ____

7. 1- 2- 3-

4- 5- ____

8. 1- 2- 3-

4- 5- ____

Example 5-a

From its title, this item type appears to be most appropriate in fields that deal with quantitative relationships. This type, in fact, appears in standardized aptitude tests for math.

In other fields, however, relationships among concepts are also expressed in greater-less-same terms. The typical format is as follows:

X G L S Y

where X and Y are two concepts, either qualitative or quantitative, that are relative to one another. The student is asked to circle, working from left to right, whether or not X is greater, less, or the same as Y. Several of these items usually are presented together. Depending on the logical order of the relationships, students are asked to use the concept on the left as a referent, as in example 5-a; occasionally the right-hand concept is the referent, as in example 5-b.

Example 5-a is purposely presented first, because it deals with a nonmathematical subject. This item is particularly appropriate to the sequences of motor development, since it meets reasonable and realistic behavioral objectives. Child development textbooks typically contain a section that is devoted to lists of landmarks in the "average" infant's motor development, by age. It seems unreasonable to expect students to memorize these detailed lists in sequence—especially since the lists are unlikely to be retained after the test. These lists can always be used for reference in the future. Since these developmental landmarks develop logically, the more reasonable expectation for students is to understand which of these developments occur together, and which occur before or after others. Thus the item asks them to indicate whether a particular skill in the left-hand column occurs after, before, or at the same time as the skill in the right-hand column.

Frequently this developmental information is presented in multiple-choice format, and students are expected to identify the age-in-months when the skill emerges. Students who are "memorizers" will select the correct answer—but memorization does not imply understanding. The teacher who wrote this item prefers to encourage the students to focus on understanding the material, with the assumption that the understandings will be retained and transferred to future learning.

Another item type in the next section of this handbook (6), the rank order item, meets the expectations that students should be able to place things in sequential order. If you feel that the sequential ordering of the material need not be as precise as in the rank order item, the material might possibly be adapted to the greater-less-same (GLS) format.

Topic: Child Development

Content objective: Sequences of motor development (birth to age 3)

Behavioral objectives: Knowledge; comprehension (translation) of trends and sequences

The Normal Course of Motor Development (birth to age 3)

The following paired statements refer to milestones in infant motor development that generally are acquired sequentially. If the motor skill described on

the *left* appears before the motor skill described on the right, circle the letter "B"; if the skill on the *left* appears after the skill on the right, circle the letter "A"; if the skills on the right and left appear approximately the same time, circle the letter "S."

Skill	When does it appear?	Skill
controls head	B A S	rolls over
sits up	B A S	crawls
turns from back to stomach	B A S	turns from stomach to back
sits with support	B A S	recognizes bottle
crawls	B A S	creeps
buttons and unbuttons	B A S	draws a circle
grasps objects	B A S	shows thumb apposition
shows good hand-finger coordination	B A S	walks well
stands with help	B A S	crawls
sits down from standing position	B A S	stands alone

Example 5-b

Although it may appear incomprehensible, this example is presented because you may have some areas in your subject matter that express similar relationships.

In the field of psychology, the content tends to be largely ideational. One exception in the psychology of learning is the observed and hypothetical relationships among the variables that influence learning, particularly in experimental settings. One theory that expresses these relative relationships is Clark Hull's theory of learning. This theory lends itself to the GLS format because students would be expected to be able to predict and formulate hypotheses about the relationships of certain variables. For example, in item 1, a very

direct relationship is that of the approximate equivalence of the amount of deprivation time (rats not receiving food or water) to the strength of the drive (for food or water).

Some of the items in this example are grouped intentionally in order to create a sense of relationship among the variables, as well as within a particular item that expresses one set of relationships, since these interrelationships exist within the theory. Thus, the various relationships of ${}_{S}E_{R}$ to other variables (items 6-9) are grouped.

In addition to the understanding of relationships, the student is also expected to understand the symbols that are employed in the theory and to translate these symbols into workable concepts in order to be able to deal with their relationships. If the behavioral objectives do not require the translation of symbols, the symbols could be expressed verbally, instead.

This item uses the right-hand term as a referent, because the left-hand term is varied to determine whether the student can predict what would happen to the term on the right. Thus, as the example reads, "drive stimulus (S_D) reduction leads to *less* drive."

Certain other areas of psychology express quantitative relationships, such as the mathematical learning theories and measurement theory as applied to testing. The fields of science, mathematics, computer science, and economics (supply and demand) contain concepts that lend themselves most readily to the GLS format.

Topic: Psychology of learning: Hull's theory

Objectives: The understanding and analysis of relationships between the variables that influence learning, and the ability to translate the symbols for the variables into the appropriate concept

The following paired statements refer to variables in learning that are to be compared in the quantitative sense, using Hull's theory. If the variable on the *right* is greater than the variable on the left, circle the letter "G"; if the variable on the *right* is less than the variable on the left, circle the letter "L"; if the right and left are the same or equivalent, circle the letter "S".

Example:

S_D reduction leads to	G L S	D

would read, "S_D reduction leads to less D"

1. D	G L S	number of hours of deprivation
2. S_D reduction leads to	G L S	${}_{S}{}^{H}{}_{R}$
3. ${}_{S}{}^{H}{}_{R}$	G L S	the tendency of a particular S to evoke an associated R
4. increasing V leads to	G L S	probability of R

5.	the greater the K,	G L S	probability of R to S
6.	the greater the $_{S}E_{R'}$	G L S	potential of the S to elicit the R
7.	increased $_{S}E_{R}$	G L S	time taken to respond
8.	increased $_{S}E_{R}$	G L S	A
9.	increased $_{S}E_{R}$	G L S	length of n

Example 5-c

This item is the more typical example of the greater-less-same item type. It clearly requires a depth of understanding of human physiology. Just as with other items you develop, the level of difficulty can be controlled, depending on the abilities of your students and the expectations you have of them.

Topic: Biology

Content objective: Human Physiology

Behavioral objectives: Knowledge of specifics, principles, and generalizations; comprehension (translation and interpretation); analysis of elements and relationships

The following paired statements refer to structures, functions, or factors that are to be compared in the quantitative sense. If the thing described on the *left* is greater than that on the right, circle the letter "G"; if the *left* is less than the right, circle the letter "L"; if the right and left are essentially the same, circle the letter "S."

Energy liberated by the oxidation of a gram of glucose *in the body*	G L S	Energy liberated by the oxidation of a gram of glucose *in a test tube*
Quantity of an enzyme present at the *beginning* of a given chemical reaction in the body	G L S	Quantity of the enzyme present at the *end* of the same chemical reaction in the body
Ease with which organic substances *soluble* in fat penetrate cell membranes	G L S	Ease with which organic substances *insoluble* in fat penetrate cell membranes
Irritability of a *sensory nerve fiber*	G L S	Irritability of the *sensory end organ* of the same fiber

Intensity of a nerve impulse caused by an adequate *weak* stimulation of a nerve fiber	G L S	Intensity of a nerve impulse caused by an adequate *strong* stimulation of a nerve fiber
Rate of flow of blood in *veins*	G L S	Rate of flow of blood in *capillaries*
Pressure of blood in *veins*	G L S	Pressure of blood in *capillaries*

from the files of Harold Gulliksen

EXERCISE: Writing a Greater-Less-Same (GLS) Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (using page 72 for your notes):

1. Consider a specific content area in which you would expect students to be able to deal with the qualitative or quantitative relationships of one concept with another concept. Your expectation that they can handle these relationships, within a certain level of difficulty, expresses your *behavioral objectives.*
2. Next make lists of paired statements that might be expressed in terms of relationships.
   These relationships have been covered in class, or in assigned reading.
   Determine the degree of mastery-knowledge, comprehension, application (to new situations) that should be represented in these pairs. You may choose to assess one level of skill in the list of items, or may vary the skills represented by the items.
   You might also wish to increase the difficulty of each pair of statements, beginning with single relationships and progressing to more difficult relationships at the end of the item.
   Also, you might wish to shorten your original statements by using phrases.
3. Number each pair of statements, depending on the order in which they will be presented.
4. Write concise but clear instructions that communicate the basis for the selection of the options (GLS). Write an example that demonstrates how the student should read and respond to the paired statements. Write a brief title for the item.
5. Review the statements with regard to difficulty level, readability, clarity, etc.
6. Using page 73, put your title, instructions, and statements together in the GLS format.
   As you review the item, reflect on your objectives (fill them in below, in your own words).

Topic:

Content objective:

Behavioral objectives:

Worksheet for Preparing a Greater-Less-Same Item

(list pairs of relationships)

Concept	*How is the relationship expressed?**	**Concept**

*Using GLS, or ABS, or any other logical designation.

Format for the Greater-Less-Same Item

_____
(title)

(instructions)

Example:

_____ (title of statement, if relevant)		_____ (title of statement, if relevant)
1.	G L S	
2.		
3.		
4.		
5.		

_____
(Use GLS, ABS, or any other logical designation)

Example 6-a

For some topics a matching type question requires only a single list, particularly when the items on the list have some natural order such as dates of historical events, steps in a laboratory process, size of countries in population or area, degree of hardness of minerals, order in which literary or artistic works were produced, etc. The responses that are made to this item type require more precision than in the Greater-Less-Same format.

In most instances the exact date or number could be given to match with the option list in conventional matching or keylist format. If you are concerned that the students know the exact date or time period, then this conventional format is more appropriate. In this case the option list should contain several more dates or numbers given than events; otherwise simply knowing the order will be sufficient to answer all of the questions correctly.

The format that calls for responses that are closest to the content and behavioral objectives is the one to use. If exact information is considered important, structure the question in that fashion; if only the general order or ranking is what is desired, use that procedure.

In some cases only ranking or ordering information is available, not exact numerical values. The format suggested here makes it possible to include such questions without the artificiality of constructing an option list for nothing but the numbers 1, 2, 3, 4, etc. All the students need is the list of statements and the instructions to number each statement by order or rank.

It is important, however, that the instructions clearly specify where to begin. For example, "List from largest to smallest, using *1* to represent the *largest,*" or, "Give the chronological order of the following events with *1* being the *earliest.*" There should also be no ambiguity about the dimension on which ranking is to take place. For example, if a group of countries is being ranked from largest to smallest, the instructions should specify whether size in area or in population is the basis for ordering the countries.

This example, as in previous examples (2-a, 3-a, 4-a) for other item types, focuses on Piaget's stages of development. This relatively simple item requires knowledge of the specific order of the stages. It also requires some comprehension, in that students may not have memorized the exact statements that appear in the item, and also may need to "translate" the terminology (such as secondary schema) in order to indicate the correct sequence.

Topic: Child Development

Content objective: Piaget's sensorimotor stages of development

Behavioral objectives: Knowledge of sequences; comprehension (translation)

Number the following descriptions of Piaget's stages of sensorimotor development in the order (1-6) in which they occur, using *1* for the *first* stage.

____ invention of new means through mental combinations

____ use of reflexes

____ application of secondary schema to new situations

____ first acquired adaptations (primary circular reactions)

____ intentional acts (secondary circular reactions)

____ discovery of new means through active experimentation

Example 6-b

This example requires a more cursory knowledge about the stages of speech development, whereas the other items about these stages (Examples 1-a, 1-b, and 2-d) attempted to tap depth of comprehension at a higher-order level of skill. If an instructor had not placed emphasis on the understanding of these steps, an item such as this might be used. A small amount of translation (comprehension) might be required if the student should need to interpret the terms, such as lallation; this is unlikely, however, since the item expresses the behavioral expectation that the steps be memorized in sequence.

Scoring the Rank Order Item

Obviously, if the student places one or two numbers out of order, but within range, all of the answers will be wrong, since the numbering is dependent on a sequence. To score the item fairly, the instructor can score each answer by obtaining its difference (in either direction) from the ideal answer on the scoring key. Using a simple example for six numbers, as in example 6-a, you would match the answer key to the students' answers as follows:

Key	*D*	*Student 1*	*D*	*Student 2*
6	1	5	0	6
1	0	1	4	5
4	1	3	0	4
2	0	2	1	3
3	1	4	1	2
5	1	6	4	1
	4		10	

As you hold the piece of paper containing the key beside the student's answers, you can place the difference score (D) for each answer beside the student's answers. Then total the sum of the differences.

The optimal sum of the differences is zero, meaning that the student's answers would match the key identically. Thus the best score for the item is one that reflects the *lowest* sum of differences. Student 1, for example disagreed slightly with the key, obtaining a difference score of 4. Student 2, on the other hand (obviously guessing), obtained a difference score of 10—considerably worse than Student 1's score.

Since lower scores are the best scores on this item, you will not want to directly add them to the total score for the rest of your test. To obtain scores that indicate that a high score is the best, you can subtract each student's sum of the differences score from the sum of the differences that is the greatest possible variation from the ideal order. For this item, the greatest sum of differences from the true order would be:

Rank or ideal score	*Greatest Variation*	*D*
1	6	5
2	5	3
3	4	1
4	3	1
5	2	3
6	1	5
		18

Therefore Student 1's score, where the sum of the differences was 4, would be $18 - 4 = 14$. Student 2's score, with a sum of differences of 10, would be $18 - 10 = 8$.

Topic: Child Development

Content objective: Stages of early speech development during i early childhood

Behavioral objectives: Knowledge of specific facts, terms, and sequenc

Stages of early speech development

Number the following descriptions of the stages of early speech developme in the order (1-10) in which they occur, beginning with *1* for the *first* stag

____ lallation

____ telegraphic speech

____ echolalia

____ differentiated crying

____ holophrases

____ expressive jargon

____ cooing

____ grammatically correct verbal utterances

____ undifferentiated crying

____ babbling

Example 6-c

This example uses an extensive list to be sequenced. Although it appears e tremely complex, a student who understands this basic technique (desensitiz tion of a fear response) can be expected to place the statements in logical orde Perhaps many students will confuse some statements and assign some inco rect numbers, but the scoring recommendations given with example 6-b wou allow for small discrepencies in numbers. The score would still indicate ho closely the student approximated the ideal order.

Class discussion would have involved the planning of such sequences f other real situations. This situation, being one that was not used in class, al requires that students apply their knowledge and comprehension of techniqu

Other subject matter areas might lend themselves to this format, such as t sequence for performing a particular experiment.

As you compare the different examples in this section, you can see that di ferent expectations are being met by the items, ranging from straightforwa knowledge (memorization) to the logic that this item requires in determini correct sequences.

Topic: Psychology of learning

Content objective: Behavior modification hierarchy for contact desensitizatic

Behavioral objectives: Knowledge of sequences, comprehension; application t concrete situations

The following is an abbreviated and scrambled list of steps that might be take to eliminate a child's fear of going into a swimming pool. Arrange the steps i

the correct order for a treatment hierarchy, using 1 for the first step to be initiated by a therapist.

____ Put your face in the water.

____ Let's walk to the red marker on the floor (three-quarters of the way to the pool).

____ Walk into the water to the green marker (the first step into the pool).

____ Walk out to the blue marker (into shallow water), and then come back to me.

____ Let's walk into the pool room to the white marker (one-quarter of the way to the pool).

____ Sit on the edge and put your feet in the water while I count to nine.

____ Splash yourself without holding on (in the pool).

____ Walk into the water to the yellow marker (halfway down the pool steps).

____ Now jump into the water right here.

____ Let's walk to the edge of the pool.

____ Put your whole body in the water.

____ Walk out to the blue marker (into shallow water) and splash yourself; hold onto the edge if you like.

Example 6-d

The rank order item type lends itself well to social studies, since the sequences of events are important to the understanding of the subject. The first item provides some structure for the student in that it differentiates the Old Kingdom from the New Kingdom—the teacher decided to provide this aid, based on the level of difficulty that was expected of the students.

The second item uses descriptions for stems, rather than names or terms, which requires more comprehension than the preceding item, which basically called for knowledge.

Topic: Social Studies (Western Civilization)

Content objective: Chronological order of the significant leaders in the history of ancient Egypt

Behavioral objectives: Knowledge of specific facts and sequences

Number (1-9) the following leaders (kings and pharaohs) of Egypt in the historical order in which they ruled, using 1 for the *earliest* ruler on the list.

Old Kingdom

____ Djoser

____ Pepi II

____ Menes

New Kingdom

____ Hatshepsut

____ Ramses II

____ Amenhotep I

____ Thutmose III

____ Ahmose I

____ Amenhotep IV

or

Content objective: Chronological order of significant events in Egyptian history

Behavioral objectives: Knowledge of specific facts and sequences; comprehension (translation from one form to another)

Number (1-8) the following events in the history of ancient Egypt in the order in which they occurred, using 1 for the *earliest* event.

____ Egypt divided; ruled by Libyan kings, Nubian pharaohs, Assyrians, and Persians

____ seizure of power by Hyksos kings

____ Upper and Lower Egypt are united by Menes

____ Alexander the Great conquers Egypt

____ reunification of Egypt under Theban pharaoh Mentuhotop II

____ rise of feudal lords leads to anarchy

____ Thutmose III expands empire to the Euphrates

____ many kings with short reigns; social and political chaos

Example 6-e

This item is interposed to contrast the keylist format to the rank order format, to point out that the different formats might lead to the measurement of different behavioral objectives. The instructor who used this item instead of a rank order item expected students to be able to extend their knowledge to a comprehension of events that occurred within certain time periods. Students who are able to answer this item well are also likely to associate the stems with the options by analyzing the relationships that are involved among these periods in Egyptian history.

Topic: Social Studies (Western Civilization)

Content objective: Significant events occurring during each time period in ancient Egyptian history

Behavioral objectives: Knowledge of specific terms, facts, and sequences; comprehension (translating from one form to another); analysis of relationships

For each of the following events in Egyptian history, identify the period during which the event occurred. Letters will be used more than once.

A. Early Dynastic Period
B. Old Kingdom
C. Middle Kingdom
D. New Kingdom
E. Late Dynastic Period
F. Ptolemaic Period

____ 1. "Books of the Dead" written on papyrus rolls

____ 2. the Great Pyramids and the Sphinx built at Gizeh

____ 3. Carius I of Persia commands codification of Egyptian law

____ 4. development of calendar and hieroglyphic writing

____ 5. bronze casting perfected

____ 6. religious and political strife between Upper and Lower Egypt

____ 7. period of cultural splendor

____ 8. Thutmose III expands empire to the Euphrates

____ 9. classical period of literature

____ 10. Alexander the Great conquers Egypt

EXERCISE: Writing a Rank Order Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives.

For this exercise, you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheet on page 80 for your notes):

1. List the specific aspects of content that are included in your instruction and that deal with ordering or sequences.
2. Choose a related set of statements about content that is covered in class or in assigned reading (content objectives) that might be used as stems for your item—these can be checked (✓) on the list you have already made.
3. In deciding to use the rank order item type, you have already determined one *behavioral objective*—the expectation that your students will be able to order certain statements sequentially. (The numbers are your *options*).
4. You may wish to reword the statements you have selected in step 2 to conform to your behavioral objectives—are you requiring a simple knowledge of sequence, or do the statements need to reflect comprehension, and possibly analysis, as well?
5. Determine the order in which the statements will be placed (out of the correct order), by numbering the statements you have listed. Decide also whether the list is too long for the students to reasonably be able to handle. If so, shorten the list, or break it into logical segments with headings (as in example 6-d).
6. Write concise but clear instructions that communicate the basis for the selection of the options. Remember that your instructions need to indicate the number with which to begin and the direction of the ordering (least to greatest, earliest to latest, etc.). Write a brief title for the item, if appropriate.
7. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, any obvious clues, etc.). Revise, where necessary.
8. Using page 81, put your title, instructions, options, and stems together in a rank order format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Rank Order Item

Content area:
Content areas dealing with sequences (make a list or lists):

Format for the Rank Order Item

_____

(title)

(instructions)

(stems)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

____ 9.

____ 10.

Example 7-a

This item type is similar to the Best Answer type. It differs slightly, however, in that the response required is an answer to a question. The responses can range from general to very specific statements, depending on the degree of discrimination that is expected and determined by the behavioral objectives.

The item type can substitute for the traditional short answer essay item. It can tap the same degrees of comprehension that the essay item measures. The item can be constructed readily by using actual student responses to the same items in the essay format. After using certain essay items for several administrations, typical student responses can be drawn from their tests, and listed. The lists of responses are then sorted into three or four piles with respect to the differing qualities of responses (either A, B, C, D, or Honors, Pass, Fail, etc.). Then you would select three to five responses to represent these levels of response, and edit them for grammar, spelling, etc. Instead of several different levels of response quality, you may choose to use one outstanding response and several "average" responses. You can determine the degree of discrimination to expect from your students as you select statements from their actual responses. Your pool of responses may even provide a sufficient number of options to comprise alternate forms for the same question.

The length of the statements might also vary from simple phrases to brief paragraphs. One social studies teacher collected students' paragraph-length responses to essay items, selected three that varied in quality, and used them to provide feedback to his students. These (anonymous) responses were discussed in class, and the students were able to learn about how to construct a "best" response to a question. This example appears with the social studies items (examples 7-j and 7-k).

The first part of this example is in the short answer essay format from which responses would be drawn for an objective item. Note that the essay item differs from the objective item in that it also assesses synthesis—the production of a unique communication. Example 8-a presents the same item in an objective format.

Topic: Child Development

Content objective: Management of typical developmental problems

Behavioral objectives: Knowledge of specifics and generalizations; comprehension; application to concrete situations; synthesis; evaluation

The Behavior of a Preschool Child

Write a brief paragraph to answer each of the following questions:

1. A preschool child refuses to share his toys with Sandy, even when he is told that Sandy has few toys of her own. How might the child's behavior be explained?

   _____

   _____

   _____

   _____

2. Mother gives a cookie to David and a cookie of the same size to Rachel.

David is upset because he thinks that Rachel's cookie is larger because she has a larger plate. Rachel feels that David's cookie is larger than hers, since his plate is smaller. Why are these preschoolers having this problem?

3. Brian and John are both the same age; however, Brian's language development clearly appears to be more advanced than John's. Brian uses more words, longer sentences, and more adjectives and adverbs. What might be some hypotheses for this difference? Choose the most likely hypothesis, and explain your choice.

This particular item aims toward the student's ability to apply knowledge and comprehension of the subject to new, concrete situations. Other items of this type may not extend the material beyond the level of comprehension.

The questions that you ask can be factual, ask for explanations, or can additionally ask the student to employ judgment (evaluation).

A variant of this item type, in the following section, is "Statement and Comment."

The Question and Short Answer item can take a variety of forms in the different subjects. You should review the examples that are offered in the specific subject area parts.

Now continue on to Section 8, Statement and Comment item types. Since the format for these items closely resembles the format for the Question and Short Answer items, the instructions and worksheets for both types appear at the conclusion of Section 8.

Topic: Child Development

Content objective: Management of typical developmental problems

Behavioral objectives: Knowledge of specifics and generalizations; comprehension (explaining the material); application to concrete situations; evaluation

The Behavior of a Preschool Child

For each of the following questions, place a plus (+) in the blank to the left of the best answer.

1. A preschool child refuses to share his toys with Sandy, even when he is told that Sandy has few toys of her own. Which of the following explains his behavior?

____ a. The child has not had sufficient opportunities to interact with other children.

____ b. The child is emotionally immature and stubborn.

____ c. The child is intellectually unable to take the role of another person.

2. Mother gives a cookie to David and a cookie of the same size to Rachel. David is upset because he thinks that Rachel's cookie is larger because she has a larger plate. Rachel feels that David's cookie is larger than hers, since his plate is smaller. Why are these preschoolers having this problem?

____ a. A child of this age is not capable of decentering.

____ b. A child of this age deals with primitive concepts.

____ c. A child of this age is unable to take the role of another person.

3. Brian and John are both the same age; however, Brian's language development clearly appears to be more advanced than John's. Brian uses more words, longer sentences, and more adjectives and adverbs. Which of the following might be a hypothesis for this difference?

____ a. Brian's parents may be more person-oriented.

____ b. Brian's parents may use elaborated language codes.

____ c. Brian's parents may be more status-oriented.

8. Statement and Comment Items

Example 8-a

This item type can be written in a format such as the Question and Short Answer item type (refer to the comments in Section 7). The slight difference between these items is that the Statement and Comment item goes beyond the more factual questions, requiring students to:

interpret information,
relate ideas to one another,
predict outcomes ("If . . . then . . . "),
make judgments,
and evaluate information or evidence.

This item type can assume several different formats; whatever format is used, the purpose of the item is to ask questions that elicit comments from students in the form of the above behaviors. One format is developed by obtaining a sampling of the range of comments that students make when they respond to an item in the short answer essay format.

The first part of example 8-a presents several items written in an open-ended format that might be used to obtain representative student comments. The first item makes a statement and asks students to interpret the facts in the statement; their interpretations should reflect a particular level of understanding of the material discussed in class. In the second item, students need to formulate a reasonable plan that pulls together various concepts (mores, cultures, rituals, communities, etc.) that were developed during class. The third item cites a quotation that did not appear in the assigned reading, but that contains ideas they have studied. Although these particular examples may be too difficult for high school students, they may suggest some ideas as you prepare this type of item. The third item, for example, suggests that statements from other sources may be used to stimulate students' thinking about the concepts they have learned.

Topic: Western Civilization

Content objective: Historical development of cultural diversity

Behavioral objectives: Knowledge of trends and sequences; comprehension (interpretation, extrapolation); application; evaluation

Answer the following questions.

Race *A* attained a high level of civilization three thousand years before race *B* attained a similar level of civilization. What is the best interpretation of this fact?

If you were the leader of a group that wished to perpetuate mores sharply divergent from those in western European culture, what measures would offer you the greatest likelihood of success? Ignore considerations of the practical feasibility of the measures, i.e., assume that the measures could be put into effect, and outline a plan which would prevent the group from adopting western European mores.

"In pre-industrial England, in-group loyalties may be said to have centered primarily around the village or manor. Since the industrial revolution the most significant in-group attitudes have both narrowed to smaller groups and expanded to larger groups."

Explain this statement.

from the files of Harold Gulliksen

Topic: Western Civilization

Content objective: Historical development of cultural diversity

Behavioral objectives: Knowledge of trends and sequences; comprehension (interpretation, extrapolation); application; evaluation

Following are a number of *questions*.
There are *three answers* to each question.

Write a plus (+) before the *one best* answer in each group.

Question: Race *A* attained a high level of civilization three thousand years before race *B* attained a similar level of civilization. What is the best interpretation of this fact?

Answers

____ The difference in time is so slight in comparison to racial history that it is probably a chance difference.

____ Race *B* probably had environmental handicaps which did not apply to race *A*.

____ The probability is that race *A* is innately better equipped than race *B*.

Question: If you were the leader of a group that wished to perpetuate mores sharply divergent from those in western European culture, what measures would offer you the greatest likelihood of success? (Assume in each case that the measure is practically feasible and can actually be put into effect.)

Answers

____ Frame your program in terms that would be attractive to existing dissatisfied groups, gain publicity and members of the movement, organize a movement and develop local leaders, gain more and more political power until you could seize control of the state, and then consolidate your position and enforce the mores on the members of the group, making wealth, prestige, and power the rewards of conformity.

____ Establish a separate school system in which you would train the children in your group, and those of as many converts as you could get, in the belief in the mores of your group. Emphasize the use of rituals and ceremonies to develop strong emotional reactions around the symbols and slogans of your group in the children at a very early age and on regular and frequent occasions thereafter. Foster in all the members of the group a belief that they are the bearers of a very special responsibility to preserve and spread to the rest of the world the sacred mores of your group.

____ Take your group to a naturally isolated location and establish a separate self-sufficient community, completely out of touch with the rest of the world. Develop your own institutions and traditions. Carefully guard against travel by the members of your colony and visits from outsiders.

from the files of Harold Gulliksen

Example 8-b

Another kind of item that can be used to elicit comments from students is in the keylist format. If you have not studied Section 2, you might review the recommendations and examples presented there.

This example is an item that requires the student to evaluate conclusions about the case study of an adolescent; the evaluations are based on the information that appeared in the case study. The detailed case study that was discussed in class is the culmination of a unit about adolescence. Thus, the student must apply knowledge of facts and generalizations about adolescence to

the elements of the case study. With the preparation they had in class and their understanding of the case study and of adolescence, students should be able to discriminate among statements in order to draw the appropriate conclusions (agree, disagree, uncertain, no evidence).

Topic: Child Development

Content objective: Integration of the basic concepts in the unit on adolescent development

Behavioral objectives: Knowledge of specific facts, criteria, and principles and generalizations; comprehension (interpretation); application to particular situations; analysis of elements and relationships; evaluation

[The students have been asked to study an extensive case study about an adolescent, Judy, who has attempted suicide.]

On the basis of the *evidence* in the case, indicate for each of the following statements whether you

A agree
D disagree
U are uncertain (the evidence is mixed)
N feel there is no evidence

Statements:

____ 1. Judy presents a problem that, aside from the suicide attempt, is typical of the average adolescent girl.

____ 2. Judy's daydreams, in which she placed herself in an undesirable or failing role, were serious symptoms of her later behavior.

____ 3. Her family's interest in church made it more difficult for Judy to adjust to everyday life.

____ 4. In her senior year, Judy began to avoid people because she had grown to dislike them and would not have accepted friendship if anyone had offered it.

____ 5. Judy's daydreaming tendencies were a cause rather than a symptom of her difficulties.

____ 6. Judy was having great difficulty in finding an acceptable and suitable role to play in life.

____ 7. Other adolescents who experience shyness are likely to experience the same problems that Judy did.

____ 8. Judy's father had been overindulgent with Judy and should have been more strict.

____ 9. Judy's early life before entering high school was thoroughly normal and lacked symptomatic indications of her later behavior.

____ 10. Judy's resistence to criticism was an indication of feelings of inferiority on her part.

____ 11. The family home situation promoted Judy's feelings of isolation and insecurity.

Example 8-c

The keylist in the previous example uses brief phrases. The comments in this keylist example are comprehensive sentences that represent generalizations or theoretical viewpoints which explain adolescent behavior. The student must fully comprehend the comments in the keylist in order to be able to match them to the appropriate statements.

The list of statements would ideally be longer than the list of comments, but were not extended for this example. The instructor might also construct additional statements for which a comment might be used more than once. The statements supply examples of real adolescents, which are new situations that were not covered in class, therefore requiring application. The students need to make relatively fine discriminations among comments in this item. As with other keylist items, the instructor should determine the degree of discrimination that could reasonably be expected of students, depending on the behavioral objectives.

Topic: Child Development

Content objective: Integration of the basic concepts in the unit on adolescent development

Behavioral objectives: Knowledge of specific facts, principles, and generalizations; comprehension (interpretation); application to concrete situations

For each of the following statements, indicate which comment about the typical adolescent is the most appropriate explanation for the statement.

Comments:

A. The intellectualism of adolescence is seen as an *ego-defense* mechanism.
B. The intellectualism of adolescence is seen by cognitive theorists as a *"flexing of intellectual muscles."*
C. Most adolescents are at the conventional stage of *morality* (level II).
D. The adolescent is continually aware of an *"imaginary audience."*
E. The adolescent is influenced by the *"personal fable."*
F. Adolescents undergo *identity confusion* as they pursue their search for identity.
G. The adolescent is searching for a redefinition of the relationships to *parents.*
H. Adolescents are highly influenced by their *peer group.*

Statements:

_____ 1. Susan spends hours in front of the mirror, putting on makeup and blow-drying her hair, because she desires a nice appearance at all times.

_____ 2. Steve's parents are concerned about his wild motorcycle driving, but he thinks they are too stuffy.

_____ 3. Joan strives very hard to do well in English because her teacher is so wonderful.

_____ 4. Harold has become deeply involved in a "born again" religious movement.

Example 8-d

This final example is of the Best Answer format, but taps higher-level skills, particularly evaluation. Each of the options that is presented with the statements supplies a reasonable recommendation; the student who has successfully integrated the basic concepts about adolescence and the case study should be able to select the best ideas.

The fifth item asks the student to choose any number of recommendations that would be reasonable, based on the background acquired from studying the material and from discussions in class.

The Statement and Comment item can also take other forms. One such form is a paragraph (statement), in which phrases are underlined or enclosed in brackets. Numbers are placed above the phrases, to be used as responses. A list of comments following the paragraph would be matched to the appropriate phrases (by number). This format has come into use in several standardized achievement tests.

Topic: Child Development

Content objective: Integration of the basic concepts in the unit on adolescent development

Behavioral objectives: Knowledge of specific facts, criteria, and principles and generalizations; comprehension (interpretation); application to particular situations; analysis of elements and relationships; evaluation

[The students have been asked to review an extensive case study about an adolescent, Judy, who has attempted suicide.]

Judy's problems might be approached in several ways. For each of the following groups of statements, select the best (+) recommendation that might be made.

1. relationships with her *parents:*

____ Judy should be made to share a room with a sibling in order to eliminate the possibility of being alone whenever she wants to be.

____ Her parents should have taken some pains to see that when Judy was a child she met and played with other children.

____ Her parents should be less protective of Judy, and provide her with more understanding and social guidance.

____ Her mother's attempts to set her cousin as an example for Judy are a wise means of providing a role model for Judy.

2. relationships with her *peers:*

____ When other students in school do not wish to work on committees with Judy, she should be allowed to work by herself.

____ A summer camp some distance away from Judy's town where Judy would not meet any of her school mates would do her a lot of good.

____ Judy needs more rebuffs to "toughen" her so that she can get along in typical social situations.

____ A group of reliable school mates might be enlisted to include Judy in their activities to help her to build up her social acceptance.

3. relationships with her *guidance counselor:*

____ The guidance counselor should show Judy some of the possibilities in interior decoration, art, or some other allied occupation.

____ The guidance counselor is wise in indicating to Judy the impossibility of her vocational desires.

____ The guidance counselor's objective attitude toward Judy is professionally sound.

4. psychiatric assistance:

____ Behavior such as Judy's will usually adjust itself after adolescence; no particular remedial action is indicated.

____ Judy's case should be referred to the school psychologist or to a psychiatrist.

____ Judy should have been institutionalized some time during her senior year.

5. *Judy's personal adjustments:* Select (+) one or more of the following recommendations for Judy's adjustment.

____ Judy should be placed in a series of situations where she is forced to make choices and decisions.

____ Judy needs to have considerably more responsibility placed on her shoulders.

____ Judy needs to be taught a number of skills so that she will have some basis of winning status with her peers.

____ At almost any point in the progression of her case, a single understanding by a sympathetic person would probably have eliminated much of her difficulty.

____ Judy should have been removed from her parents and placed in a foster home.

____ Judy's daydreaming tendencies might be eliminated by providing her with greater means of satisfaction with real-life situations.

____ Judy should be graduated and sent to a college some distance from her home town so that her problems clear up on their own.

[This item could have been assigned as an essay item, with specific directions indicating that the students should provide a plan with recommendations for the specific problem areas of Judy's life—parents, peers, school authorities, guidance counselor, etc. The behavioral objective for this item type would be *synthesis,* the production of a proposed plan or set of operations. If the assignment also included a requirement that the student include reasons for each recommendation that are based on specific examples of evidence from Judy's case, the objective for *evaluation* (judgments in terms of internal evidence) could also be met.]

EXERCISE: Writing the Question and Short Answer/ Statement and Comment Item

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives.

For this exercise you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (use the worksheet on page 92 for your notes):

1. List the specific aspects of the content that might be included in your instruction. In other words, you are listing your *content objectives.*

2. Next, choose a related set of content objectives that might comprise an item—those could be checked (✓) on the list you have already made.

   For the Question and Short Answer item type, ask yourself, "What kinds of distinction or discriminations should my students be able to make?" (These behavioral objectives are usually stated in terms of knowledge and/or comprehension). Then write a question or questions that will elicit these behaviors.

   For the Statement and Comment item type, ask yourself, "What interpretations, drawing of relationships, predictions, judgments, or evaluations should my students be able to make?" (These are your behavorial objectives for your students.) Then write a *statement* or statements (or, cite a quotation or example) that will elicit these behaviors.

3. Now write comments that will serve as *options* from which students will choose. Your statements and comments can be presented in one of the various formats—keylist (keylist, best answer, or a paragraph with underlined (and numbered) phrases). Also consider the appropriate degree of discrimination that can be expected of your students.

4. At this point you will have the parts for your item. Using the worksheet:

   Determine the order in which to place each of the statements and their comments (options).

   Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item.

5. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise, where necessary.

6. Using pages 93 or 94, put your title, instructions, statements, and comments (or questions and short answers) in the most appropriate format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing a Question and Short Answer/ Statement and Comment Item

Content area:

Statements or Questions

(to elicit knowledge, comprehension, interpretations, the drawing of relationships, predictions, judgments, or evaluations)

Statements and Comments (options):

Format for the Question and Short Answer/ Statement and Comment Item (Keylist Format)

_____

(title)

(instructions)

(keylist comments)

A.

B.

C.

D.

(statements)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

Format for the Question and Short Answer/ Statement and Comment Item (Best Answer Format)

_____

(title)

(instructions)

(statements or questions)

1.

____

____

____

2.

____

____

____

3.

____

____

____

Example 9-a

The construction of this item type parallels that of the Best Answer format (Section 4). All of the options are reasonably correct answers, with one being clearly the best. This more specialized form of the Best Answer item type focuses on experimental situations and their outcomes. The stem of the item describes an experiment or a situation, and the options suggest several possible results. If the students are expected to remember the specific experiments or examples that were presented in class, items written in this format would be assessing their recognition of the correct outcomes. This type of item can also require students to *apply* their knowledge and understanding of what they have learned in class by predicting the results of new and unfamiliar situations.

The behavioral objective for the items here expects students to recognize the results of experiments that were studied in class. In the area of language development, many different, significant studies were covered. The research investigators, as a result of the particular experiments they conducted, arrived at specific conclusions. The options for item 1, for example, describe the various conclusions of different studies of language development. The student is required to remember the conclusion that was drawn by Chomsky from his research. In the second item, even finer discriminations are required, since the students must choose among the observations that were made in one extensive study, rather than among several diverse studies. Options a, b, and c are conclusions which were drawn by the investigators, but which are subsidiary to the major conclusion, option d. Item 3 requires a similar form of discrimination.

This item type capitalizes on the confusion students may experience if they have not carefully sorted out the material they are expected to learn.

This example also assesses understanding, since the options are presented in words other than those in the textbook or presented in class.

Subject matters in which experimental investigations are conducted, such as the sciences and child psychology, readily lend themselves to this item format. In social studies, student knowledge and understanding of the cause-effect relationships, which are the result of historical events, can be evaluated in this format. If the instructor expects students to stretch their minds even further, the item can be framed so that students need to apply their knowledge about social principles, such as capitalism and communism, to hypothetical situations or to events that were not discussed in class. In English, the "results" of an "experiment" might be the rewriting of a statement that appears in the stem. In English literature, particularly when universal themes have been studied, this item format could ask students to apply what they understand about these universals to new material. Another English item might assess student comprehension of the characterizations in a drama with a stem that hypothetically alters an event in a Shakespearean tragedy. The potential results of this alteration would be expressed as options, one option being the most likely, based on the most appropriate interpretation of the play.

Your subject matter is likely to suggest other adaptations of this item format. A further extension of this format is the Experiment/Results/Interpretation item, discussed in Section 10. The worksheet for developing both of these items appears at the end of Section 10.

Topic: Child Development

Content objective: Influences on language development

Behavioral objectives: Knowledge of specifics; comprehension (interpretation)

For each of the specific research studies cited, place a plus (+) in the blank to the left of the answer that most accurately summarizes the major conclusions drawn by the investigator.

Studies of Language Development

1. Chomsky noted that there are universal aspects of acquisition and of linguistic structure common to all languages.

_____ a. The sounds that infants make while babbling are universal.

_____ b. Inborn mental structures enable children to build grammars, or systems of rules.

_____ c. The specific language we learn influences our mental processes.

_____ d. Language develops along with the child's capacities for logical thought.

2. Hess and Shipman's (1965) longitudinal study of Head Start Children pointed to socioeconomic influences on language development.

_____ a. Lower-class children have parents who rarely bother to correct their grammar.

_____ b. Lower-class children know fewer words and speak shorter sentences.

_____ c. Lower-class children require more reinforcement of verbal skills.

_____ d. Lower-class children exhibit language development that is less mature and different in kind.

3. Bernstein (1964) distinguishes two different types of family control that influence the development of language.

_____ a. Early experience with language in the home influences the child's language facility and intellectual development.

_____ b. Restricted codes of speech are more typically used by the lower social class; elaborated codes, by the middle class.

_____ c. Lower-class children exhibit a quantitative language deficit—fewer words, shorter sentences.

_____ d. Early language experiences influence the quality of the child's social experiences.

Example 9-a (continued discussion)

This section reviews some of the recommendations made for the Best Answer item, which are equally important here.

When writing the distractors for this item type, you must keep in mind that all of the distractors are acceptable answers, but that one, on the basis of what the student is expected to know, is the *best*. Depending on the expected capabilities of the students, you will need to determine the appropriate degree of

discrimination that is required. The distractors should consist of related items of information that are likely to be confused and that may or may not require fine discriminations.

The distractors should be brief, concise, and equivalently plausible. The stem should provide sufficient, yet not obvious, information that would permit the student to select the best answer. You should also attempt to write options that are of the same length—often the best answer turns out to be the most complete, therefore the longest. For this item good distractors are not easy to write; once they are written, however, different stems can be substituted so that you will have a variety of items to reuse in different combinations in the future.

The Experiment/Results item assumes a variety of forms and levels of discrimination that are required of the student, depending on your objectives. For an overview of the different forms that this item takes, also consult the examples in the different subject areas.

10. Experiment/Results/Interpretation Items

Example 10-a

This item type is an extension of the Experiment/Results format, therefore the same recommendations for item development apply. In addition to expecting students to identify the results of an experiment, the item also requires an interpretation or evaluation. To be able to demonstrate this level of thinking, the student must develop a considerable depth of understanding. This item would be used for material with which students were expected to exercise this level of thinking in the classroom and in assignments. Unless the behavioral objective had been communicated by the manner in which the instructor conducted student learning, the students would not be prepared for the item.

The first sample item here evaluates student knowledge of the experimental results and interpretations that were discussed in class. Understanding is assessed because the stems and options are expressed more briefly and in different words than were used in class or in the textbook.

As in the Best Answer item, all of the options are reasonably correct answers, with one option being clearly the best. These differentiations would have been made clearly during class discussions.

The recommendations that should be heeded for this item type are the same as those that were made for the Experiment/Results item types.

Topic: Child Development

Content objective: The influences of heredity and environment on development

Behavioral objectives: Knowledge of specifics, principles, generalizations; comprehension (interpretation of material)

The Influences of Heredity and Environment on Development

1. A number of different twin studies compared the mental and physical development of identical twins who had been reared together, identical twins who had been reared apart, and fraternal twins reared together.

With regard to intelligence, which of the following statements *best* summa-

rizes the *results* that were obtained? Place a plus (+) in the blank to the left of the best statements.

_____ a. Identical twins come from a single fertilized egg, whereas fraternal twins come from two separate fertilized eggs.

_____ b. Differences between fraternal twins can be attributed to both environmental and hereditary factors.

_____ c. Intelligence is determined before birth by the genes we carry.

_____ d. IQ scores for identical twins reared apart were more closely related than for fraternal twins reared together.

Which of the following provides the best *interpretation* of these results?

_____ a. Intelligence is affected by maturation, and maturation is affected by heredity.

_____ b. Educational attainments seem to be more closely related to environmental influences than to genetic inheritance.

_____ c. It takes an unusual disparity in environmental conditions to impose a major change in intellectual development.

_____ d. Although identical twins receive the exact same hereditary endowment, their prenatal environment may be different.

2. Dennis (1960) compared the motor development and ways of handling children in three Iranian institutions.

Which of the following statements best summarizes the *results* that were obtained? Place a plus (+) in the blank to the left of the best statement.

_____ a. Children in two institutions, since they had never been propped in a sitting position, had no practice in learning how to sit.

_____ b. The severe levels of environmental deprivation experienced by children in two institutions resulted in the temporary retardation of motor development.

_____ c. Children in one group exhibited advanced development as a result of training in developmental activities.

_____ d. The severe levels of environmental deprivation experienced by children in two institutions resulted in retarded motor development that extended into their school years.

Which of the following provides the best *interpretation* of these results?

_____ a. The more the environment departs from the normal, the more it can affect both the form and sequence of motor development.

_____ b. Motor development consists of the emergence of a behavioral sequence based primarily upon maturation.

_____ c. The sequence of motor development emerges with maturation, whereas the form of motor development can be influenced by experience.

_____ d. The maturation of certain structures is necessary before certain motor responses can be learned.

Example 10-b

Item 1 of this example was developed with the same behavioral objectives as those of Example 10-a. Item 2 expects students to extend their understanding of infant attachment behavior to new studies with which they are unfamiliar (extrapolation).

An item such as this requires a fairly thorough understanding of a topic. Instead of asking the students to select an interpretation, the item might have been designed for them to draw an *inference*, or to make a *judgment* (evaluation). When students are asked to make judgments about the material, the item instructions should remind them to use the criteria that were discussed in class, and the criteria might even be listed for them. With this information, students would be making judgments based on *external* criteria. If you expect students to generate and use their own (internal) criteria for making a judgment, the suggestion about using certain predetermined criteria would not be made.

Since the options for this item type may be difficult to generate, you may wish to administer the item as an open-ended item at first. The statements that the students are most likely to make, which are likely to vary in quality, could be used to write the most reasonable objective options for subsequent testing. Once this item has been developed, it can be used repeatedly; it is not an item for which the answers can be memorized. The list of options that were originally generated by students in responding to open-ended questions should provide you with new options that can be substituted for use in future items with the same stems.

Whenever students are asked to draw inferences or to make judgments, the best option may provoke some controversy. The scoring of the item may therefore require some flexibility on your part, if a student can defend his or her choice with rational arguments. Occasionally a student may also suggest a particularly creative interpretation of an item that you or other students may not have entertained. As an instructor, you should encourage the generation of these valid, creative insights when they occur.

Topic: Child Development

Content objective: The influences of heredity and environment on development

Behavioral objectives: Knowledge of specifics, principles, generalizations; comprehension (interpretation of material and extrapolation)

The Influences of Heredity and Environment on Development

1. The Harlows' study (1966) of mother-infant relationships compared groups of infant rhesus monkeys raised either by no mothers, "motherless mothers," or surrogate mothers made of cloth or wire.

Which of the following is the *best* statement of the most significant *result* obtained by this study? Place a plus (+) on the blank to the left of the best statement.

____ a. Infants raised by cloth mothers showed more interest in exploring than did infants raised by wire mothers.

____ b. Infants raised by the cloth or wire surrogate mothers were sexually inadequate at maturity.

____ c. Infants raised with no mothers exhibited depressed patterns of social adjustment.

_____ d. Infants raised with no mothers displayed precocious heterosexual behavior.

Which of the following provides the *best interpretation* of these results?

_____ a. Imprinting takes place during a critical period in life that enables an infant to form its first social relationships.

_____ b. A live, species-specific mother is essential for subsequent normal sexual behavior.

_____ c. Early emotional development is influenced by the comfort and the nutrients that the mother provides.

_____ d. Contact comfort and environmental stimulation are essential to the early emotional and social development of infants.

2. The following study confirms the findings of the research on maternal deprivation and infant attachment that was covered in your textbook. In a study with which you are unfamiliar, Beckwith (1972) looked at the relationship between parents' behavior and their babies' social behavior. He determined that the more the infant responds to the mother, the less apprehension will be shown to a stranger. Stranger anxiety appeared to bear an inverse relationship to a baby's closeness to parents. In another study, conducted by Moss, Robson, and Pederson (1969), the researchers concluded that the more auditory and visual stimulation a baby received, the less stranger anxiety would be exhibited.

Based on the research that was reported in the textbook and these two additional studies, which of the following appears to be the *best* generalization to draw with regard to the mother-infant relationship?

_____ a. The number of adults a baby is familiar with influences the degree of stranger anxiety.

_____ b. Babies who have received contact comfort and environmental stimulation may have a better set for coping with strangeness.

_____ c. Stranger anxiety is determined by the degree of discrepancy between what is familiar and what is unfamiliar.

_____ d. Social behavior can be influenced by the mother's responsiveness to her baby.

Example 10-c

This example presents the Experiment/Results/Interpretation format as it more typically would be developed for biology. Item 1 uses an experiment that students conducted during the lab period; hence, it assesses knowledge. Item 2 proposes a new experiment that is similar to other experiments that the students investigated; thus, it evaluates their abilities to apply what they have learned to new situations. They also are expected to analyze the relationships among the variables in the experiment. You should refer also to sample items of this type in the various content areas.

Topic: Biology

Content objective: Biology experiments

Behavioral objectives: Knowledge of specifics, methodology, principles; comprehension (interpretation); application to concrete situations; analysis of relationships

Check (✓) the best answer to indicate the result and explanation of the result for each of the following experiments.

1. To blood from which the calcium has been removed, thrombin is added.

Result:

_____ The blood clots.

_____ The blood does not clot.

Explanation:

_____ Calcium is necessary to form thrombokinase.

_____ Calcium is necessary to form fibrinogen.

_____ Thrombin is necessary to form fibrin.

_____ Thrombin is necessary to form fibrinogen.

2. A strain of fruit flies, when mated 100 times to individuals of other and random strains, occasionally produced a "roughoid" individual. Individuals of the original strain were subsequently mated 100 times to each other.

Result:

_____ The number of "roughoid" individuals increases.

_____ The number of "roughoid" individuals decreases.

_____ All the offspring are "roughoid."

Explanation:

_____ The rate of mutation is increased by inbreeding.

_____ Linkage is increased by inbreeding.

_____ More homozygous individuals result from inbreeding.

_____ More heterozygous individuals result from inbreeding.

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from the files of Harold Gulliksen

EXERCISE:
Writing the Experiment/Results and Experiment/Results/Interpretation Items

This exercise is intended to give you some experience in writing an item of this type. In the normal course of instruction, you would *first* select your content and behavioral objectives, and next select the type of item that would serve as the most suitable format with which to measure your objectives.

For this exercise you should first select an area of the subject matter for which this item type would be appropriate. Then consider the following steps (using page 103 for your notes):

1. List the specific aspects of the content within that area that might be included in your instruction. In other words, you are listing your *content objectives.*

2. Next choose a related set of content objectives that might comprise an item—those could be checked (✓) on the list you have already made.

   For the Experiment/Results item type, ask yourself, "What kinds of distinction or discriminations should my students be able to make?" (These behavioral objectives are usually stated in terms of knowledge and/or comprehension.) Then write a question or questions that will elicit these behaviors.

   For the Interpretation section of an Experiment/Results/Interpretation item type, ask yourself, "What interpretations, drawing of relationships, predictions, judgments, or evaluations should my students be able to make?" (These are your behavioral objectives for your students.) Then write a *statement* or statements (or, cite a quotation or example) that will elicit these behaviors.

3. Now write comments that will serve as *options* from which students will choose. Your statements will be presented in the Best Answer format or a Keylist format. Also consider the appropriate degree of discrimination that can be expected of your students.

4. At this point you will have the parts for your item. Using the worksheet:

   Determine the order in which to place each of the statements and their comments (options).

   Write concise but clear instructions that communicate the basis for the selection of the options. Write a brief title for the item, if appropriate.

5. Refer to the item-writing tips on page 14 of the Introduction as you review your item (check for difficulty level, option-stem match, any obvious clues, etc.). Revise, where necessary.

6. Using pages 104, 105, and 106, put your title, instructions, statements, and comments (or, questions and short answers) together in the most appropriate format.

   As you review the item, reflect on your objectives (fill them in below, in your own words).

   Topic:

   Content objective:

   Behavioral objectives:

Worksheet for Preparing an Experiment/Results and Experiment/Results/Interpretation Item

Content area:

Statements or Questions

(to elicit knowledge, comprehension, interpretations, the drawing of relationships, predictions, judgments, or evaluations)

Statements about Results (options):

Statements about Interpretations (options for items including interpretations):

Format for the Experiment/Results Item

(Best Answer Format)

_____
(title)

(instructions)

1. (statement or question—description of experiments)

   Result:

   ____
   ____
   ____
   ____

2. (statement or question—description of experiments)

   Result:

   ____
   ____
   ____
   ____

3. (statement or question—description of experiments)

   Result:

   ____
   ____
   ____
   ____

Format for the Experiment/Results/Interpretation Item

(Best Answer Format)

_____

(title)

(instructions)

1. (statement or question—description of experiments)

   Result:

   _____

   _____

   _____

   _____

   Interpretation:

   _____

   _____

   _____

   _____

2. (statement or question—description of experiments)

   Result:

   _____

   _____

   _____

   _____

   Interpretation:

   _____

   _____

   _____

   _____

Format for the Experiment/Results Item

(Keylist Format)

_____

(title)

(instructions)

(keylist comments—description of results/outcomes)

A.

B.

C.

D.

(statements—description of experiments)

____ 1.

____ 2.

____ 3.

____ 4.

____ 5.

____ 6.

____ 7.

____ 8.

____ 9.

____ 10.

B. Sample Items in English

Prepared by Nancy Horkay

Contents

Note: A Greater-Less-Same (Section 5) item is not supplied, since this format is not particularly appropriate to English. Student knowledge of chronological events in literature, for example, is more reasonably assessed in the keylist or rank order item format.

Example 1-f

This item is a basic test of the information that students have acquired about the characters in the play *Julius Caesar.* The list of options is slightly longer than the list of characters. Each option must be clearly circumscribed so that only one character can be matched to it. For example, if option D had stated, "conspired against Caesar," other conspirators than Cassius might be considered correct. Instead, "originates the idea of the conspiracy" clearly limits the answer to Cassius.

Note that the instructions are as brief as possible, since the title conveys the subject of the item.

Another matching exercise might require students to match a set of words to their correct definitions. The words could be derived from a reading assignment in which vocabulary was emphasized, or from a larger list of vocabulary words for which the students had looked up the definitions. If the list of words consists of the same parts of speech (for example, all nouns or present-tense verbs), the students will need to make finer discriminations, as determined by the degree of discrimination that would be expected of them.

Topic: English literature

Content objective: Characters in the play *Julius Caesar*

Behavioral objectives: Knowledge of specific facts

Characters in Julius Caesar

Match a letter from column B with the name in column A.

Column A	Column B
_____ 1. Cassius	A. conspirator, explains Caesar's death to Romans
_____ 2. Julius Caesar	B. wife of Brutus
_____ 3. Calpurnia	C. a tribune of Rome
_____ 4. Brutus	D. originates the idea of the conspiracy
_____ 5. Cinna	E. servant of Cassius
_____ 6. Portia	F. member of the first triumvirate
_____ 7. Marc Antony	G. pleads for his brother's pardon
_____ 8. Pindarus	H. wife of Caesar
_____ 9. Lucius	I. a soothsayer
_____ 10. Flavius	J. friend who gives Caesar's eulogy
	K. servant of Brutus
	L. a poet

Example 1-g

The quotations in this example are among many that were discussed in class because they are important to the play for many reasons. Thus, students who comprehend the reasons for the speeches in the play would not need to memorize the match of quotations and characters in order to identify them correctly.

For an honors class, the teacher also would expect students to write a brief essay to explain the significance of each quotation.

For the average high school student, understanding Shakespearean language is very difficult. Discussion of quotations is important to ensure comprehension by the students. An item of this type might help to focus on quotations of importance and their position in the play.

Topic: English literature

Content objective: Quotations from *Julius Caesar*

Behavioral objectives: Knowledge of specifics; comprehension

Quotations from Julius Caesar

For each quotation from *Julius Caesar,* match from column A the person who *said* the quote and from column B to *whom* it was said.

Said by:	**Said to:**
____ "Beware the Ides of March."	____
____ "Et tu . . .? Then fall, Caesar!"	____
____ "I come to bury Caesar, not to praise him."	____
____ "The fault . . . is not in our stars, But in ourselves, that we are underlings."	____
____ "Cowards die many times before their deaths; The valiant never taste of death but once."	____
____ "Ambition should be made of sterner stuff, . . ."	____
____ "This was the noblest Roman of them all . . ., this was a man."	____

Column A	**Column B**
A. Marc Antony	1. Marc Antony
B. Julius Caesar	2. Julius Caesar
C. Brutus	3. Brutus
D. Cassius	4. Cassius
E. Soothsayer	5. Octavius
F. Calpurnia	6. Calpurnia
G. Roman people	7. Roman people

2. Master List (Keylist)

Example 2-h

With this item, students must demonstrate a knowledge of two Shakespearean plays, as well as the ability to recognize their similarities and differences. The item could be extended to include an additional play, such as *Macbeth,* which would increase the complexity of discrimination. The depth of comprehension of the item also could be increased with stems (1-10) that require more complex information.

Topic: Shakespearean drama

Content objective: Comparisons and contrasts of *Hamlet* and *Julius Caesar*

Behavioral objectives: Knowledge of specifics, classifications; comparisons

Hamlet and Julius Caesar

In the blank before each statement, place the letter which:

A. applies to *Hamlet*
B. applies to *Julius Caesar*
C. applies to *both* plays
D. applies to *neither* play

_____ 1. parent-child relationship essential to the play

_____ 2. contains a character whose noble intentions result in his downfall

_____ 3. required a cast of fewer than 20 people

_____ 4. Plutarch was the main source for the play.

_____ 5. Play was set approximately 2,000 years ago.

_____ 6. classified as a Shakespearean tragedy

_____ 7. Actors performed while in contemporary costume of 1600s.

_____ 8. included a ghost as a character in the play

_____ 9. uses the technique of a "play within a play"

_____ 10. uses the technique of "comic relief"

Example 2-i

Another example of the keylist format uses two periods of drama as its basis. Examples of this type might be useful with comparison/contrast of characters, authors, figures of speech, and poems (see other examples in this section).

Topic: Greek and Shakespearean drama

Content objective: Comparisons and contrasts of Greek and Shakespearean drama

Behavioral objectives: Knowledge of specifics and classifications, comparisons

Drama

In the blank before each statement, place the letter which:

A. applies to Greek drama
B. applies to Shakespearean drama
C. applies to both forms of drama
D. applies to neither form of drama

_____ 1. Women performed in plays.

_____ 2. Masks were worn to identify characters.

_____ 3. Playwrights often had a role in their own productions.

____ 4. Plays were performed primarily in open air theaters.

____ 5. Extensive sound effects were used.

____ 6. Violent scenes occasionally were enacted on stage in view of the audience.

____ 7. Actors were costumed in the dress of their time period.

____ 8. Acting was considered an honorable profession.

____ 9. Plays were attended only by the wealthy nobility.

____ 10. Private citizens often funded actors and playwrights.

Example 2-j

Another application of the keylist item to literature is one that focuses on the literary technique that is exemplified by a quotation. This example uses the poems as the options, with the literary techniques as stems.

As another brief example, the technique may comprise the keylist with the quotations as the options:

Each quotation below contains an example of a literary technique or device. From the list below, choose the answer that best describes the technique used. Letters (A-D) may be used more than once.

A. use of comparison
B. use of exaggeration
C. use of slang
D. understatement

____ 1. "His furious, bloodshot eyes flashed like wet marbles in a pool of blood."

____ 2. "I cried an ocean of tears when he left."

The list of literary techniques can be changed to include whatever devices are most important in the prose or poetry being studied. For a poetry item, the options might consist of various kinds of rhyme and meter, mood, metaphor, etc. A short story item might include options concerning dialogue, mood, motive, etc.

If the material in the item consists of the same material that was assigned or discussed in class, the behavioral objectives that are assessed would be knowledge and comprehension. If the item contains unfamiliar material, the behavioral expectation is that the students should be able to *apply* their knowledge about literary devices to the material. If an item that uses unfamiliar material requires students to make qualitative *judgments* about the material before selecting an option, the behavioral objectives would be aimed at *evaluation*, a higher-order skill. Of course, instruction that communicates these definitions for the criteria, such as "use of exaggeration," should precede any expectation of student behavior on a test item.

Occasionally you may decide to use an item of this type that asks students to evaluate literary material on the basis of their own subjective, internal criteria. This kind of behavior, which permits a more original approach, is a level of thinking that should be encouraged. The scoring of this item, however, may require more flexibility. Example 6-j in this section discusses this type of item more fully.

Topic: Poetry

Content objective: Comparisons/contrast of poems

Behavioral objectives: Knowledge of conventions, classifications, and criteria; comprehension (extrapolation); application to new situations

Looking at Poetry

Study poems I and II, and place the correct letter next to each statement:

A. Poem I only
B. Poem II only
C. Both poems
D. Neither poem

____ 1. The poem deals with a memory from childhood.
____ 2. The poem makes references to at least three of the senses.
____ 3. The poem has a specific rhyme scheme.
____ 4. The poem uses similes as a means of comparison.
____ 5. The poem is written in first person point of view.
____ 6. The poem has a rural setting.
____ 7. The poem suggests that childhood can be a troublesome time.
____ 8. The poem deals with a handicapped child.
____ 9. The poem involves only one character.
____ 10. The poem is written in iambic pentameter.

Poem I

Running *Richard Wilbur*

1933
North Caldwell, New Jersey

What were we playing? Was it prisoner's base?
I ran with whacking keds
Down the cart-road past Rickard's place,
And where it dropped beside the tractor-sheds

Leapt out into the air above a blurred
Terrain, through jolted light,
Took two hard lopes, and at the third
Spanked off a hummock-side exactly right,

And made the turn, and with delighted strain
Sprinted across the flat
By the bull-pen, and up the lane.
Thinking of happiness, I think of that.

Poem II

Eleven *Archibald MacLeish*

And summer mornings the mute child, rebellious,
Stupid, hating the words, the
  meanings, hating
The Think now, Think, the O but Think! would leave
On tiptoe the three chairs on the verandah
And crossing tree by tree the empty lawn
Push back the shed door and upon the sill
Stand pressing out the sunlight from his eyes
And enter and with outstretched fingers feel
The grindstone and behind it the bare wall
And turn and in the corner on the cool
Hard earth sit listening. And one by one,
Out of the dazzled shadow in the room,
The shapes would gather, the brown plowshare, spades,
Mattocks, the polished helves of picks, a scythe
Hung from the rafters, shovels, slender tines
Glinting across the curve of
  sickles—shapes
Older than men were, the wise tools, the iron
Friendly with earth. And sit there, quiet, breathing
The harsh dry smell of withered bulbs, the faint
Odor of dung, the silence. And outside
Beyond the half-shut door the blind leaves
And the corn moving. And at noon would come,
Up from the garden, his hard crooked hands
Gentle with earth, his knees still earth-stained, smelling
Of sun, of summer, the old gardener, like
A priest, like an interpreter, and bend
Over his baskets.
    And they would not speak:
They would say nothing. And the child would sit there
Happy as though he had no name, as though
He had been no one: like a leaf, a stem,
Like a root growing—

Example 3-d

This item is an example of content and behavioral objectives in English that can be adapted appropriately to the matrix format. The matrix is most suitable to the objectives, because the students are asked to make a differential number of choices for each statement. If the content had been cast in a keylist format (in which the column headings would be used as options), the indeterminate number of option choices would be confusing.

Instruction about the structural pattern of sentences would have clarified the definitions and criteria so that students would be prepared to make the decisions that the item requires. Since the sentences are different from the sentences that were studied in class, students also need to structurally analyze them and apply the definitions and criteria.

The sentences in the list of stems could be drawn from the literature that the students are reading.

Topic: English grammar

Content objective: The structural patterns of sentences

Behavioral objectives: Knowledge of specifics, conventions, classifications, and criteria; comprehension (interpretation); application to new situations; analysis of elements

Sentence Structure

For each of the following sentences, place an X in the appropriate box(es) on the table.

1. Bill and Joe went to the store and bought candy.
2. The soldiers not only surrounded the enemy base, but they also successfully attacked it.
3. The girls who entered the contest were photographed for the newspaper and a local magazine.
4. If it rains tomorrow, the picnic and the parade will be postponed until next week.
5. Anyone who chooses may go to the movies with us or may stay at home.
6. The teacher assigned math and English homework over the weekend.
7. Ducks and geese are related, but are different species.

	simple sentence	compound sentence	complex sentence	simple subject	compound subject	compound verb	contains prep. phrase(s)	contains direct object(s)	
1.	X				X	X	X	X	1.
2.		X		X				X	2.
3.			X	X			X		3.
4.			X		X		X		4.
5.			X	X		X	X		5.
6.	X			X			X	X	6.
7.	X				X	X			7.

Example 3-e

This matrix requires the students to *produce* the correct verb forms by filling in the blank cells of the matrix, rather than choosing from a list of options. Thus the item measures the ability to recall, which is a reasonable expectation for this kind of material.

Topic: English grammar

Content objective: Verb tenses

Behavioral objectives: Knowledge of specific terminology, facts, and conventions

Verb Tense Forms

Complete the chart by inserting the proper verb tense form:

Present tense	Past tense	Past participle	Future tense
bring			will bring
		sung	
	took		
am			
	swam		
ride			
burst			
	were		
	jumped		
go			
	saw		
	froze		
			will draw
		cried	
walk			
			will run
		flown	
			will ring
speak			
		heard	
			will sneak

Example 4-d

Although the content of this example appears to be more appropriate to the elementary level, the items represent illustrations of common errors that secondary-school students are making. These instances of erroneous punctuation and capitalization were drawn from papers written by the students in one class. For classes with different levels of ability, the items would be constructed to match the levels of ability that are evidenced.

Used as a quiz after the corrected papers have been returned, the items can serve to reinforce correct usage.

The examples used and correct responses also would reflect the specific rules and style of the classroom text, as in items 1 and 9, where several possibilities may exist. (McDougal, Littel & Co., *Building English Skills*, 1981).

Topic: English grammar

Content objective: Punctuation and capitalization

Behavioral objectives: Knowledge of conventions

Capitalization & Punctuation

For each item, select the *one* that is correctly capitalized and punctuated by placing a check (✓) next to it.

1. Dear sir: ____
   Dear Sir, ____
   Dear Sir: ____
2. Sincerely yours, ____
   sincerely yours, ____
   Sincerely Yours, ____
3. Mary please close the door. ____
   Mary, please close the door. ____
   Mary, Please close the door. ____
4. The flag is red, white, and blue. ____
   The Flag is red, white and blue. ____
   The flag is: red, white, and blue. ____
5. That tall, green, and white house is mine. ____
   That tall green and white house is mine. ____
   That tall, green and white house is mine. ____
6. I am taking Algebra this year. ____
   I am taking algebra this year. ____
   I am taking algebra, this year. ____
7. My uncle lives in the South. ____
   My Uncle lives in the South. ____
   My Uncle lives in the south. ____
8. The tall straight soldier entered. ____
   The tall, straight soldier entered. ____
   The tall, straight, soldier entered. ____

9. In March 1958 he was elected. ____
   In March, 1958 he was elected. ____
   In March, 1958, he was elected. ____

10. "Is that all?" she asked. ____
    "Is that all," she asked? ____
    "Is that all? she asked." ____

11. "Watch out," she shouted! ____
    "Watch out!" she shouted. ____
    "Watch out! she shouted." ____

Example 4-e

Another objective of English literature is for students to understand the meaning of significant passages that were discussed in class. The "best" answers would be those on which the students had reached agreement during class discussion of the passages.

Students need practice in paraphrasing, especially when reading Shakespeare, because of the level of difficulty. They should be informed of the possibility of a variety of interpretations; however, caution should be exercised, since interpretations tend to get exaggerated. Within limits, their individual paraphrasing should be allowed as long as students can supply support for statements made.

If the meanings of the passages had not been discussed in class, these items would require more subjective interpretation; hence, the best answers might be more arguable, and scoring might depend on whether students could defend their decisions.

Topic: English literature

Content objective: Quotations from *Julius Caesar*

Behavioral objectives: Knowledge of specific facts; comprehension (translation)

Understanding the Quotations from Julius Caesar

For each of the following quotations from *Julius Caesar,* choose the *best* paraphrase (rephrasing) of the statement. Place a check (✓) next to the correct response.

1. "The evil that men do lives after them.
   The good is oft interred with their bones. . . ."

   ____ a. Evil men live, while the good die.
   ____ b. People will remember the bad things about you, rather than the good things.
   ____ c. Evil or bad things happen even after you die.

2. "Cowards die many times before their deaths;
   The valiant never taste of death but once."

   ____ a. Cowardly people live in fear, but brave people have no fear except death.
   ____ b. Cowardly people are afraid to die, but brave people are not.
   ____ c. Cowards have many close calls with death, but brave people do not.

3. "Yon Cassius has a lean and hungry look. . . ."
   ____ a. Cassius is thin because he does not eat enough.
   ____ b. Cassius is eager for power.
   ____ c. Cassius looks angry.

4. "A friend should bear his friend's infirmities. . . ."
   ____ a. Friends should help one another when they are sick.
   ____ b. Friends should always be there.
   ____ c. Friends should accept one another's weaknesses.

5. "The fault, dear Brutus, is not in our stars,
   But in ourselves, that we are underlings."
   ____ a. We are responsible for ourselves. Luck or chance is not to blame.
   ____ b. There is nothing wrong with the prophet—we are at fault.
   ____ c. We are not to blame. Fate is in control.

6. Rank Order

Examples 6-f through 6-j

The rank order format can be used in English with a variety of applications. In literature, it can be used to test for knowledge of the sequence of events (example 6-f). For vocabulary, number prefixes can be ordered (example 6-g and 6-h). The elements of coherent paragraph construction (example 6-i) and the use of criteria to evaluate poetry (example 6-j) are other adaptations of this format.

The level of difficulty of example 6-f can be simplified by using a shorter list if the students cannot be expected to discriminate among as many as 10 separate events. Considering the length of the play, however, the events quite possibly are sufficiently discrete for students to be able to identify their ordering.

Example 6-f

Topic: English literature

Content objective: Chronological events in *Julius Caesar*

Behavioral objectives: Knowledge of specific facts and sequences; comprehension (interpretation)

Events in Julius Caesar

Indicate the order in which the following events occurred in *Julius Caesar,* using 1 as the first event.

____ Calpurnia warns and tries to protect Caesar.

____ Brutus and Cassius flee from Rome.

____ Artemidorus attempts to give Caesar a letter warning of danger.

____ Cassius forces his servant to kill him.

____ Caesar attends festivities of the Lupercal.

____ Antony appeals to the Romans after Caesar's death.

____ Facing defeat, Brutus kills himself.

____ Brutus and Cassius make a pact of conspiracy.

____ The triumvirate seeks to destroy its enemies.

____ Caesar is stabbed to death.

Example 6-g

The enhancement of vocabulary through the use of numerical prefixes is a skill which can be tested by the rank order format. Students will need to know the "value" of each prefix in order to complete the exercise. A variation of this format might ask students to order numerically a series of prefixes (example 6-h).

Topic: Vocabulary

Content objective: Numerical prefixes and their sequential value

Behavioral objectives: Knowledge of specifics; comprehension; sequence

Numerical Prefixes

Next to each of the following items, place a number from 1 to 10 in order to indicate the numerical value of the prefix. (Example: Place a "1" next to the prefix which means "one.")

Note: Some numbers may be used more than once.

____ 1. quint-	____ 10. dia-
____ 2. deci-	____ 11. octa-
____ 3. tri-	____ 12. uni-
____ 4. sex-	____ 13. hexa-
____ 5. nona-	____ 14. ter-
____ 6. tetra-	____ 15. centi-
____ 7. bi-	____ 16. mono-
____ 8. penta-	____ 17. nov-
____ 9. sept-	____ 18. quad-

Example 6-h

Numerical Prefixes

Using the list of numerical prefixes, place the prefixes in order of value from 1 to 10.

____ tetra-
____ bi-
____ deci-
____ mono-
____ penta-
____ octa-
____ nona-
____ tri-
____ sept-
____ hexa-

Example 6-i

This item illustrates one way in which students can be asked to apply (by using new material) what they have learned about constructing a coherent paragraph. In addition, they need to comprehend the sentences in order to be able to put them together (synthesis) in a logical order. The content of the paragraph is sufficiently general for students to understand, and the sentences provide internal cues which permit them to be interrelated.

Topic: English composition

Content objective: Coherence of an explanatory paragraph

Behavioral objectives: Knowledge of conventions; comprehension (interpretation); application to a new situation; synthesis

Writing a Logical Paragraph

The sentences given are in proper form to make a coherent paragraph, but they are not in the proper sequence. Arrange them logically, placing the appropriate number next to each sentence.

_____ Such a bridge is based on the theory that if cables can be strung across an area, a bridge can be hung from them.

_____ The roadway platform is supported by vertical cables, which in turn are attached to the dipping cables.

_____ The most practical kind of bridge for use in spanning wide areas is the suspension bridge.

_____ This will allow for stabilization of the bridge and will make it more secure.

_____ The bridge usually is made of sturdy steel cables which are supported by towers and secured in the ground at either end.

_____ Girders then support the roadway, in order to prevent the bridge from movement.

_____ According to most engineers, the main span of a suspension bridge should not be more than 7,000 feet in length.

Example 6-j

For the rank order item that requires *evaluations* of material from the most poetic to the least poetic, the rank order of appropriate responses needs to be flexible. Each student would be expected to support the particular ordering he or she selected by supplying, either orally or in writing, the reasons for the judgments. The criteria (a-e) for making these judgments are supplied in the item, and would have been applied extensively to other poetic samples during classroom instruction. This rationale for scoring would allow for the personal response which poetry evokes in the individual reader, as well as offering students an opportunity to make judgments without considering which is "right" according to someone else's criteria.

Note that a very clever student could defend the first item very well as "most poetic," using the given criteria.

An exercise of this type might be used primarily as a tool to stimulate class discussion, rather than as a test. If used as a test, students would be required to explain their evaluative process and to supply supportive statements for their judgments.

Topic: English

Content objective: Judgments of poetic merit

Behavioral objectives: Knowledge of conventions or criteria; comprehension (extrapolation); application; evaluation (judgments in terms of internal criteria)

Evaluating Poetry

Rank the following passages from *most* poetic (1) to *least* poetic (6), using as your basis for judgment:

a) organization
b) accomplishment of purpose
c) significance
d) freshness of approach
e) response from the reader

Be prepared to support your choices with valid reasoning.

_____ 1. area of circle = πr^2

_____ 2. The written word
Should be clean as bone,
Clear as light,
Firm as stone.
Two words are not
As good as one.
—*Anonymous*

_____ 3. Keep your face to the sunshine and you cannot see the shadow.
—*Helen Keller*

_____ 4. Some books are to be tasted,
Others to be swallowed,
And some few to be chewed and digested.
—*Sir Francis Bacon*

_____ 5. *Parting at Morning*

Round the cape of a sudden came the sea,
And the sun looked over the mountain's rim:
And straight was a path of gold for him,
And the need of a world of men for me.
—*R. Browning*

_____ 6. *Wind and Silver*

Greatly shining,
The Autumn moon floats in the thin sky;
And the fish-ponds shake their backs and
flash their dragon scales
As she passes over them.
—*Amy Lowell*

Example 7-b, 7-c

The question and short answer format is highly compatible with literature testing because it can be used on a variety of levels: literal, interpretive, and critical. The depth and complexity of responses may also vary with the ability of the group being tested, and the teacher can then assess what a "good" response requires.

Example 7-b format might be more appropriate for a higher level group since it requires essay writing and explanations. The example 7-c format could be used to test the same basic content material; however, in its more objective form, lower level students might achieve greater success. Responses for example 7-c also could easily be used to stimulate classroom discussion rather than as test items.

Example 7-b

Topic: English Literature

Content objective: Comprehension of *Julius Caesar*

Behavioral objectives: Knowledge of specific facts, conventions; comprehension (interpretation); analysis of relationships; synthesis

Julius Caesar

Answer the following questions:

1. Trace the motives Brutus had for killing Caesar.

_____

_____

_____

_____

2. Using either Caesar or Brutus as an example, explain the concept of the "tragic hero."

_____

_____

_____

_____

3. What universals was Shakespeare commenting on by his writing of *Julius Caesar*? Give examples from the play to support your statements.

_____

_____

_____

_____

Major points to be covered in each question:

1. Trace the motives Brutus had for killing Caesar.
   a) fear of Caesar's popularity with the Roman people, and the possibility of Caesar's control over them
   b) jealousy over Caesar's popularity
   c) concern that Caesar might choose to "accept the crown"
   d) his claim of love for Rome and noble ideals

2. Using either Caesar or Brutus as an example, explain the concept of the "tragic hero."

"Tragic hero"—combines the qualities of good and evil and depicts the "hero" against the fates (destiny); allows a flaw to cause his downfall.

Caesar—because of his political position and his refusal to be wary, he is destined to be an assassin's target; his lack of perception about his political associates contributes to their ability to carry out the plot.

Brutus—noble ideals drove him to commit murder; claimed he killed Caesar for "the good of Rome," but had some selfish motives; destined to atone for the evil deeds, he finally committed suicide.

3. What universals was Shakespeare commenting on by his writing of *Julius Caesar*? (Explain each in terms of the play.)
   a) Greed and ambition—Brutus and Antony both had overly ambitious goals in politics; Cassius' conspiracy led to his downfall.
   b) Power—the desire for power corrupts both Brutus and Cassius; Caesar's need for power destines him to assassination.
   c) Loyalty/love—Antony's loyalty to Caesar drives him to avenge Caesar's death; the love of Portia and Calpurnia for their husbands forces them to support their husbands, even at "the worst of times."

Example 7-c

Topic: English literature

Content objective: Comprehension of *Julius Caesar*

Behavioral objectives: Knowledge of specific facts, conventions; comprehension (interpretation); analysis of relationships

Julius Caesar

Place a plus (+) next to the *best* response.

1. Brutus' primary motive for killing Caesar:
   _____ a. fear of Caesar's popularity and his possible control of Rome
   _____ b. concern for the good of Rome and its people, and for the government itself
   _____ c. jealousy of Caesar and his power

2. Brutus may be described as a "tragic hero":
   _____ a. because he dies at the end of the play
   _____ b. because he combines the qualities of good and evil and also has a character "flaw"
   _____ c. because he does not recognize Antony's ability to sway the people

3. Universals which Shakespeare was commenting on in *Julius Caesar:*
   _____ a. Ambition and the desire for power can force people to become obsessed.
   _____ b. Loyalty to one's friends requires strength.
   _____ c. Greed can destroy a person.

Example 8-e

This format also is easily applied in literature, as class discussions of theme or central ideas will often evoke comments which can then be used for an exercise such as this. Here again the ability level of students might determine the length and complexity of the desired response.

Note: Students need to be reminded that "comment" should include both an explanation and their own opinion about the statement.

The next two examples are possible alternatives for this format and might be useful with lower level students needing more structure and direction in question-answer situations.

Topic: English literature

Content objective: The relationship of specific statements to the themes of *Julius Caesar*

Behavioral objectives: Knowledge of specific facts, conventions; comprehension (interpretation); analysis of relationships; synthesis

The Themes of Julius Caesar

The following are statements that have been made about the basic themes of *Julius Caesar.* What is the most pertinent comment to be made about each from the viewpoint of class discussion?

1. "Power corrupts."

2. "Cowards die many times before their deaths."

3. "The evil that men do lives after them."

Sample responses to the statements:

The following statements have been made to summarize the themes of *Julius Caesar.* What is the most pertinent comment to be made about each from the viewpoint of class discussion?

1. "Power corrupts"

   a) Caesar's political associates feared the power which Caesar wielded, and conspired against him because of this.

   b) Cassius envied the potential power Caesar had over the Roman people, and this desire for power drove him to murder Caesar. Later, ironically, the knowledge that he would never have that power caused him to commit suicide.

2. "Cowards die many times before their deaths"

Brutus and Cassius fled Rome in fear and disgrace after Antony influenced the people to his cause. For their remaining days, Brutus and Cassius were forced to run and fight, until finally, in defeat and shame, both committed suicide.

3. "The evil that men do lives after them"

Because Brutus and Cassius plotted and committed a murder, they were destined to atone for this evil. Their deed, long remembered, affected the remainder of their lives and was also responsible for their untimely deaths.

Example 8-f

Topic: English Literature

Content objective: The relationship of specific statements to the themes of *Julius Caesar*

Behavioral objectives: Knowledge of specific facts, conventions; comprehension (interpretation); analysis of relationships

The Themes of Julius Caesar

For the following items, place a plus (+) next to the response which *best* applies the statement to the play.

1. "Power corrupts."

   ____ a. Caesar wanted to be crowned king.
   ____ b. Brutus feared the control of Rome by one man, and therefore plotted against Caesar.
   ____ c. Cassius' desire for power caused him to lead a conspiracy against Caesar.

2. "Cowards die many times before their deaths."

   ____ a. Caesar refused to heed the warnings given to him because he was not a coward.
   ____ b. Brutus and Cassius had to run away from Rome or they would have been killed.
   ____ c. Brutus and Cassius led a life of disgrace after fleeing Rome, finally dying in shame and defeat.

3. "The evil that men do lives after them."

   ____ a. Rather than the "noble" motives, the Romans would remember the murder committed by Cassius and Brutus.
   ____ b. All of Caesar's bad qualities were considered by his murderers, not his positive qualities.
   ____ c. Antony remembered only the evil side of Cassius.

Example 8-g

Topic: English literature

Content objective: Characters and situations in *Julius Caesar*

Behavioral objectives: Knowledge of specific facts, comprehension (interpretation, extrapolation); application to new situations; analysis of relationships

Evaluating Characters and Situations in Julius Caesar

Place a plus (+) next to the best response for each question.

1. Why Brutus might be described as "the noblest Roman of them all" by Antony:

   ____ a. His intentions were always honorable.
   ____ b. He loved Caesar, but was willing to sacrifice that for Rome.
   ____ c. He was deeply concerned about Caesar.

2. Roman politics most closely resembles our own political system:

   ____ a. power of the common people
   ____ b. opposing parties and ideas
   ____ c. senators in control

9. Experiment/Results

Example 9-b

This item requires students to imagine or consider possible alternatives to situations that characters encounter in literature. It also can be useful in motivating discussion, as students will be required to supply supporting statements for their choices. Emphasis might be placed on the explanation, rather than the choice of response, as students perhaps can justify one or more of the possible responses.

Topic: English literature

Content objective: Comprehension of *Julius Caesar*

Behavioral objectives: Knowledge of specific facts; comprehension (interpretation and extrapolation)

Julius Caesar

For each of the following items place a plus (+) next to the *most probable* result, and be prepared to explain your reasoning.

What would have happened if . . .

1) Brutus stayed to hear Antony's funeral oration?

_____ a. He would have realized Antony's true intention.

_____ b. He would have killed Antony immediately.

_____ c. He would have conspired against Cassius.

2) Brutus decided not to join the conspiracy?

_____ a. He would have killed Cassius.

_____ b. He would have warned Caesar.

_____ c. He would have been killed by Cassius.

10. Experiment/Results/Interpretation

Example 10-d

This item was constructed to emphasize specific errors which were occurring repeatedly in student compositions, even after instruction in dangling modifiers and parallel construction. The purpose is to involve students in rewriting and recognizing common errors, so that transfer might be carried over into composition writing.

Topic: English composition

Content objective: Recognition of and improvement on poorly constructed writing

Behavioral objectives: Knowledge of conventions, criteria; comprehension (translation); application; evaluation (judgments in terms of external criteria)

Rewrites

For each of the following, two possible ways of rewriting are suggested. Determine whether or not each rewrite is an improvement, and then explain (on lines A and B below) why it would or would not be an improvement on the original.

1) The dictionary shows us the pronunciation of a word, what it means, and where it came from.

A. The dictionary shows us the pronunciation, meaning, and origin of a word.

B. The dictionary shows us the pronunciation, meaning of a word, and from where it came.

A. _____

_____

B. _____

_____

2) I like to play baseball better than running races.

A. I like to play baseball better than to run races.

B. I like playing baseball better than running races.

A. _____

_____

B. _____

_____

3) Sailing toward the plate, the batter said that the ball looked as big as a balloon.

A. The ball, sailing toward the plate, looked as big as a balloon the batter said.

B. The batter said that the ball, sailing toward the plate, looked as big as a balloon.

A. _____

_____

B. _____

_____

C. Sample Items in Science

Prepared by Gary Brown

Contents

Note: A Statement and Comment (Section 8) example is not supplied, since the instructor feels that the item format types in Sections 7, 9, and 10 are more appropriate to the learning objectives in science classes.

Example 1-h

One of the first units covered in an earth science course usually is astronomy. Basic to this study are the names of the planets making up our own solar system. Once this is accomplished, more detail about the nature and characteristics of each planet can then be added. Example 1-i is a quiz given to a ninth grade earth science class to find out if they had learned the names of all nine planets making up our solar system, and some of the major characteristics regarding these planets. This quiz was also included as part of a major test when the chapter was completed.

Topic: General Science—the solar system

Content objective: General information about the planets

Behavioral objectives: Knowledge of specific facts; comprehension

The Planets of Our Solar System

Choose the *one* phrase from the right hand column that *best* describes or tells something about a planet listed in the left hand column.

1. ____ Mercury	A. moons are Phobos and Deimos
2. ____ Venus	B. named after Roman god of fire
3. ____ Earth	C. earth's "sister planet"
4. ____ Mars	D. farthest from the sun
5. ____ Jupiter	E. has large ring system
6. ____ Saturn	F. 240,000 miles from earth
7. ____ Uranus	G. also known as Icarus
8. ____ Neptune	H. rotates once every 24 hours
9. ____ Pluto	I. a planetoid
	J. supports life other than earth
	K. nearest to sun
	L. named for god of the sea
	M. largest planet
	N. called a minor planet
	O. discovered by William Herschel

Example 1-i

These items were part of a larger test which covered the human circulatory system. This test covered structures, functions, bloodflow pathways, and relationships between the human circulatory system and the circulatory systems of the lower forms of animal life. This particular series of questions deals with the functions of the various parts of the circulatory system; in fact, this section was given separately as a quiz in preparation for the test. It was necessary for the students to understand the function of each part so they could get a better idea of how the entire system functioned as a whole.

Topic: Biology—the parts of the circulatory system

Content objective: General information about the circulatory system

Behavioral objectives: Knowledge of specific facts; comprehension (interpretation); analysis of elements

The Parts of the Circulatory System

Choose the *one* phrase from the right hand column that *best* describes or tells something about a part of the circulatory system listed in the left hand column. Place the letter (A-M) for the phrase in the blank to the right of the number.

1. _____ left ventricle
2. _____ right ventricle
3. _____ right atrium
4. _____ left atrium
5. _____ aorta
6. _____ pulmonary artery
7. _____ pulmonary vein
8. _____ artery
9. _____ capillaries
10. _____ vein

A. represents open circulatory system
B. receives blood with CO_2 waste from body
C. carries blood with O_2 from left ventricle to body
D. tiny capillary veins
E. carries blood with O_2 from lungs to left atrium
F. carries blood back to heart
G. pumps blood with O_2 to all body parts except the lungs
H. location of exchange of materials between blood and cells
I. carries blood away from heart
J. carries blood with CO_2 from right ventricle to lungs
K. plays major role in blood clotting
L. pumps blood with CO_2 to lungs
M. receives blood with O_2 from lungs

Example 1-j

To understand modern cell biology, it is necessary that students be familiar with the different types of organic compounds that make up the various cell structures and control the chemical reactions that are constantly taking place within the cell itself. These particular items were taken from a multiple-choice test and transformed into a matching form for a quiz. The main purpose is to test the students' knowledge of the structure, function, or use of these common organic compounds and ultimately their understanding of the importance of these compounds to the cell.

Topic: Biology—organic compounds

Content objective: General information about organic compounds

Behavioral objectives: Knowledge of specific facts; comprehension (interpretation)

Organic Compounds

Choose the *one* phrase from the right hand column that *best* describes or tells something about an organic compound listed in the left hand column. Place the letter (A – L) of the phrase in the blank to the right of the number.

1. ____ urea	A.	most abundant carbohydrate
2. ____ carbohydrates	B.	first synthesized by Wohler
3. ____ glucose	C.	makes food from sunlight
4. ____ cellulose	D.	carries oxygen in red blood cell
5. ____ lipids	E.	linked together forms proteins
6. ____ proteins	F.	formed from two molecules of maltose
7. ____ amino acids	G.	cell "building blocks"–control reactions
8. ____ hemoglobin	H.	has hydrogen-oxygen ratio of 2:1
	I.	has hydrogen-oxygen ratio greater than 2:1
	J.	covalent bond
	K.	made of single element
	L.	simple sugar

Example 1-k

The following also was given as a quiz on the planets making up our solar system. However, this time only the students' knowledge of two characteristics was tested: the size of the planet relative to earth, and distance from the sun relative to each other. Since two specific characteristics were being tested, an ideal way to test the students was by use of the double matching format. This format allowed testing for specific information without attempting to assess detailed knowledge.

Topic: General Science—the solar system

Content objective: Information about the relative size of the planets and their positions from the sun

Behavioral objective: Knowledge of specific facts

The Planets of Our Solar System

For each of the eight planets listed below, determine the size of each planet relative to the earth and its position from the sun.

Size		**Position**		
A.	larger than earth	1. 1st	4. 4th	7. 7th
B.	smaller than earth	2. 2nd	5. 5th	8. 8th
		3. 3rd	6. 6th	9. 9th

Size		Position	Size		Position
____	Mercury	____	____	Mars	____
____	Uranus	____	____	Venus	____
____	Saturn	____	____	Jupiter	____
____	Pluto	____	____	Neptune	____

Example 1-l

At this point in the chapter, the students were familiar with the functions of each of the major parts making up the circulatory system. The next step was to familiarize them with how each of these parts functioned together, and what part they played in the overall scheme of blood flow. The circulatory system itself can be broken down into two halves, one half carrying oxygenated blood, the other half, deoxygenated blood. In addition, at any one time, blood is flowing either towards the heart or away from the heart. Since both knowledge of direction of flow and oxygen content was the major objective, this section was well suited to the double matching format, allowing testing for the integrated comprehension and analysis of both halves of the circulatory system.

Topic: Biology—the circulatory system

Content objective: Information about the oxygen content of blood and its direction of flow in the various parts of the circulatory system.

Behavioral objectives: Knowledge of specific facts, comprehension (interpretation), analysis of elements and relationships

The Circulatory System

For each of the parts of the circulatory system listed below, determine the direction of blood flow and oxygen content. Place the letter for oxygen content (A or B) and blood flow (A – C) in the appropriate space.

Oxygen Content

A. blood with oxygen
B. blood without oxygen

Blood Flow

A. toward heart
B. away from heart
C. not applicable

Oxygen Content	*Parts of Circulatory System*	*Blood Flow*
____	left ventricle	____
____	right ventricle	____
____	right atrium	____
____	left atrium	____
____	aorta	____
____	pulmonary artery	____
____	pulmonary vein	____
____	arteries	____
____	veins	____
____	capillaries	____

Example 2-k

The following items appeared in a section of a major test dealing with our solar system. This particular section dealt with characteristics of the major planets making up the solar system. Writing the questions in the keylist format helped to eliminate guessing; since the correct answer could be one, all, or any combination of the planets, it could quickly identify students who had put the time in on studying, and who had not. With a matching format, the possibility of guessing correctly is much greater, whereas the keylist effectively eliminates this factor in the test.

Topic: General Science—the solar system

Content objective: Information about the similarities and differences of the planets in our solar system

Behavioral objectives: Knowledge of specific facts, classifications, and categories

The Planets of Our Solar System

For each question, circle as many of the planets as necessary that apply to the phrase on the right.

ME—Mercury	J —Jupiter	P—Pluto
V —Venus	S —Saturn	
E —Earth	U—Uranus	
M —Mars	N—Neptune	

1. ME - V - E - M - J - S - U - N - P **** has only one moon.
2. ME - V - E - M - J - S - U - N - P **** has no moons.
3. ME - V - E - M - J - S - U - N - P **** larger than earth.
4. ME - V - E - M - J - S - U - N - P **** smaller than earth.
5. ME - V - E - M - J - S - U - N - P **** has no atmosphere.
6. ME - V - E - M - J - S - U - N - P **** composed mostly of gas.
7. ME - V - E - M - J - S - U - N - P **** composed mostly of rock.
8. ME - V - E - M - J - S - U - N - P **** can support life.
9. ME - V - E - M - J - S - U - N - P **** has moon with atmosphere.
10. ME - V - E - M - J - S - U - N - P **** named after Roman or Greek god.

Example 2-l

One of the major topics that every earth science course will cover at one time or another is the identification of unknown minerals. There are seven basic tests that can be used to identify most, if not all, mineral types. These tests include color, streak, hardness, luster, crystal form, cleavage and fracture, and specific gravity. In order to use these tests properly, however, the student must first understand the nature of each test, and then how to use each one correctly.

The purpose of this quiz was to assess the understanding of what each test was

designed to accomplish, and the knowledge of some important factor regarding each of the tests. The quiz served as preparation for using the tests to actually identify unknown minerals.

Topic: Earth Science—identification of minerals

Content objective: Information about the various tests used to identify unknown mineral samples

Behavioral objective: Knowledge of specific facts

Identifying Unknown Minerals

A. color
B. streak
C. hardness
D. luster
E. crystal form
F. cleavage and fracture
G. specific gravity

Match the mineral identification tests above to the descriptions of them in the following. Not all of the letters must be used, and some may be used more than once.

1. _____ easiest to use
2. _____ makes use of Moh's scale
3. _____ comparison of weights
4. _____ atoms shaped like tetrahedron
5. _____ makes use of powdered form of mineral
6. _____ water plays an important role
7. _____ ease of scratching
8. _____ a tile plate is used
9. _____ ability to bend, reflect light
10. _____ easiest to misuse

Example 2-m

Most basic to the study of chemistry is the knowledge of the structure of the atom. Any atom is made up of three basic parts, each having its own electrical charge, which consist of the proton, the neutron, and the electron. Before students can go any further in their study of chemistry, it is imperative that information about the charge, location, and behavior of each of these parts is known and understood. Since the proton, neutron, and electron do share some common characteristics, using questions written in keylist form will tend to show if the student has just memorized the information, or really understands the similarities and differences of these three structures and their behavior in relation to each other.

Topic: Chemistry—atomic structure

Content objective: Information about the similarities and differences of the structures that make up matter

Behavioral objectives: Knowledge of specific facts, classifications, and categories; comprehension (translation); analysis of elements and relationships

Atomic Structure

For each question, circle as many of the structures as are appropriate that apply to the phrase on the right.

P—proton	E—electron	I —ion
N—neutron	A—atom	Nu—nucleus

1. P - E - I - N - A - Nu **** positively charged
2. P - E - I - N - A - Nu **** negatively charged
3. P - E - I - N - A - Nu **** has (have) an electrical charge
4. P - E - I - N - A - Nu **** has (have) NO electrical charge
5. P - E - I - N - A - Nu **** found in center of atom
6. P - E - I - N - A - Nu **** orbit the nucleus
7. P - E - I - N - A - Nu **** has (have) about the same mass
8. P - E - I - N - A - Nu **** has (have) the smallest mass
9. P - E - I - N - A - Nu **** used to determine atomic mass
10. P - E - I - N - A - Nu **** addition will form isotope

Example 2-n

Most students find the science of chemistry very difficult, if not impossible. One of the reasons for this perception of difficulty is that chemistry has its own language that a student must learn before going on to more difficult concepts. This language is the language of symbols. The "dictionary" of this language is the periodic table. Therefore, a most important objective is the students' ability to be able to read and interpret the periodic table of the elements.

Being familiar with what elements are represented by what symbols is important, but memorization of these symbols is usually not necessary because of the number of occasions a student will have to use the periodic chart during the course. Eventually, the student has little difficulty remembering the symbols for the more common elements. The less common ones, again, can be looked up in the table.

The following quiz tests the students' ability to meaningfully interpret the sections of the periodic table. The symbols for three of the more common elements are given, along with other information that is found on the periodic table. A series of questions is then asked which can only be answered if the student has the ability to interpret the symbols correctly. A similar exercise also was included in the major test covering this particular chapter.

Topic: Chemistry

Content objective: Chemical symbols

Behavioral objectives: Knowledge of specific facts, classifications, and categories

Translation of Symbols

A		B		C
22.9898		35.453		1.00797
1		±1,3,5,7		1
(Ne)3s'	**Na** 11	$(Ne)3s^2 3p^5$	**Cl** 17	1s'
892		−34.7		−252.7
97.5		−102		−259.2
0.97		1.56		0.071

Refer to the chemical symbols above to answer the following questions:

1. ____ Which of the above elements has the largest atomic weight?
2. ____ Which of the above elements has the largest atomic number?
3. ____ Which of the above elements has the lowest boiling point?
4. ____ Which of the above elements has the lowest melting point?
5. ____ Which of the above elements has the highest density?
6. ____ Which of the above elements has the least number of electrons?
7. ____ Which of the above elements has the least number of protons?
8. ____ Which of the above elements represents chlorine?
9. ____ Which of the above elements represents sodium?
10. ____ Which of the above elements represents hydrogen?

Example 2-o

Organic compounds play a vital role in cell biology. It is important that the student of biology understand the importance of these compounds to the everyday activities of the cell. This particular section of the textbook emphasized both the similarities and differences of the most important organic compounds, as well as the importance of each compound to cell function.

The following was given to the students as a quiz to test their understanding of both the similarities and differences among each compound, and also to test their knowledge of the importance (function) of each compound in relation to the role it played in the overall well-being of the cell.

Setting up the quiz in a keylist type of format made it more difficult for students to simply memorize the compound with its function. Instead, the keylist makes it necessary for the student to have some understanding of not only function, but also of the relationship between compounds in regard to their functions.

Topic: Biology—organic compounds

Content objective: Information about the similarities and differences of the various types of organic compounds found in all living things

Behavioral objectives: Knowledge of specific facts, classifications, and categories: comprehension (translation); analysis of elements and relationships

Organic Compounds

For each question, circle as many of the organic compounds as appropriately apply to the phrases on the right.

C—Carbohydrates A—Amino Acids Cat—Catalyst
L—Lipids E—Enzymes P—Proteins

1. C - L - P - A - E - Cat **** must contain carbon
2. C - L - P - A - E - Cat **** found in all organisms
3. C - L - P - A - E - Cat **** held together by peptide bonds
4. C - L - P - A - E - Cat **** can speed up a chemical reaction
5. C - L - P - A - E - Cat **** ratio of hydrogen to oxygen is 2:1
6. C - L - P - A - E - Cat **** lowers energy necessary for chemical reaction to start
7. C - L - P - A - E - Cat **** in simplest form, a simple sugar
8. C - L - P - A - E - Cat **** can be used by body for energy
9. C - L - P - A - E - Cat **** must contain hydrogen and oxygen
10. C - L - P - A - E - Cat **** controls chemical reactions in the cell

3. Tabular (Matrix)

Example 3-f

Using tabular format in writing questions regarding the planets of our solar system effectively accomplishes the same goals as the keylist format in that its use tends to eliminate the problem of guessing. Either tabular or keylist formats will accomplish the same goal, at least in this instance.

Topic: General Science—the solar system

Content objective: Information about the similarities and differences of the planets in our solar system

Behavioral objectives: Knowledge of specific facts, classifications, and categories

The Planets of Our Solar System

For each of the following descriptions, place an X in the box below the name of each planet that fits the description.

Planet Descriptions	Earth	Jupiter	Mars	Mercury	Neptune	Pluto	Saturn	Uranus	Venus
	Planets								
1. has only one moon	X								
2. has no moons				X		X			X
3. larger than Earth		X			X		X	X	
4. has no atmosphere				X		X			
5. composed mostly of gas		X					X		
6. can support life	X								
7. has moon with atmosphere		X							
8. named after Roman or Greek god		X	X	X	X	X	X	X	X

Example 3-g

The following item is cast in the tabular format; however, much more is accomplished than in the tabular item in example 3-f. Although the content of the questions again focuses on the planets of the solar system, this format lends itself to testing the students' knowledge of many more factors. In this item, the student is asked to apply four specific characteristics to each of the nine planets. Using the tabular format for writing questions allows much flexibility, and at the same time discourages memorization.

Topic: General Science—the solar system

Content objective: Information about the different planets—combined

Behavioral objectives: Knowledge of specific facts, analysis of elements

The Planets of Our Solar System

Fill in the blanks by choosing from the answers provided. (You need not fill in a blank that is marked with an X)

Position	Size	Number of satellites	God after which planet is named
1. 1st 6. 6th 2. 2nd 7. 7th 3. 3rd 8. 8th 4. 4th 9. 9th 5. 5th	A. larger than earth B. smaller than earth	A. 0 E. 9 B. 1 F. 12 C. 2 G. none of these D. 3	A. war E. seed sowing B. love F. underworld C. winged god G. none of these D. sea god

Planet	Position from Sun	Size Relative to Earth	No. of Known Satellites	God after which Planet Named
Earth	____	X	____	X
Jupiter	____	____	____	____
Mercury	____	____	____	____
Uranus	____	____	____	____
Saturn	____	____	____	____
Pluto	____	____	____	____
Mars	____	____	____	____
Venus	____	____	____	____
Neptune	____	____	____	____

Example 3-h

The topic of the digestive system in biology can be broken down into two parts. The first part deals with the organs making up the system itself. The second part deals with the methods of digestion. The latter section can be broken down further into two parts, mechanical and chemical digestion.

This quiz deals with chemical digestion, specifically the types of enzymes involved in chemical digestion, where these enzymes are produced, where they act within the digestive system, and on what types of food.

Since many digestive enzymes will have functions that will overlap, this particular subject lends itself readily to the tabular type of quiz format.

Topic: Biology—the digestive system

Content objectives: Information regarding the action of various enzymes and other chemical substances on the digestive process

Behavioral objectives: Knowledge of specific facts, classifications, and categories

Chemical Substances Involved in Digestion

For each of the following digestive functions, put an "X" in the space below the name of each substance that will perform the function described.

Digestive function	Substances: *saliva*	*amylase*	*pepsin*	*gastrin*	*lipase*	*tripsin*	*bile*
1. adds mucous to water	X						
2. found in the mouth	X	X					
3. converts starch into sugar		X					
4. digests proteins			X			X	
5. causes secretion of gastric juice				X			
6. helps in fat breakdown					X		X
7. is a hormone				X			
8. found in the stomach			X				
9. produced by the pancreas					X	X	
10. secreted into small intestine		X			X	X	X

Example 4-f

The following series of questions appeared in a major test dealing with the planets of our solar system. Each question contains three possible answers from which to choose. In some cases more than one answer was correct, but in all cases the student was to have chosen the *best* answer from the three choices given. The fact that the best answer was required forced the student to stop and think about the choices, rather than simply repeat memorized answers. This reasoning process is important in science, and the best answer format of questioning lends itself well to reinforcing this reasoning skill.

Topic: General Science—the solar system

Content objective: Detailed information about the planets and their characteristics

Behavioral objectives: Knowledge of specific facts, classifications, and categories

The Planets of Our Solar System

Place an "X" in the blank in front of the BEST answer.

1. The planet Mercury:
   ____ has no atmosphere.
   ____ is the only planet with no atmosphere.
   ____ is the only planet without a satellite.

2. The planet Venus is named after:
   ____ the goddess of love.
   ____ the god of war.
   ____ the god of the sea.

3. The planet Mars is named after:
   ____ the goddess of love.
   ____ the god of war.
   ____ the god of the sea.

4. The planet Jupiter is known as the:
   ____ ringed planet.
   ____ largest planet.
   ____ fourth planet from the sun.

5. The planet Saturn is:
   _____ known as the ringed planet.
   _____ named after the god Titan.
   _____ is the largest planet.

6. The planet Uranus:
   _____ was discovered by accident.
   _____ cannot be seen without a telescope.
   _____ is the fifth planet from the sun.

7. The planet Neptune:
   _____ was named after the god of the sea.
   _____ was discovered by accident.
   _____ is nothing like the planet Uranus.

8. The planet Pluto:
   _____ is the eighth planet from the sun.
   _____ has no atmosphere.
   _____ was one of the first planets discovered.

Example 4-g

This particular section of the earth science course dealt with topographic maps. Being able to read and interpret a topographic map is a very important skill that cannot be learned by memorization alone. Before map reading can even be attempted, however, there are certain basic terms and ideas that the students must know. To test the students' knowledge of these basics, the best answer format was used for this quiz. This allowed students to begin using some of the interpretive skills they would develop later on in the chapter.

Topic: Earth Science—topographic maps (models of earth)

Content objective: Information regarding the terms and ability to use a topographic map

Behavioral objectives: Knowledge of specific facts; comprehension (interpretation)

Models of the Planet Earth

Place an "X" in the blank to the left of the *best* answer for each item.

1. Earth was thought to be the center of the universe
   _____ by everyone.
   _____ by the majority of the people.
   _____ by Galileo and Kepler.

2. The most conclusive proof of the earth's shape is (are)
   ____ photographs from space.
   ____ the shape of the surface of a small body of water.
   ____ the horizon moving closer as an observer gains altitude.

3. A relief map would show
   ____ national and local boundaries.
   ____ arrangement of rock formations.
   ____ elevation of land surface using different colors.

4. A fractional scale would be written as:
   ____ 1 in. = 1 mi.
   ____ 1 : 62,500.
   ____ one inch equals one mile.

5. Topography is defined as:
   ____ the details making up the surface of the earth.
   ____ the difference between the highest elevation and sea level.
   ____ the difference between the highest and lowest elevations.

6. Mean sea level is:
   ____ land elevation measured from high tide.
   ____ land elevation measured from midpoint between highest and lowest tide.
   ____ land elevation measured from low tide.

7. The contour interval is:
   ____ differences in elevation between highest and lowest contour lines.
   ____ difference in elevation between two contour lines.
   ____ distance between two contour lines.

5. Greater-Less-Same

Example 5-d

Being able to make comparisons is important in any science. In a laboratory situation, comparisons are made continually. Being able to interpret data gathered from these comparisons is not, however, a skill that most students can master immediately. Practice is necessary whenever and wherever possible. This is why the greater-less-same format of questioning is so useful.

The following questions deal with the planets of our solar system. Some characteristic of one of the planets is taken, and then compared with that same

characteristic of another planet. For example, the first question deals with the characteristic of planet size. Using this format, the student must decide whether or not the planet Jupiter is greater in size, smaller in size, or the same size as the planet Saturn.

The following questions were given in quiz form to a group of high school freshmen taking earth science.

Topic: General Science—the solar system

Content objective: Comparisons and contrasts of the different characteristics of the planets

Behavioral objectives: Knowledge of specific facts; comprehension (extrapolation); analysis of relationships

The Planets of Our Solar System

The following paired statements refer to different characteristics of the planets in our solar system. If the characteristic described on the *left* is greater than that on the right, circle the letter "G"; if the *left* is less than the right, circle the letter "L"; if the right and left are about the same, circle the letter "S."

1. The size of the planet Jupiter	G L S	The size of the planet Saturn
2. The amount of atmosphere on Mars	G L S	The amount of atmosphere on Earth
3. The distance of the Earth from the sun	G L S	The distance of Mars from the sun
4. The number of moons of Saturn	G L S	The number of moons of Jupiter
5. The amount of atmosphere on Mercury	G L S	The amount of atmosphere on Pluto
6. The rotation period of Mars	G L S	The rotation period of Earth
7. The mass of Earth	G L S	The mass of Venus
8. The radius of Earth	G L S	The radius of Venus
9. The number of satellites of Mars	G L S	The number of satellites of Neptune
10. The length of a year on Earth	G L S	The length of a year on Mars

Example 5-e

When covering the circulatory system, one of the major themes that is continually stressed relates to structure and function. To compare and contrast structure and function, the greater-less-same question format is almost ideal. This quiz was taken from a larger test on the circulatory system. It was designed to test the students' knowledge of the structure of the various parts of the human circulatory system and how these parts function in relation to each other. In addition, this type of question tends to discourage simple memorization of facts by encouraging comparisons and interpretations.

Topic: Biology—the circulatory system

Content objectives: Comparisons and contrasts of the different characteristics of the circulatory system

Behavioral objectives: Knowledge of specific facts; comprehension (translation); analysis of relationships

The Circulatory System

The following paired statements refer to different characteristics of the parts of the human circulatory system. If the characteristic described on the *left* is greater than that on the right, circle the letter "G"; if the *left* is less than the right, circle the letter "L"; if the right and left are approximately the same, circle the letter "S".

1. The size of the aorta	G L S	The size of the superior vena cava
2. Amount of oxygen in the blood in the left ventricle	G L S	Amount of oxygen in the right ventricle
3. Thickness of muscle wall of left ventricle	G L S	Thickness of muscle wall of right ventricle
4. Number of valves in arteries	G L S	Number of valves in veins
5. Size of the arterioles	G L S	Size of the venules
6. Thickness of muscle wall of left atrium	G L S	Thickness of muscle wall of right atrium
7. Blood pressure in the veins	G L S	Blood pressure in the arteries
8. Amount of oxygen in blood of pulmonary artery	G L S	Amount of oxygen in blood of pulmonary vein
9. Thickness of the artery walls	G L S	Thickness of the vein walls

Example 6-k

When covering the topic of the planets in our solar system, one of the first things that is usually done is to study the location of the planets in relation to the sun, and also to each other. An ideal method of testing for this is using the rank order format. The nine planets are simply listed, and the student must put them in their correct order from the planet closest to the sun, to the planet farthest away from the sun.

The following was a quiz given to high school freshmen taking an earth science course.

Topic: General Science—the solar system

Content objective: Position of planets relative to the sun

Behavioral objective: Knowledge of specific facts

The Planets of Our Solar System

Next to each planet listed below, put a 1 in front of the planet that is closest to the sun, a 2 in front of the planet that is second closest from the sun, etc.

1. _____ Mercury
2. _____ Uranus
3. _____ Saturn
4. _____ Pluto
5. _____ Mars
6. _____ Venus
7. _____ Jupiter
8. _____ Neptune
9. _____ Earth

Example 6-l

When teaching the circulatory system, one of the first things covered is the pathway of the blood through the body. Since learning this particular sequence involves simple memorization, the rank order type of question lends itself well to testing to see if this task has been accomplished.

Topic: Biology—the circulatory system

Content objective: Familiarization with the pathway of blood flow through the circulatory system

Behavioral objective: Knowledge of specific facts

The Pathway of Blood Flow Through the Circulatory System

Next to each part of the circulatory system listed below, beginning with the left ventricle, put a 2 next to the structure through which blood passes next, then a 3, etc. (left ventricle is 1), through number 11.

A. ____ left ventricle
B. ____ venules
C. ____ right ventricle
D. ____ lungs
E. ____ superior and inferior vena cava
F. ____ arterioles
G. ____ left atrium
H. ____ pulmonary vein
I. ____ right atrium
J. ____ pulmonary artery
K. ____ aorta

7. Question and Short Answer

Examples 7-d and 7-e

On many occasions, when a student attempts to answer a question, or explain a certain situation, his or her answer is not a very good one. Many times the answer given has little to do with the actual question. The student loses sight of the main idea behind the question. This type of situation occurs most frequently in the laboratory write-up. The student attempts to explain data collected, and ends up drawing a conclusion having little if any relationship to the data.

For many students, the explanation of data and the drawing of valid conclusions are the most difficult things about science. There is a way, however, to help many of these students with a variation of the short answer question.

By giving students a question, along with several possible answers, practice is given in applying reasoning to arrive at the most logical conclusions to various situations. This kind of practice allows students to actually follow the reasoning process step by step, and eventually makes it easier for them to be able to draw their own conclusions regarding various types of laboratory and testing situations.

The following questions were written in class to provide a demonstration of how to interpret data.

Example 7-d presents an item for which the response is open-ended, whereas example 7-e suggests how such an item, using the responses made by students as distractors, can be designed to be scored objectively.

Example 7-d

Topic: General Science—the solar system

Content objective: Information about the general characteristics of the planets

Behavioral objectives: Knowledge of specific facts, principles, generalizations and methodology; comprehension (interpretation)

The Planets of Our Solar System

Answer the following questions:

1. The planet Venus is sometimes called the "Earth's sister." Explain how this name came about.

2. Explain the relationship of the distance of the planets from the sun to the length of a planet's year.

3. Venus is one of the brightest objects in the sky. When looked at through a telescope, no surface features can be observed. Explain how these two statements are related.

4. The rings of Saturn are not solid sheets. Explain how this was determined.

Example 7-e

Topic: General Science—the solar system

Content objective: Information about the general characteristics of the planets

Behavioral objectives: Knowledge of specific facts, principles, generalizations, and methodology; comprehension (interpretation)

The Planets of Our Solar System

Below are a number of questions, each having three different answers. Write a plus (+) before the best answer in each group.

1. *Question:* The planet Venus is sometimes called the "Earth's sister." What is the best explanation of how this came about?

Answers:

_____ Venus is the closest to size and mass of Earth.

_____ Venus comes closer to Earth than any other planet.

_____ Venus has the same type of atmosphere as Earth.

2. *Question:* What is the relationship between the distance of a planet from the sun and the length of its year?

   Answers:

   _____ The closer the planet, the longer its year.

   _____ The more distant the planet, the longer its year.

   _____ The length of the year on Venus is shorter than that of Earth.

3. *Question:* Besides being one of the brightest objects in the sky, Venus also shows no surface features. These two facts are related because:

   Answers:

   _____ The planet's brightness hides its features to an extent.

   _____ The cloud cover that reflects light also obscures surface features.

   _____ Venus never presents more than a crescent shape towards Earth.

4. *Question:* The rings of Saturn were determined not to be solid. The easiest way to determine this was to:

   Answers:

   _____ Look at stars shining through the rings.

   _____ Determine that the inner rings revolve faster than the outer rings.

   _____ Watch through a telescope the different portions of rings revolve faster than others.

Examples 7-f and 7-g

Just as with examples 7-d and 7-e, this item emphasizes the importance of explaining data and drawing valid conclusions. Example 7-f is in the open-ended format, and example 7-g, for which the distractors are drawn from student responses, can be scored objectively. When such an item is used progressively throughout a school year, students can be assisted in developing their reasoning skills as they observe natural phenomena and report their conclusions.

Example 7-f

Topic: Biology

Content objective: Explanations of natural phenomena

Behavioral objectives: Knowledge of specific facts, principles, generalizations, and methodology; comprehension (interpretation)

Explanations of Natural Phenomena

Answer the following questions:

1. The appearance of rabbits with white fur in areas of heavy snowfall can be explained in two different ways. What are these two explanations? Which explanation is the best? Why?

2. The theory of spontaneous generation is not widely accepted as true. Yet at one time spontaneous generation probably did occur. Explain.

3. Recent discoveries have shown the other galaxies in our universe to be rapidly moving away from each other. How does this tend to disprove the steady state theory of the creation of the universe?

Example 7-g

Below are a number of questions for which you will find three different answers. Write a plus (+) before the best answer in each group.

1. *Question:* Rabbits that live in regions of heavy snowfall all have white fur. What is the best interpretation of this fact?

   Answers:

   ____ The rabbits acquired the trait from their environment and passed it to their offspring.

   ____ A mutation occurred in normal rabbits producing white fur.

   ____ A mutation occurred in dark furred rabbits producing offspring with white fur and a better chance of surviving in a white environment.

2. *Question:* Spontaneous generation is not generally accepted today, even though it probably has occurred before. The best explanation for this is:

Answers:

____ We cannot explain how life began.

____ Some types of organisms can only be reproduced in the laboratory.

____ At one time life did not exist on earth, so life had to begin in some way other than the process of biological reproduction.

3. *Question:* The steady state theory of the creation of the universe has been weakened considerably by the discovery of:

Answers:

____ The disappearance of fossils at a level corresponding to about 4.5 billion years ago.

____ The red shift of light at the edge of our galaxy indicating our galaxy is expanding.

____ The red shift of light from other galaxies indicating they are moving away at tremendous speeds.

Example 7-h

Students seem to find the unit on photosynthesis to be one of the more difficult ones. Once the unit has been completed, however, the short answer type of question is one of the best methods of testing the students' understanding. Some memorization of data is possible, but if this is all the student has accomplished, it is quickly brought to light. If students cannot apply their knowledge to the explanation of concepts, the short answer type of question brings out this weakness, and both students and teacher can then take the necessary action to remedy the situation.

Topic: Biology—photosynthesis

Content objective: Information about the mechanism of photosynthesis

Behavioral objectives: Knowledge of specific facts, principles, generalizations, and methodology; comprehension (interpretation)

Photosynthesis

Answer the following questions.

1. What contributions have the following men made toward the understanding of the process of photosynthesis: Priestly, Ingenhouz, De Saussure, Mayer?

2. Explain the relationship of the following structures to a chloroplast: grana, lamellae.

3. Using complete sentences, explain the meaning of the following equation:

$$6\ CO_2 + 6\ H_2O \xrightarrow[\text{enzymes}]{\text{chlorophyll \& sunlight}} C_6H_{12}O_6 + 6\ O_2$$

4. Explain how ATP is formed in the cyclic light reactions.

5. Explain how $NADPH_2$ is formed in the noncyclic light reactions.

Sample Responses to the Statements

Answer the following questions.

1. What contributions have the following individuals made toward the understanding of the process of photosynthesis: Priestly, Ingenhouz, De Saussure, Mayer?

   Priestly—Plants restore something to air.
   Ingenhouz—Plants restore something to air only when exposed to light.
   De Saussure—Plants grow from intake of CO_2 and H_2O.
   Mayer—Identified the main events in photosynthesis

2. Explain the relationship of the following structures to a chloroplast: grana, lamellae.

   Lamellae—Composed of layers of chlorophyll, protein, lipids, and make up grana

3. Using complete sentences, explain the meaning of the following equation:

$$6\,CO_2 + 6\,H_2O \xrightarrow[\text{enzymes}]{\text{chlorophyll \& sunlight}} C_6H_{12}O_6 + 6\,O_2$$

   Carbon dioxide plus water combined with chlorophyll, sunlight, and enzymes will produce glucose and oxygen.

4. Explain how ATP is formed in the cyclic light reactions.

   Light causes chlorophyll to release high energy electron—passed along electron carrier and energy transferred to enzyme systems—catalyze change of ADP—ATP.

5. Explain how $NADPH_2$ is formed in the noncyclic light reactions.

   Chlorophyll releases high energy electron. Two high energy electrons from two chlorophyll molecules join two hydrogen ions, formed by ionization of two H_2O molecules and one molecule NADP resulting in $NADPH_2$.

Example 7-i

The following questions were taken from a review sheet given to the students before their test on continental drift and plate tectonics. Once again, the short answer question provides a means of determining how well the students understood the concepts presented in the chapter, and how well they were able to use these concepts.

Topic: Earth Science—continental movement

Content objective: Explanation of natural phenomenon

Behavioral objectives: Knowledge of specific facts, principles, generalizations, and methodology; comprehension (interpretation)

Continental Movement

Answer the following questions:

1. Explain the relationship between continental drift and plate tectonics.

2. Explain the evidence that exists for the break-up of the supercontinent of Pangea.

3. Explain how the earth's core affects the movement of earthquake waves through the earth.

4. Explain how the following features are formed in terms of plate movement: mid-ocean ridges, subduction zone, mountains.

Sample Responses to the Statements

Answer the following questions.

1. Explain the relationship between continental drift and plate tectonics.

   When plates making up surface move—continents carried along.

2. Explain the evidence that exists for the break-up of the supercontinent of Pangea.

   Continents today have coastlines that fit together.

3. Explain how the earth's core affects the movement of earthquake waves through the earth.

   Core will cause waves to deflect creative areas on surface where waves cannot be detected.

4. Explain how the following features are formed in terms of plate movement: mid-ocean ridges, subduction zone, mountains.

   mid-ocean ridges—2 plates moving apart
   subduction zone—1 plate moves under another
   mountains—2 plates collide

Example 9-c

The concept of energy transformation from one form to another is one that many students find difficult. The following questions were designed to test understanding of this concept by presenting a hypothetical situation and asking the student to explain the results by choosing from a number of possibilities. The student's ability to apply reasoning skills to an unfamiliar situation based on known facts and ideas is much more important here than just the memorization of facts.

Topic: General Science—energy

Content objective: The mechanisms involved and the results of energy transfer from one form to another

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation); application

Energy Transfer

Read the experiment below and then answer the questions that follow regarding the interpretation of the results. Circle the letter of the one *best* answer to each question.

Experiment:

Two unknown gases, gas "X" and gas "Y," are mixed in a closed container. It is found that for every 8 parts of gas "X" in the container, there are 2 parts of gas "Y." When a heat source is applied to the container, an explosion occurs, forming a small amount of liquid on the inside of the container.

After the explosion, it is found that there are 4 parts of gas "X" left in the container, but none of gas "Y." It is also discovered that the temperature inside the container went up after the explosion.

Questions:

1. The fact that an explosion took place in the container showed that

   a. energy was converted to matter in the reaction.
   b. matter was converted to energy in the reaction.
   c. energy was consumed during the reaction.
   d. energy was released during the reaction.

2. The amounts of gases "X" and "Y" left in the container showed that the gases

   a. reacted with each other in a proportion of one part "X" to two parts "Y."
   b. reacted with each other in a proportion of one part "Y" to two parts "X."
   c. were converted to matter, explaining the presence of liquid in the container.
   d. burned up during the explosion but at different rates.

Examples 9-d and 9-e

The experiment/results type of format not only discourages memorization, but also gives excellent practice for writing up lab reports. The details of an experiment are given, along with the data that were collected from the experiment. Then several different questions are given regarding the interpretation of the data.

The science student must be able to master these interpretive skills to be successful in the laboratory. These types of questions give much needed practice toward reaching that goal.

Example 9-d

Topic: Biology

Content objective: Genetic terms and mechanisms involved in the transfer of traits from one organism to another.

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation)

The Transfer of Traits

Read the experiment below and then answer the questions that follow regarding the interpretation of the results.

Experiment:

In an attempt to breed a new kind of rose, a red rose is crossed with a white rose. The resulting F_1 generation is all pink. When two pink roses are crossed the resulting F_2's are red, white, and pink in a ratio of 1 red: 2 pink: 1 white. Using this information answer the following.

Questions:

1. This problem is an example of:
   a. dominance.
   b. recessiveness.
   c. incomplete dominance.
   d. none of these.

2. In a dominance problem the F_1 generation would be:
   a. red.
   b. all white.
   c. all pink.
   d. none of these.

3. In a blending problem the F_1 generation would be:
   a. all red.
   b. all white.
   c. all pink.
   d. none of these.

4. Crossing a red with a pink would give you:

   a. all red.
   b. all pink.
   c. both red and pink.
   d. none of these.

5. The recessive trait in this problem is:

   a. red.
   b. white.
   c. pink.
   d. none of these.

Example 9-e

Topic: Biology

Content objective: Genetic terms and mechanisms involved in the transfer of traits from one organism to another

Behavioral objectives: Knowledge of terms, specific facts, principles, and generalizations; comprehension; application

The Transfer of Traits

Read the experiment below and then answer the questions that follow regarding the interpretation of the results.

Experiment:

In an experiment using fruit flies, a light bodied parent is crossed with a dark bodied parent. The offspring were all light bodied. Two light bodied offspring were then crossed producing both light and dark bodied offspring in a ratio of 3 light to 1 dark. Using this information answer the following:

Questions:

1. The parents of the second (P_2) cross are:

   a. hybrid.
   b. pure.
   c. heterozygous for light body.
   d. none of these.

2. The F_1 generation in the second cross is:

   a. hybrid.
   b. pure.
   c. homozygous for light body.
   d. none of these.

3. The dominant characteristic in the second (P_2) cross is:

   a. dark body.
   b. light body.
   c. dark and light are of equal strength.
   d. none of these.

4. If the F_1 generation resulted in a 1:1 ratio of light body to dark body, then what genetic make-up would the parents have to be if light is dominant?

   a. pure for light—pure for dark.
   b. hybrid for light—pure for dark.
   c. hybrid for light—hybrid for dark.
   d. none of these.

5. Two light bodied parents from the F_2 generation are crossed, and again we get a 3:1 ratio of light to dark in the offspring. For this to happen the F_2's that we crossed would have to be:

   a. both pure.
   b. both hybrid.
   c. 1 pure and 1 hybrid.
   d. none of these.

Example 9-f

The ability of a cell to survive depends on the process of diffusion, which is the movement of molecules from an area of high concentration to an area of low concentration. This part of the unit on cells dealt mainly with a special type of diffusion called osmosis, the diffusion of water through a membrane. To avoid questions which relied completely on memorization, a hypothetical situation was presented, requiring the students to select one of several possible explanations.

Topic: Biology—osmosis

Content objective: Information about the mechanism underlying the process of osmosis

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation); application

Biology

Read the experiment below and then answer the questions that follow regarding the interpretation of the results. Circle the letter of the one *best* answer to each question.

Experiment:

A bag containing a solution "A" was dropped into a beaker of water. After five minutes it was found that water was moving into the bag containing solution "A."

Questions:

1. The movement of water into the bag is an example of the process called

   a. diffusion.
   b. osmosis.
   c. active transport.
   d. plasmolysis.

2. Water will continue to move into the bag until

   a. the number of molecules of solution "A" is equal on both sides of the bag.
   b. the number of molecules of solution "A" is greater outside the bag than inside the bag.
   c. the number of molecules of water is greater inside the bag than outside the bag.
   d. the number of molecules of water is equal on both sides of the bag.

3. What will occur when this experiment reaches equilibrium?

   a. All movement of molecules will cease.
   b. The concentration of solution "A" will be the same on both sides of the bag.
   c. For every molecule of solution "A" that leaves the bag, another molecule of solution "A" will enter the bag.
   d. For every molecule of water that leaves the bag, another molecule of water will enter the bag.

4. In a living cell, substances sometimes move from an area of low concentration to an area of high concentration. The process that allows this to occur needs energy and is called

   a. osmosis.
   b. diffusion.
   c. active transport.
   d. plasmolysis.

10. Experiment/Results/Interpretation

Example 10-e

The very nature of biology is experimental. Questions dealing with experiments and their interpretations can be quite flexible by their own nature. The following questions again challenge the student to interpret what has happened during an experiment on osmosis, yet the questions are set up in a different format than the previous ones.

This set of questions gives the student a choice between possible explanations. At first, this item appears to be quite easy; however, students sometimes find that this particular format is actually much harder than some other types of experiment/results/interpretation formats.

Again, these questions were a part of a larger test dealing with cell biology.

Topic: Biology—osmosis

Content objective: Information regarding the mechanism behind the process known as osmosis

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation)

The Process of Osmosis

Put an "X" in front of the correct statements for each result and explanation of the result.

1. *Experiment:* A red blood cell was placed in a beaker of distilled water.

   Result:

   _____ The red blood cell began to grow larger in size.

   _____ The red blood cell began to shrink in size.

   Explanation:

   _____ The concentration of water on the outside of the cell was greater than that on the inside, so water went into the cell causing it to expand.

   _____ The concentration of water on the inside of the cell was greater than that on the outside, so water went out of the cell causing it to shrink.

   _____ Active transport caused the cell to shrink in size.

2. *Experiment:* A red blood cell was placed in a saline solution.

   Result:

   _____ The red blood cell began to get larger.

   _____ The red blood cell began to shrink in size.

   Explanation:

   _____ The concentration of water outside the cell was greater than inside the cell, so water went into the cell causing it to expand.

   _____ The concentration of water inside the cell was greater than outside the cell, so water went out of the cell causing it to shrink in size.

   _____ There is not enough information given to explain the results.

Examples 10-f, 10-g, and 10-h

This type of question takes the experiment/results format one step further to emphasize the ability to accept a correct interpretation of the data and to recognize and reject a false interpretation of the data. These questions, to many students, are the most difficult types to answer. However, to the teacher, they are the most valuable in assessing the students' ability to reason and interpret data effectively.

Example 10-f

Topic: General Science—the solar system

Content objective: Information about current findings about our solar system

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation)

The Planets of Our Solar System

Put an "X" in front of the correct statements.

1. *Experiment:* In an experiment to determine if Saturn's rings were solid:

   Result:

   _____ It was found all portions of the rings reflected the same wavelength of light.

   _____ It was found different portions of the rings reflected different wavelengths of light.

   Explanation:

   _____ Reflections of the wavelengths indicate that different portions of the rings move at different speeds.

   _____ Reflections of the wavelengths indicate that the rings were solid.

   _____ Reflections of wavelengths indicate a solid ring system.

2. *Experiment:* Spacecraft sent to Mars were equipped to do certain chemical tests to determine if life existed in the Martian soil. When these tests were done:

   Result:

   _____ All tests indicated positive results for life.

   _____ Only some tests indicated positive results for life.

   _____ No tests indicated positive results for life.

   Explanation:

   _____ There is probably some type of life in the Martian soil.

   _____ There is no life in the Martian soil.

   _____ The tests were too inconclusive to make a judgment.

Example 10-g

Topic: Chemistry

Content objective: New experiments involving concepts of chemistry

Behavioral objectives: Knowledge of specific facts and methodology; comprehension; application

Experiment:

Equal amounts of oil and water were poured into a test tube and shaken for several minutes. The test tube was then allowed to sit undisturbed for 15 minutes. After this time two distinct layers could be seen in the test tube. When a flame was applied to the top layer, it ignited and burned away.

1. Which of the following is true?

   a. The water formed a colloidal suspension with the oil.
   b. The water is lighter than the oil.
   c. The oil is lighter than the water.
   d. None of these.

The table below gives the density of several common elements.

Element	Density g/ml.
Sodium	0.97
Hydrogen	0.07
Lithium	0.53
Potassium	0.83

1. If a cubic inch of each element was obtained, which would weigh more than a cubic inch of water?

   a. Na
   b. H
   c. Li
   d. K
   e. none of these

Example 10-h

Topic: Biology

Content objective: Mechanisms of genetic transmission

Behavioral objectives: Knowledge of specific facts, principles, and generalizations; comprehension; application

Genetic Transmission

Circle the one *best* answer to each question.

light male X dark female	*light female X dark male*
light bodied—510 dark bodied—0	light bodied—460 dark bodied—0

According to the above information:

1. Which is the dominant characteristic?

   a. Dark is dominant.
   b. Light is dominant.
   c. The parents are hybrid.
   d. None of these.

2. The parents of this cross were:

   a. both hybrid.
   b. both pure.
   c. one hybrid—one pure.
   d. none of these.

3. Which sex determines the dominant trait?

   a. The male controls the dominant trait.
   b. The female controls the dominant trait.
   c. The sex makes no difference in the results of the cross.
   d. None of these.

Example 10-i

Many times it is difficult to tell if a student really has mastered an understanding of a particular subject, or if he or she simply has done a very good job of memorization. One of the best ways to solve this problem is to use a type of question that challenges the student's ability to not only apply the facts given, but also to interpret those facts. The ability to interpret the results of a particular experiment or situation is an important learning objective, since it requires a higher level of cognitive skills.

The following questions concerned with fossil evidence of human ancestors lends itself very well to this interpretive skill. For this question format, memorized answers play a minor role of simply telling the instructor how much meaningful knowledge the student has actually acquired. This set of questions was given as part of a larger test at the completion of the unit on human evolution.

Topic: Biology—evolution

Content objective: To determine how characteristics of organisms can be determined by examination of their fossils

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation)

The Examination of Fossils

Use the information about two fossil sites to answer the following questions. Circle the one *best* answer to each question.

Fossil site #1	Fossil site #2
A. skull size = 400 mm	A. skull size = 500 mm
B. stone tools	B. crude metal arrowheads
C. no evidence of fire	C. evidence of campfire
D. arm bone longer than leg bone	D. arm bone shorter than leg bone

According to the above information:

1. At which fossil site would you most likely find humans most closely related to modern man?
   a. site #1
   b. site #2
   c. both site #1 and #2
   d. neither site #1 nor #2

2. At which site could you find the bones of animals used for food?
   a. site #1
   b. site #2
   c. both site #1 and #2
   d. neither site #1 nor #2

3. At which site would you expect to find remains of humans that walked upright?
   a. site #1
   b. site #2
   c. both site #1 and #2
   d. neither site #1 nor #2

Example 10-j

This particular chapter in Earth Science concerned minerals and mineral identification. In dealing with this subject, the students build their knowledge on what has been learned previously. First, students must familiarize themselves with the seven basic tests to identify an unknown mineral. Of course, these tests can be memorized, but their use in a given situation with an unknown mineral cannot be memorized.

The following questions are designed not only to see if students can remember what the tests are, but also if they can use the tests given the same amount of information that would be available to them if they actually had an unknown specimen in front of them. Again, interpreting results plays a very important role in this type of question.

Topic: Earth Science—minerals

Content objective: Interpreting the results of tests for determining the identity of unknown mineral samples

Behavioral objectives: Knowledge of specific facts, methodology, and theories/generalizations; comprehension (interpretation)

Experiment:

A student was given an unknown mineral sample with the following characteristics:

hardness—1	streak—white
cleavage plains—1	luster—nonmetallic
color—white to green	

1. Which of the following is true?

   a. The unknown mineral is quartz.
   b. The unknown mineral is talc.
   c. The unknown mineral is calcite.
   d. The unknown mineral is halite.

———

The table below gives the density of several common minerals.

Mineral	Specific Gravity
quartz	2.65
feldspar	2.60
calcite	2.72
pyrite	5.02

1. If a cubic inch of each mineral was obtained, which would weigh more than a cubic inch of water?

   a. quartz
   b. feldspar
   c. calcite
   d. pyrite
   e. all of these
   f. none of these

D. Sample Items in Social Studies

Prepared by Larry Kidder

Contents

Note: There are no examples here from Section 9, Experiment/Results, because the instructor prefers his social studies students to go beyond the results to interpretation. Refer to the Section 10 example of Situation/Results/Interpretation.

Example 1-m

These items were part of a larger test covering the period of the 1840s. Some of the questions ask for recall of specific information about the person, e.g., identifying Nicholas Trist with the Treaty of Guadaloupe-Hidalgo. Other questions deal with demonstrating an understanding of the significance of actions rather than their names, e.g., identifying Daniel Webster with a treaty settling the Maine boundary dispute rather than with the name of the treaty. This fits in particularly well with this question, since Webster's name is part of the name of the treaty. As follow-up activities, each item can be discussed to examine cause-and-effect relationships or to gain additional information.

Topic: U.S. History

Content objective: Events in the 1840s involved in settling U.S. boundaries

Behavioral objectives: Knowledge of specific facts; analysis of relationships

Match the people on the right to the descriptions of them on the left. Not all the people are used, and some may be used more than once.

_____ 1. annexed Texas to the Union

_____ 2. helped give the U.S. a claim to Oregon by naming the Columbia River

_____ 3. helped make a treaty settling the Maine boundary dispute

_____ 4. served as president during the Mexican War

_____ 5. led U.S. expedition in the Southwest that captured Sante Fe

_____ 6. helped set up the Bear Flag Republic

_____ 7. negotiated the Treaty of Guadaloupe-Hidalgo

_____ 8. tried to get an amendment passed to outlaw slavery in territory won from Mexico

_____ 9. was leader of an army which was attacked at the beginning of the Mexican War

_____ 10. captured Mexico City

_____ 11. became the first "Dark Horse" candidate to be elected president

A. Robert Gray
B. John Tyler
C. James K. Polk
D. Zachary Taylor
E. Winfield Scott
F. John C. Fremont
G. Stephen Kearny
H. Nicholas Trist
I. David Wilmot
J. Daniel Webster
K. Robert J. Walker

Example 1-n

The text book discussed each event's significance in addition to describing the circumstances surrounding the event. In discussing the events in class, their effect on relations between the North and South was stressed. The development of the questions followed this analysis with which the students had become familiar. Other questions on the test dealt with sequence and cause-and-effect relationships of these events.

Topic: U. S. History

Content objective: Events leading to the Civil War

Behavioral objectives: Knowledge of trends and sequences; interpretation

Match the items below to the statement of their significance. Some items may be used more than once and some may not be used.

____ 1. Sumner-Brooks incident	A. a politically timed event which caused great anger in the North
____ 2. Harper's Ferry Raid	B. South favored it, but many northerners ignored it
____ 3. Crittenden Amendment	C. showed that emotion was replacing reason
____ 4. Dred Scott Decision	D. showed people on both sides would fight over principle instead of reality
____ 5. Lecompton Constitution Controversy	E. made the South fearful of Northern interference with slavery
____ 6. "Bleeding Kansas"	F. showed the period of compromise was over
____ 7. Fugitive Slave Law	G. angered the North by calling for the addition of Cuba as a slave state
____ 8. Underground Railroad	

Example 1-o

Prior to taking this quiz, students had read appropriate chapters from Edith Hamilton's *Mythology*. They were asked to find and learn about the relationships between the gods, descriptions of the gods, their areas of concern, and any symbolism associated with them. This information was then discussed in class.

Topic: Western Civilization

Content objective: The Greek gods

Behavioral objective: Knowledge of specific facts to recognize the names of each significant Greek god or goddess that is associated with the appropriate description

Place the name of the individual being described in each statement in the blank to the left of the statement. Some names may not be used, some may be used more than once.

A. Aphrodite	F. Cerberus	K. Hades	P. Olympus
B. Ares	G. Cronus	L. Hera	Q. Poseidon
C. Artemis	H. Eros	M. Hermes	R. Styx
D. Athena	I. Graces	N. Hestia	S. Titans
E. Centaurs	J. Graiae	O. Homer	T. Zeus

____ 1. father of Zeus

____ 2. children of Heaven and Earth

____ 3. supreme ruler of the gods

____ 4. god who gave the horse to man

____ 5. ruler of the dead

_____ 6. wife and sister of Zeus
_____ 7. guide of the dead
_____ 8. god of love
_____ 9. goddesses of splendor, mirth, and good cheer
_____ 10. goddess born from the foam of the sea
_____ 11. savage creatures that were half horse and half man
_____ 12. goddess of wisdom
_____ 13. ruler of the sea
_____ 14. goddess of the hearth, protector of homes
_____ 15. messenger of the gods
_____ 16. god whose symbol is the trident
_____ 17. god whose symbol is the vulture
_____ 18. goddess who was born emerging from the head of Zeus
_____ 19. goddess identified with the moon
_____ 20. three sisters who had one eye
_____ 21. three-headed dog who guarded the underworld

Example 1-p

The primary emphasis of the unit was an understanding of the process of the coup d'etat. In introducing the idea of coups, the textbook defined other types of political change that are not coups. After discussing these other types of change this quiz was constructed to determine how well the students could identify situations with the type of change taking place. All of the situations are fictional and follow closely the definitions given in the text. This quiz proved to be more difficult than expected, apparently due to the fact that students were required to apply the definitions they had learned rather than simply to recognize the definitions. Real examples for these types of changes had been discussed before the quiz and they were discussed again after the quiz and compared to the fictional examples given in the quiz.

Topic: Politics of Developing Nations

Content objective: Definitions of various types of political change

Behavioral objectives: Knowledge of specific facts; translation; analysis of elements

Match the correct type of political change described in each of the examples given below. Not all types of political change are used.

A. Liberation B. Civil War C. Putsch D. War of National Liberation

E. Revolution F. Pronunciamiento G. Coup d'Etat

____ 1. After months of economic and social crisis, the army of a South American country has taken over in order to carry out programs it states are part of the "national will."

____ 2. The government of an African country is fighting to maintain control of the country. The government has been challenged by the leaders of a large, although minority, tribe and the army has split into two factions along tribal lines and the two factions conduct military operations against each other.

____ 3. After four years of bloody warfare against foreign invaders, the leader of an army division declares himself leader of a government to continue fighting against the invaders now that the central government has decided to give up and try to negotiate a settlement that will end the bloodshed.

____ 4. The government of an Asian country is engaged in a fight for survival against the military forces of a rival government set up in several provinces which is working to alienate the people from the central government and switch their allegiance to the new regime. As part of this effort, a guerrilla army fights sporadically against units of the national army. There are now really two governments in the country.

____ 5. A country has been undergoing a lot of internal turmoil with mass demonstrations by a variety of groups, all protesting one or more aspects of the government. The demands of these groups go beyond mere policy changes and there is a widespread feeling that deep social and political structural changes will be necessary to curb the violence, in addition to changes in the personnel running the government.

Example 1-q

This quiz item was designed to provide a review of the Greek gods and goddesses which had been studied in a previous unit on Greece, and also to provide a quiz on a current unit which included the Roman gods and goddesses. In order to demonstrate the heavy borrowing of Greek mythology by the Romans, the double matching format was used.

Topic: Western Civilization

Content objective: The Greek and Roman deities

Behavioral objectives: Knowledge of terms and recognition of the parallel Greek and Roman names of significant gods or goddesses that are associated with the appropriate descriptions

For each description below, identify the name of the Greek god or goddess in the blank to the *left*, and also identify the Roman names in the blank to the *right* of each description. Some names may not be used, and some may be used more than once.

Greek Deities

A. Aphrodite
B. Apollo
C. Ares
D. Artemis
E. Athena
F. Hades
G. Hera
H. Hephaestus
I. Hermes
J. Hestia
K. Homer
L. Persephone
M. Poseidon
N. Zeus

Roman Deities

1. Diana
2. Juno
3. Jupiter
4. Mars
5. Mercury
6. Minerva
7. Neptune
8. Phoebus
9. Pluto
10. Proserpine
11. Venus
12. Vesta
13. Vulcan

____ 1. supreme ruler of the gods ____

____ 2. god who gave the horse to man ____

____ 3. ruler of the dead ____

____ 4. wife and sister of Zeus ____

____ 5. guide of the dead ____

____ 6. goddess born from the foam of the sea ____

____ 7. goddess associated with the trait of cleverness ____

____ 8. ruler of the sea ____

____ 9. goddess of the hearth, protector of the home ____

____ 10. messenger of the gods ____

____ 11. god whose symbol is the trident ____

____ 12. god whose symbol is the vulture ____

____ 13. goddess who was born emerging from the head of Zeus ____

____ 14. goddess identified with the moon ____

Example 1-r

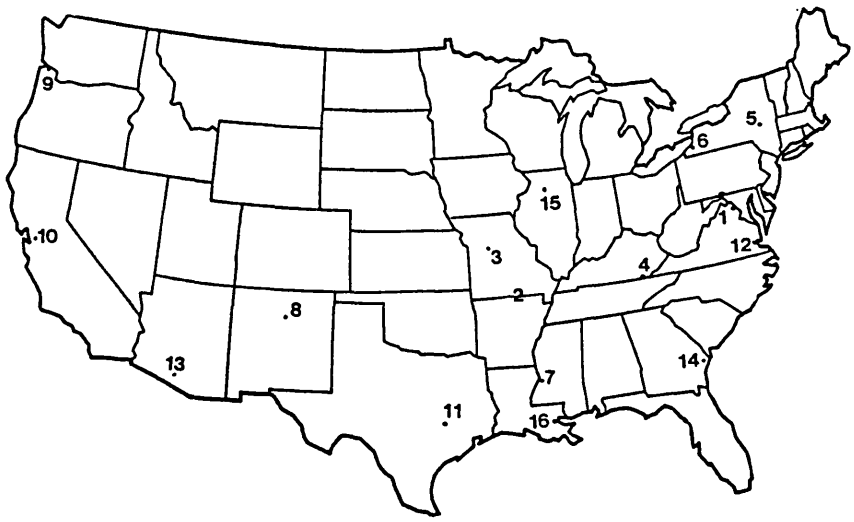
This type of item was used as a way to combine the memorization of place names in U.S. geography with important information about those places. Students often find it easier to remember information if they can make several connections to related information. This item makes the connection between the location and an important historical fact about the place.

Each of the following places or locations is represented by a number on the map. In addition, each of the names may be associated with one of the descriptive phrases in the list on the right. In the *first* blank before each name, place its *map number*. In the *second* blank, write the *letter* of the description which *best* fits it.

There are more numbers on the map and more descriptive phrases than names in the list.

Map Number	Letter	
____	____	Freeport
____	____	Gadsden Purchase
____	____	Richmond
____	____	Harper's Ferry
____	____	Independence
____	____	Buffalo
____	____	Astoria
____	____	Vicksburg
____	____	36°30′ north latitude
____	____	Cumberland Gap

A. eastern end of Santa Fe-Oregon Trails
B. early American fur-trading post in the Far West
C. The Wilderness Road went through here.
D. John Brown raided it.
E. strategic location for control of Mississippi in the Civil War
F. Missouri Compromise line
G. connected with the question of a transcontinental railroad in the 1850s
H. Douglas tried here to reconcile popular sovereignty and the Dred Scott opinion.
I. It took almost four years for the North to capture it.
J. western end of Erie Canal
K. western end of Oregon Trail
L. western end of California Trail



Revised, from the files of Harold Gulliksen, 1943.

Example 1-s

On this quiz, students must demonstrate that they know the location of several places important in understanding the Vietnam War, as well as the roles played by those places and some of the incidents that happened there. This quiz was presented as a review near the end of the term. Previous quizzes had included some of this information, and students had been asked to review maps and to be able to associate events with the places where they happened. This question was expanded for the final exam.

Topic: Vietnam War

Content objective: Locations significant in understanding the Vietnam War

Behavioral objectives: Knowledge of specific facts; application

Use the letters on the attached map to answer the following questions. Identify the location described on the map and put the letter in the appropriate blanks. Not all locations on the map are used and some are used more than once.

PLACES

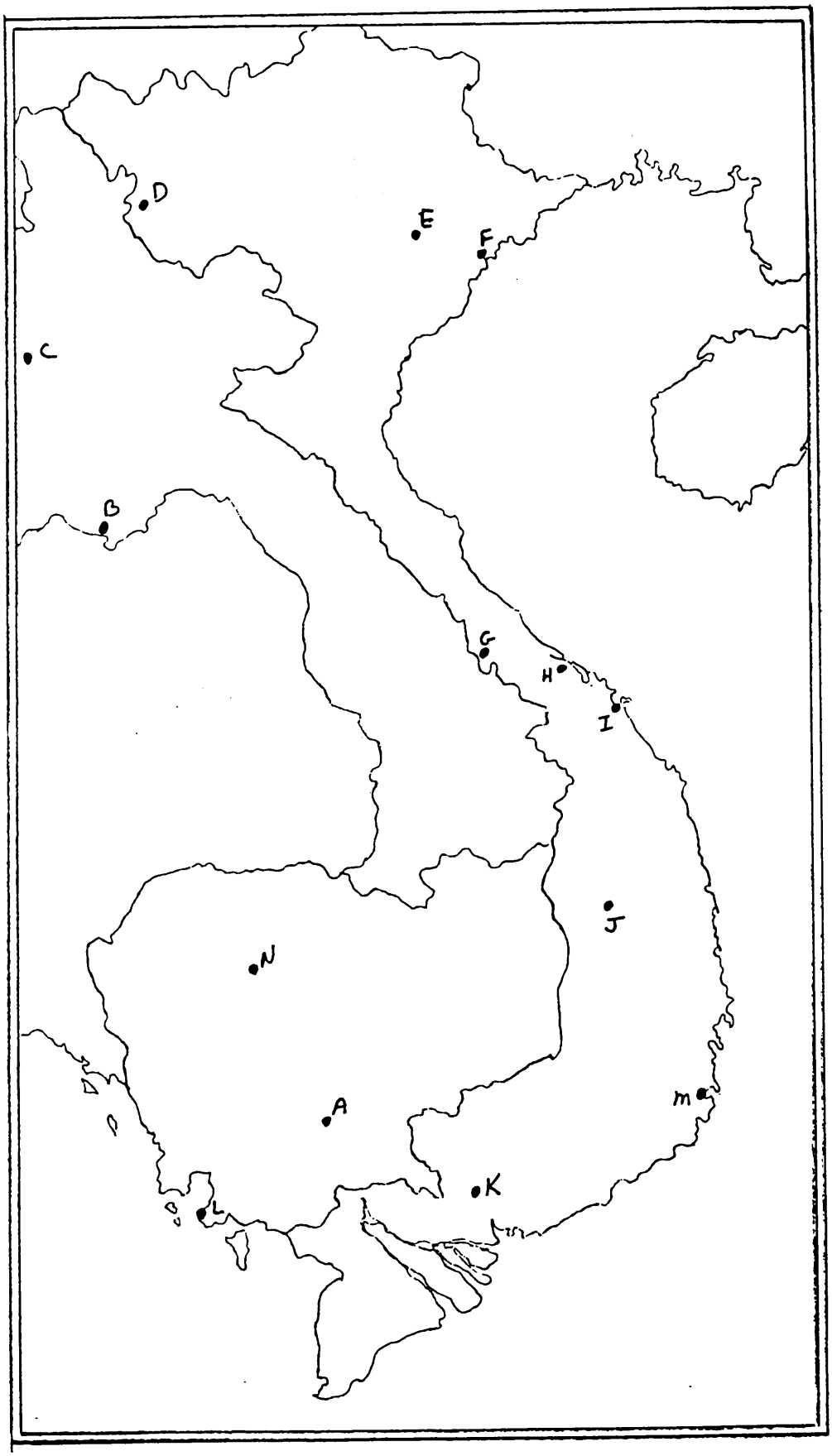
____ 1. Saigon
____ 2. Hanoi
____ 3. Danang
____ 4. Pleiku
____ 5. Luang Prabang
____ 6. Dien Bien Phu
____ 7. Hue
____ 8. Haiphong
____ 9. Phnom Penh
____ 10. Vientiane
____ 11. Khe Sanh

FUNCTIONS

____ 12. Royal Capital of Laos
____ 13. Capital of Cambodia
____ 14. Capital of North Vietnam
____ 15. Old Imperial Capital of Vietnam
____ 16. Administrative Capital of Laos
____ 17. Capital of South Vietnam

INCIDENTS

____ 18. first landing of U.S. troops in 1965
____ 19. U.S. Special Forces camp attacked in 1965 by the Viet Cong, prompting the U.S. to send combat troops to Vietnam to protect U.S. installations
____ 20. U.S. Marine outpost beseiged for several months in 1968
____ 21. French outpost beseiged and captured by the Viet Minh in 1954
____ 22. renamed Ho Chi Minh City in 1975
____ 23. bombed repeatedly by U.S. planes in Operation Rolling Thunder from 1965 to 1973
____ 24. the scene of heavy fighting during the 1968 Tet Offensive; mass graves found afterwards led to fears of bloodbaths if the Viet Cong took over the country completely


D
E
F
C
B
G
H
I
J
N
A
M
K
L

Example 2-p

Students had studied the rise to power of Augustus by reading a biographical sketch of some 25 pages. This quiz was designed to assess the students' comprehension of the roles played by some of the central characters in the story. Students should be able to recognize that some roles could be played by more than one person and that one individual could play several roles. This quiz could be followed with short essays calling for a discussion of the complete role played by one or more of the characters. Sequencing questions (such as in example 2-q) could also be used as a follow-up.

Topic: Western Civilization

Content objective: Roles played by people associated with the rise to power of Augustus (Octavius)

Behavioral objective: Analysis of relationships

Match the people to the statements below. Use as many letters as are applicable before each of the statements.

A. Octavius B. Antony C. Brutus D. Lepidus E. Cicero

_____ 1. a great-nephew of Julius Caesar

_____ 2. a Roman who tried to gain some of Caesar's power from his position as executor of Caesar's will

_____ 3. a senator who fell on his sword after defeat at Philippi

_____ 4. a leader of the senatorial party who wanted to use Octavius' popularity to help the Senate

_____ 5. a member of the Second Triumvirate

_____ 6. a member of the Second Triumvirate who lost power when he failed to do his part in fighting the pirates of Sicily

_____ 7. a member of the Second Triumvirate who lived in luxury and laziness with Cleopatra in Egypt

_____ 8. a member of the Second Triumvirate who later became the sole ruler of Rome

_____ 9. a Roman who wanted to avenge the death of Caesar and then take over his power

_____ 10. a Roman responsible for establishing the Principate

Example 2-q

Students should be able to associate specific situations with the proper political period in the life of Augustus. Students must understand the nature of the Second Triumvirate and the Principate in order to know what types of activities were common to both and which were unique to each of the periods. The class used a timeline to help in sorting out the events and this quiz was used to

see how well the timeline had helped students make this kind of understanding a part of their comprehension of the chapter. A follow-up exercise involved writing a short essay on either the Second Triumvirate or the Principate to demonstrate an understanding of the political dynamics involved during that period.

Topic: Western Civilization

Content objective: Events and situations in Roman politics during the life of Octavius (Augustus)

Behavioral objectives: Knowledge of sequences

Indicate the time period in the life of Augustus when the statements below were true.

A. during the Second Triumvirate
B. during the Principate
C. during both
D. during neither

_____ 1. Octavius was given the title of "Imperator Caesar Augustus."

_____ 2. Octavius was given power by the Senate to issue edicts which had the effect of laws.

_____ 3. Octavius forced farmers to give up their land in order to repay his soldiers.

_____ 4. Peace was brought to the Roman Empire.

_____ 5. The Senate was in theory the chief lawmaking group in Rome.

_____ 6. Mark Antony was the ruler of the city of Rome.

_____ 7. The Senate turned over more and more power to Octavius.

_____ 8. Octavius' power rested ultimately on his control of the army.

_____ 9. Many senators and knights were killed for opposing Octavius.

_____ 10. The government of Rome was a dictatorship pretending to be a democracy.

Example 2-r

In the first section, students should be able to recognize the cause or effect relationships of events related to the Kansas-Nebraska Act. Since students may be able to answer the questions by knowing events that came chronologically before or after the act rather than truly recognizing them as causes and effects, follow-up should include discussion of the ways in which the cause and effect relationship can be demonstrated. This could be accomplished through discussion or through short essay questions on the test.

In the second section, students should be able to differentiate between Republican and Democratic elements in the election of 1856. This is a straightforward item, and needs to be supported by questions which allow the student to demonstrate an understanding of platform terms such as Popular Sovereignty. This could be accomplished either with multiple choice or short answer questions.

Topic: U.S. History

Content objective: Events prior to the Civil War

Behavior objective: Analysis of relationships

A. Indicate the connection of the following items with the Kansas-Nebraska Act.

C for a cause of the Kansas-Nebraska Act
E for an effect of the Kansas-Nebraska Act
N for not related to the Kansas-Nebraska Act

_____ 1. the idea of Popular Sovereignty

_____ 2. the Pottawattomie Creek Massacre

_____ 3. the Lecompton Constitution

_____ 4. attempts to revise the Missouri Compromise

_____ 5. the Dred Scott Decision

_____ 6. election to the Senate of Stephen Douglas

_____ 7. the split of the Democratic Party

B. Match the three possibilities below to the items listed relating to the Election of 1856.

R refers to the Republicans in 1856
D refers to the Democrats in 1856
N not involved in 1856

_____ 1. John C. Fremont

_____ 2. James Buchanan

_____ 3. Stephen A. Douglas

_____ 4. platform supporting Popular Sovereignty

_____ 5. platform supporting no extension of slavery into the territories

Example 2-s

Students should be able to recognize information about, and the significance of, ten inventions of the first half of the 19th century. Questions are based on actual points made by the textbook in connection with the inventions. Although it might appear that some of the answers are obvious, experience has shown that students perform about the same on this quiz as on others. Students need to be reminded that this is not a test of logic, but of understanding of the text. Students often will try to justify an answer on the basis of logic; for example, the telegraph could be considered a public menace because of the poles and wires. This often leads to discussion that becomes a good follow-up exercise concerning the many ramifications of new inventions. This type of discussion is a worthwhile experience in itself, although outside the arena of testing the point of view of the textbook and its author. This type of quiz can be followed up through individual reports on the various inventions or through supplemental reading on one or more of them.

Topic: U.S. History

Content objective: Significant events and inventions of the early 1800s

Behavioral objectives: Knowledge of specific facts; analysis of relationships

Match the items below to the statements about them.

A. interchangeable parts
B. sewing machine
C. telegraph
D. steel plow
E. reaper
F. steamboat
G. railroad
H. clipper ships
I. Erie Canal
J. Conestoga wagon

____ 1. designed by Donald McKay

____ 2. invented by Elias Howe

____ 3. met opposition because it would hurt tavern keepers

____ 4. helped cause factories to flourish in the North and helped North win the Civil War

____ 5. made long-range communication almost instantaneous

____ 6. one of the earliest aids in helping settlers get to the West

____ 7. allowed man to defy wind and currents

____ 8. met opposition by those who invested in canals

____ 9. invented by John Deere

____ 10. was called a public menace

____ 11. made immigration into the Old Northwest more attractive to European immigrants

____ 12. helped America compete successfully with England in the Asia trade

____ 13. allowed the development of large scale, specialized, cash crop agriculture in West

____ 14. brought many women into the factory workforce

____ 15. was not as reliable and was less profitable than its slower competitors

Example 2-t

Students should be able to recognize cause and effect relationships of events associated with the Mexican War and also distinguish between historical events having to do with the Maine and Oregon boundary disputes. In this quiz, students demonstrate a deeper knowledge of the Mexican War than of the two boundary disputes. A good follow-up question would be to take the elements identified as being part of one of the boundary disputes and writing a short essay incorporating those items. This essay should follow the teaching objective for this unit, which emphasized cause and effect relationships.

Topic: U.S. History

Content objective: The Mexican War and Maine and Oregon boundary disputes

Behavioral objectives: Knowledge of sequences; analysis of relationships

Indicate the relationship of the items listed below as follows:

C causes of the Mexican War
E effects of the Mexican War
O had nothing to do with the Mexican War but was a factor in the Oregon boundary dispute
M had nothing to do with the Mexican War but was a factor in the Maine boundary dispute

_____ 1. election of James K. Polk

_____ 2. Webster-Ashburton Treaty

_____ 3. formation of the Bear Flag Republic

_____ 4. Battle of the Maps

_____ 5. annexation of the Lone Star Republic

_____ 6. Aroostook War

_____ 7. Mexican Cession

_____ 8. crossing the Nueces River by General Taylor

_____ 9. American settlers in the Willamette Valley

_____ 10. Manifest Destiny

_____ 11. U.S. desire for California

_____ 12. Wilmot Proviso

3. Tabular (Matrix)

Example 3-i

Students should be able to associate the first 16 presidents with the time of office, political party, and important events taking place during their respective terms. This test was a culminating activity which tested an accumulation of information over most of the year. A chart (see Instructor's Notes) had been developed and discussed with students during the year. Quizzes were given periodically following the same format and gradually building to this final test. The teacher believed that memorization of a framework such as this would prove helpful to the students in establishing a frame of reference for time and sequence in early U.S. History.

Topic: U.S. History

Content objective: Presidents from Washington through Lincoln

Behavioral objectives: Analysis of elements and relationships

"X's" appear in blanks for which there is no answer listed.

Years	Name	Party	Military Event	Important Events
1789-97	____	____	____	____
1797-1801	____	____	____	____
1801-09	____	____	____	____
1809-17	____	____	____	____
1817-25	____	____	____	____
1825-29	____	____	X	____
1829-37	____	____	____	____
1837-41	____	____	____	____
1841	____	____	X	X
1841-45	____	____	X	____
1845-49	____	____	____	____
1849-50	____	____	X	____
1850-53	____	____	X	____
1853-57	____	____	X	____
1857-61	____	____	____	____
1861-65	____	____	____	____

NAMES

A. John Adams
B. J. Q. Adams
C. Buchanan
D. Fillmore
E. Harrison
F. Jackson
G. Jefferson
H. Lincoln
I. Madison
J. Monroe
K. Pierce
L. Polk
M. Taylor
N. Tyler
O. Van Buren
P. Washington

PARTIES

A. Democratic
B. Democratic-Republican
C. Federalists
D. Republican
E. Whig
F. None

MILITARY EVENTS

A. Bleeding Kansas
B. Civil War
C. Mexican War
D. Removal of Indians and Black Hawks War
E. Seminole War
F. Texas War of Independence
G. Undeclared Naval War with France
H. War of 1812
I. War with Tripoli
J. Whiskey Rebellion

IMPORTANT EVENTS

A. Alien and Sedition Acts
B. Beginning of debate on Compromise of 1850
C. Discovery of California Gold
D. Dred Scott Decision
E. Emancipation Proclamation
F. Fletcher vs. Peck Supreme Court Decision
G. Gadsden Purchase
H. Jay's Treaty
I. Kansas/Nebraska Act
J. Louisiana Purchase
K. Missouri Compromise
L. Nullification Crisis
M. Panic of 1837
N. Tariff of Abominations
O. Webster-Ashburton Treaty

President	Party	Military Event	Important Event or Work
Washington	None	Whiskey Rebellion	Jay's Treaty
John Adams	Federalists	Undeclared Naval War with France	Alien and Sedition Acts
Jefferson	Democratic-Republican	War with Tripoli	Louisiana Purchase
Madison	Democratic-Republican	War of 1812	Fletcher vs. Peck Supreme Court Decision
Monroe	Democratic-Republican	Seminole War	Missouri Compromise
J.Q. Adams	Democratic-Republican		Tariff of Abominations
Jackson	Democratic	Removal of Indians and Black Hawk War	Nullification Crisis
Van Buren	Democratic	Texas War of Independence	Panic of 1837
Harrison	Whig		
Tyler	Whig		Webster-Ashburton Treaty
Polk	Democratic	Mexican War	Discovery of California Gol
Taylor	Whig		Beginning of Debate on Compromise o 1850
Fillmore	Whig		Gadsden Purchase
Pierce	Democratic		Kansas/Nebraska Act
Buchanan	Democratic	Bleeding Kansas	Dred Scott Decision
Lincoln	Republican	Civil War	Emancipation Proclamation

Example 3-j

This item is part of a final exam for a term course on the Vietnam War. In th reading for the course, many abbreviations and acronyms were used. Durin the course, students were asked to keep a "glossary" of these abbreviations i their notebooks and to include in their definitions the types of informatio demanded by this test item.

Topic: Vietnam War

Content objective: Organizations involved in the Vietnam War

Behavioral objectives: Knowledge of terms and specific facts

Fill in the chart below by selecting the correct items from the lists provided and by writing in the correct words giving the complete title for the abbreviations given.

	ABBREVIATION	FULL TITLE	ID	PERSON	IDENTIFICATION
1.	MAC-V	_____	____	____	commanding general 1964-1968
2.	GVN	_____	____	____	president 1955-63
3.	PAVN	_____	____	____	commanding general
4.	ARVN	_____	____	____	general who later became president
5.	CORDS	_____	____	____	person who first established it
6.	MAAG	_____	____	____	general in charge 1962-1964
7.	COSVN	_____	____	____	deputy commander
8.	PRG	_____	____	____	prime minister
9.	NLF	_____	____	____	founding president
10.	DRV	_____	____	____	president 1945-1969

ID's

A. government of North Vietnam
B. military command for U.S. troops in South Vietnam beginning in 1962
C. branch of North Vietnamese Communist Party in South Vietnam
D. South Vietnamese Army
E. umbrella organization for all U.S. civilian agencies working in South Vietnam
F. group organized in South Vietnam in 1960 to overthrow the government of South Vietnam
G. South Vietnamese government
H. political organization growing out of the Southern guerrilla movement in 1969
I. U.S. military advisory organization from 1955-64
J. North Vietnamese Army

PEOPLE

1. Tran Van Tra
2. Ho Chi Minh
3. Robert Komer
4. Huynh Tan Phat
5. William Westmoreland
6. Paul Harkins
7. Nguyen Van Thieu
8. Nguyen Huu Tho
9. Vo Nguyen Giap
10. Ngo Dinh Diem

Example 4-h

Students should be able to select from four examples of short answers the one answer which not only contains accurate information but also gives the most complete answer. Questions of this nature were chosen to help freshmen learn to write higher quality short responses to test questions. The unacceptable answers contain specific misinterpretations and omissions which were discussed as a follow-up exercise. Student responses could be used and evaluated using responses from other class sections, kept anonymous to avoid embarrassment.

After some experience with this type of question, the classes were given a short answer question as part of a homework assignment and the teacher selected three answers as representative of excellent, good, and poor categories. These examples were then typed and dittoed (using anonymous examples from other classes), then discussed and graded by the students in class before receiving their own papers. Finally, students were asked to evaluate their own answers in light of the class discussion. While grammar per se was not stressed in these assignments and quizzes, having students evaluate other students' answers as well as their own increased their awareness of the benefits of using proper grammar in communicating ideas, especially when those answers are being graded on the basis of accuracy of information. Poor grammar was often a reason for information judged as incorrect, even though the student may have intellectually understood the answer. Many students became more conscious of their writing as a result of this exercise.

Topic: Western Civilization

Content objective: William the Conqueror

Behavioral objectives: Analysis of elements; knowledge of sequences

Which of the following statements best describes why William attacked England?

A. William felt that his family ties to the kings of England qualified him to take the throne when Edward the Confessor died.

B. William was asked by the King of Norway, Harold Hardrada, to help him conquer England. William agreed, hoping to dispose of Harold later.

C. William felt that Edward the Confessor had promised him the throne and Harold, Earl of Wessex, had sworn personal loyalty to him. When the Witan chose Harold to be king, William felt betrayed.

D. William's cousin, Harold of Wessex, was being held for ransom by Edward the Confessor and William wanted to help release him and then ask him to swear loyalty to William as King of England.

Example 4-i

To answer this type of question, students should be able to recognize accurate statements about political realities in the U.S. just prior to the outbreak of the Civil War. This item was part of a much larger test and was used with an average class to see if a generalization could be applied. The generalization concerned the relatively strong political position of the South which made any legislated changes to the Southern way of life less than imminent. This item could be used by itself as a short quiz to test understanding of a textbook passage assigned as homework. In turn, the quiz could become a springboard to discussion of the assigned text. Each of the three pairs of answers are replete with discussion possibilities for review of previously learned information, as well as to gain a deeper understanding of why the South reacted to the election of Lincoln in such a negative way.

Topic: U.S. History

Content objective: Political situation prior to the Civil War

Behavioral objectives: Knowledge of generalizations; interpretation

For each pair of statements below, place an X in front of the one that best describes the U.S. in 1860.

1. ____ The South had a majority on the Supreme Court.

   ____ The South had lost control of the Supreme Court.

2. ____ The Democrats controlled both houses of congress.

   ____ The Republicans controlled the presidency and the congress.

3. ____ Because there were almost an equal number of slave and free states, there was little likelihood of a constitutional amendment to abolish slavery.

   ____ The South was in danger of losing its slaves because of a proposed constitutional amendment.

5. Greater/Less/Same

Example 5-f

To answer these questions, students should be able to recognize a rough chronology of events by relating them to the presidency of Andrew Jackson. This item was used as a review of several chapters in the textbook and halfway through the chapter on Jackson. Because this quiz asks the student only for a knowledge of sequence, it could be expanded by adding short essay questions. The additional topics could include cause-and-effect relationships, relating the events occurring before or after Jackson with the proper presidency, or by relating events to other people and events not included in the quiz items.

Topic: U.S. History

Content objective: Review of the early 1800s (the place of Andrew Jackson in the history of the U.S.)

Behavior objective: Knowledge of sequences

The presidency of Andrew Jackson is outstanding in U.S. history. Indicate whether the events listed below came (B) before, (A) after, or (S) at the time of his presidency.

_____ 1. the Era of Good Feeling

_____ 2. the Mexican War

_____ 3. the first president from a Western state was elected

_____ 4. building of the National Road

_____ 5. removal of the Cherokees to Oklahoma

_____ 6. War for Texan Independence

_____ 7. establishment of the Second Bank of the U.S.

_____ 8. the last Federalist president

_____ 9. the first Whig president

_____ 10. attempts by South Carolina to nullify the tariff

6. Rank Order

Example 6-m

In the first part of this example, students should be able to recognize the sequence of events which led to an increasingly volatile disagreement over the issue of Black slavery in the South. In the second part, students should be able to recognize the sequence of events in two categories of developments concerning the economic growth of the U.S. in the early 1800s. Class discussion centered around the reasons for the timing of events and any cause-and-effect relationships. Since students were not asked to memorize sequence, they could only do well on this quiz if they understood the relationships discussed. Further evidence of this understanding could be obtained by adding a short essay question asking for a discussion of the specific relationships between two or several events.

Topic: U.S. History

Content objective: Events associated with the slavery issue

Behavioral objectives: Knowledge of sequences; analysis of relationships

Indicate the order of the following events by putting numbers in front of them. Use a *1* for the *earliest* event, and a *5* for the *latest* event.

____ Compromise of 1850

____ Harper's Ferry raid

____ Kansas-Nebraska Act

____ invention of cotton gin

____ Lincoln-Douglas debates

Topic: U.S. History

Content objective: Events associated with the economic development of the U.S. in the early 1800s

Behavioral objectives: Knowledge of sequences; analysis of relationships

Put each of the two following columns of items in the correct order, using the number *1* for the *earliest* event and number *4* for the *latest* event.

____ Tariff of 1816

____ invention of cotton gin

____ invention of sewing machine

____ first spinning and weaving factory

____ pony express

____ beginning of B&O Railroad

____ invention of steamboat

____ completion of Erie Canal

7. Question and Short Answer

Example 7-j

Students should be able to recognize the best short statement concerning selected topics from the philosophies of Confucius and Mao Tse-tung. Students had studied the teachings of Confucius earlier in the term, and had finished reading selections from the quotations of Mao and hearing lectures on the thoughts of Mao. Students were asked to prepare for this quiz by reviewing their notes and readings on both Confucius and Mao. This part of the test asked students to correctly identify beliefs of the two thinkers. Other parts of the test asked for a comparison of ideas on subjects both men had discussed in the readings used. There were also questions which asked students to explain in their own words a given belief of Mao or Confucius. All of this ultimately led to a discussion of the ways in which Communism has changed Chinese society and ways in which Communism has adapted to Chinese traditions.

Topic: History of China

Content objective: Philosophies of Confucius and Mao Tse-tung

Behavioral objective: Interpretation

1. How does the Confucian concept of sincerity differ from the Western sincerity?
   a. Confucians believe it is not always necessary to be sincere.
   b. Confucians believe sincerity is shown through proper behavior rather than thoughts.
   c. Confucians believe that life is a constant struggle to be sincere.

2. What was Mao Tse-tung's attitude toward rural life?
   a. He believed everyone should experience the rural life sometime.
   b. He believed rural and urban life were both important.
   c. He believed only the urban proletariat really understood the Revolution.

3. What was Mao Tse-tung's attitude toward self-sufficiency?
   a. He believed each person should try to become self-sufficient.
   b. He believed China should try to become self-sufficient.
   c. He believed the Communist Party should try to become self-sufficient.

4. What was Mao Tse-tung's attitude toward education?
   a. He believed strongly in technical subjects as the basis of a good education.
   b. He believed strongly in Communist ideology as the basis of a good education.
   c. He believed strongly that people needed a technical education but should also have some exposure to Communist ideology.

5. What was Mao Tse-tung's attitude toward individualism?
   a. Individuals should strive for personal success.
   b. Individuals should strive for the success of their country.
   c. Individuals should be rewarded for their successes.

Example 7-k

This question was used to help a sophomore class learn to write better short essay answers. The choices represent teacher-reworked examples from answers given by former students. This type of question also has been used with actual examples of student answers. Often students are first asked to write their own essay on the topic, then they take this short quiz, and then compare their answers to the examples. A good follow-up activity is to have students correct the three sample essays as though they were the teacher, looking for inaccurate statements, spelling and grammar mistakes, good insights, etc. This question could be used as a non-graded exercise or as one question on a larger test which can then be used for follow-up student practice in grading essays. Students who have the opportunity to evaluate essays often think more about the essays they write, and the quality of student responses increases. The instructor often puts the answers on an overhead transparency and corrects them to show the class what he is looking for in an essay. He then gives them another set to grade, with the instruction to look for the same things. The students then compare how they graded an essay with how others in the class graded it to see if they agree with the majority.

Topic: U.S. History

Content objective: Importance of the cotton gin to U.S. history

Behavioral objectives: Judgment in terms of external criteria; knowledge of sequences and specific facts

What effects did the invention of the cotton gin have on U.S. history?

_____ The invention of the cotton gin was important because it made life so much easier for the slaves. Many slaves could now be freed because the new invention did most of the work the slaves had been doing. This

caused many blacks to be freed by their masters with the result that poor whites became angry and insisted that slavery be preserved so they wouldn't have to compete with blacks for jobs. This explains why the South fought so hard to preserve slavery in the Civil War.

____ The biggest effect of the invention of the cotton gin was on our relations with European countries. The cotton gin made the growing of cotton more profitable and cotton became the most important crop grown in the South. Since England's textile factories needed large amounts of cotton, England could not afford to be an enemy of the United States. That explains why we got what we wanted in the Maine and Oregon boundary disputes. England and the United States were friends until the Civil War when England sided with the Confederacy in order to keep the cotton coming into her factories. While our relationship with England was generally good, our relationship with Spain was damaged due to the annexation of Texas as a new area to use for the expanding cotton culture.

____ The invention of the cotton gin made the growing of cotton more profitable in the South. This invention came about at a time when slavery was apparently slowly dying out. The cotton gin caused an economic boom in the South and increased the need for slavery. The South became dependent on cotton as the basis of its economy and, therefore, also became dependent on slavery. This helps to explain why the South was so fearful of losing slavery that it was willing to go to war in 1861. At the same time, northern merchants and manufacturers became more dependent on the cotton industry and were reluctant to go to war to end slavery, but could be persuaded to go to war to preserve the union and their mutual economic interests.

8. Statement and Comment

Example 8-h

Students should be able to demonstrate an understanding of mercantilism as learned from the textbook and from classwork by interpreting a quotation from Adam Smith's *Wealth of Nations*. The students had not seen the quote before the quiz. To recognize the best answer for each question, the students must have a good general knowledge of the period described in the quote. To be able to recognize which answer is the worst, or least likely to be true, also requires students to have a very good understanding of U.S. history. Interesting discussions can develop when going over this quiz and soliciting student comments as to why they believe answers are least likely to be true. For example, in question #5, Charles Townshend is clearly the least likely because of his advocacy of the mercantile theory, which this statement argues against. It is less clear how Jefferson might have felt about the issue and various thoughts as to his attitude can be elicited. In making up a question of this type, it is very important that there be an answer which is clearly least likely. This can occur for some reason (such as answer "c" in question #2). Some teachers may not want to use the least likely option always, but the follow-up discussion can still be used to discuss why answers were incorrect.

Topic: U.S. History

Content objective: Mercantilism—demonstrate an understanding of mercantilism as learned from the text and from classwork, by interpreting a quotation from Adam Smith's *Wealth of Nations* (not seen previously)

Behavioral objectives: Application; interpretation

"To prohibit a great people, however, from making all that they can of every part of their own produce, or from employing their stock and industry in the way that they judge most advantageous to themselves, is a manifest violation of the most sacred rights of mankind. Unjust, however, as such prohibitions may be, they have not hitherto been very hurtful to the colonies. Land is still so cheap, and, consequently, labour so dear among them, that they can import from the mother country, almost all the more refined or more advanced manufactures cheaper than they could make them for themselves. Though they had not, therefore, been prohibited from establishing such manufactures, yet in their present state of improvement, a regard to their own interest would, probably, have prevented them from doing so. In their present state of improvement, those prohibitions, perhaps, without cramping their industry, or restraining it from any employment to which it would have gone of its own accord, are only impertinent badges of slavery imposed upon them, without any sufficient reason, by the groundless jealousy of the merchants and manufacturers of the mother country. In a more advanced state they might be really oppressive and insupportable."

Pick the *best* (+) and *worst* (−) interpretation of this statement from each group of three comments below. Base your answers on the statement itself and your overall knowledge of history.

1. ____ a. The statement describes France and her American colonies.
   ____ b. The statement describes Spain and her American colonies.
   ____ c. The statement describes England and her American colonies.

2. ____ a. The author believes a mother country can regulate the business of a colony without necessarily hurting the colony.
   ____ b. The author believes people should be left free to develop to their greatest economic potential.
   ____ c. The author believes mother countries should be careful only to prohibit those industries in their colonies that would not develop anyway.

3. ____ a. The author believes the mother country placed the manufacturing prohibitions on its colony because of unnecessary jealousy.
   ____ b. The author believes the mother country placed the manufacturing prohibitions on its colony as a sign of domination.
   ____ c. The author believes the mother country placed the manufacturing prohibitions on its colony to save the colony from higher labor costs.

4. ____ a. The author is arguing against the economic theory of capitalism.
   ____ b. The author is arguing against the economic theory of mercantilism.
   ____ c. The author is arguing against the economic theory of Laissez Faire.

5. ____ a. This statement was most likely made by Adam Smith.
   ____ b. This statement was most likely made by Thomas Jefferson.
   ____ c. This statement was most likely made by Charles Townshend.

Example 8-i

Students should be able to demonstrate an understanding of the vocabulary and the literal meaning of the passages, and the ability to interpret the ideas expressed in two quotes from the Lincoln-Douglas debates. The students had not seen the quotes previously. This item was part of a term examination and the students did not know the quotes were associated with the Lincoln-Douglas debates. This should be deduced by the students as they read the quotes. Using basic questions such as these leads to many possibilities for questions involving interpretation. For example, the question concerning the attitude of an abolitionist towards the statements requires an understanding of the beliefs of abolitionists, as well as the ability to understand the quotes. Other groups of people or individuals could be added to the question list and possible attitudes for each suggested. Short answer questions in which students would have to state how someone would react to the statements also could be included.

Topic: U.S. History

Content objective: To demonstrate an understanding of the vocabulary, literal understanding of the passages, and interpretation of the ideas expressed in two quotes from the Lincoln-Douglas debates

Behavioral objectives: Application; interpretation; extrapolation

QUOTE A: "I hold that the people of a territory, like those of a State, . . . have the right to decide for themselves whether slavery shall or shall not exist within their limits. . . . If the people want the institution of slavery they will protect and encourage it; but if they do not want it they will withhold that protection, and the absence of local legislation protecting slavery excludes it as completely as a positive prohibition."

QUOTE B: "Wrong as we think slavery is, we can yet afford to let it alone where it is, because that much is due to the necessity arising from its actual presence in the nation; but can we, while our votes will prevent it, allow it to spread into the National Territories, and to overrun us here in these Free States? If our sense of duty forbids this, then let us stand by our duty, fearlessly and effectively."

Place an "x" by the statement below that is *true* of the quotes above.

_____ These quotes both call for the abolition of slavery.

_____ Neither quote calls for the abolition of slavery.

_____ Quote A calls for the abolition of slavery while quote B does not.

_____ Quote B calls for the abolition of slavery while quote A does not.

_____ Which of the two quotes best describes the theory of "Popular Sovereignty"?

_____ Which of the two quotes best summarizes the platform of the Republican Party in 1858-60?

_____ Which quote is from Lincoln?

_____ Which quote is from Stephen A. Douglas?

Place an "x" in front of the statement that *best* indicates how an abolitionist would most likely respond to these two quotes.

_____ would agree with statement A but disagree with B

_____ would agree with statement B but feel it doesn't go far enough

_____ would agree with statement A believing that if given a choice people would not choose slavery

Place an "x" in front of the statement that *best* summarizes quote A.

_____ If people in a territory or state want slavery they should be able to have it.

_____ States that want slavery should have laws to protect slave owners.

_____ The people of new territories added to the union should be able to decide if they want to have slavery.

Place an "x" in front of the statement that *best* summarizes quote B.

_____ The spread of slavery must be stopped.

_____ Slavery is wrong and it must be destroyed.

_____ There is a danger that slavery will spread to the free states.

Which quote would the following people probably agree with the most?

_____ John C. Calhoun

_____ Jefferson Davis

_____ William Lloyd Garrison

_____ John Brown

_____ Roger B. Taney

_____ Dred Scott

Place an "x" in front of any statements below that can be justified based on the ideas expressed in the quotes and from your knowledge of American history.

_____ The ideas in quote B helped bring on the problem of "Bleeding Kansas."

_____ The ideas in quote A had been used in the Compromise of 1850.

_____ Southerners interpreted the ideas expressed in quote B to mean the author wanted to do away with all slavery.

_____ Quote A expressed the opinion of most Southerners and quote B expressed the opinion of most Northerners in 1860.

Example 10-k

Students should be able to demonstrate an understanding of the results and importance of two events of 1860. These questions were part of a larger test on the period leading to the Civil War. The correct responses follow very closely the information presented by the textbook, which was reinforced through class discussion. In some instances, the wrong answers represent myths about the events. A good example is the one wrong statement concerning the election of Lincoln. Follow-up to the quiz could involve discussion based on why each of the correct statements presents an idea that is important.

Topic: U.S. History

Content objective: The U.S. in 1860

Behavioral objective: Analysis of relationships and elements

1. In 1860, Abraham Lincoln was elected president.

   Put an "x" in front of each statement that indicates a *result* of this election.

   _____ It was a victory for the Republicans.

   _____ Seven Southern states seceded.

   _____ The South prepared to attack the North.

   _____ There were widespread slave revolts in the South.

   _____ Southern troops attacked Washington but were defeated at Bull Run.

   Put an "x" in front of each statement that indicates the *importance* of this election.

   _____ Lincoln was a minority president.

   _____ The South felt it could no longer be part of the union.

   _____ The ideas of union and secession would have to be tested.

   _____ It showed the unity of the North in the struggle against slavery.

   _____ Varying ideas on how to deal with the slavery issue had split the Democratic Party.

2. In 1860 the pony express began service between California and Missouri.

   Put an "x" in front of each statement that indicates a *result* of this event.

   _____ Mail service was improved significantly to the Far West.

   _____ The service was a disaster at first, but over the years it improved.

   _____ The job of express rider became both difficult and dangerous.

   _____ Other pony express routes were added in other parts of the West.

Put an "x" in front of each statement that indicates the *importance* of this event.

_____ The pony express was a last ditch effort to improve communication by "superhuman" efforts.

_____ The pony express did not last because of rapid improvements in technology.

_____ Because of weather, Indians, and extreme physical punishment, the express proved ineffective in the long run.

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