
How to Defeat the Common Rules of Thumb Which Students Use to Guess Correct Answers

Rule of thumb: Pick the longest answer.

Way to defeat this strategy: Make sure the longest answer is right about a fifth of the time (if there are five alternatives for each question).

Rule of thumb: Pick the 'b' alternative.

Way to defeat this strategy: Make sure each answer is used the same number of times, in random order.

Rule of thumb: Never pick an answer which uses the word 'always' or 'never' in it.

Way to defeat this strategy: Make sure such answers are correct about a fifth of the time.

Rule of thumb: If there are two answers which express opposites, pick one or the other and ignore other alternatives.

Way to defeat this strategy: Sometimes offer opposites when neither is correct.

Rule of thumb: If in doubt, guess.

Way to minimize the impact of this strategy: Use five alternatives instead of three or four.

Rule of thumb: Pick the scientific-sounding answer.

Way to defeat this strategy: Use scientific sounding jargon in wrong answers

Rule of thumb: Do not pick an answer which is too simple or obvious.

Way to defeat this strategy: Sometimes make the simple, obvious answer the correct one.

Rule of thumb: Pick a word which you remember was related to the topic.

Way to defeat this strategy: When drawing up distractors (wrong answers) use terminology from the same area of the text as the right answer, but in distractors use those words incorrectly so the wrong answers are definitely wrong.

When to Use Essay or Objective Tests

(Continued from previous page)

Either essay or objective tests can be used to:

- measure almost any important educational achievement a written test can measure.
- test understanding and ability to apply principles.
- test ability to think critically.
- test ability to solve problems.

Conventional wisdom accurately portrays short-answer and essay examinations as the easiest to write and the most difficult to grade, particularly if they are graded well.

The matching of learning objective expectations with certain item types provides a high degree of test validity: testing what is supposed to be tested

Certain item types are better suited than others for measuring particular learning objectives. For example, learning objectives requiring the student to demonstrate or to show, may be better measured by performance test items, whereas objectives requiring the student to explain or to describe may be better measured by essay test items.

To further illustrate this principle, several sample learning objectives and appropriate test items are provided on the right. Match the most suitable test item with each of the learning objectives.

Matching Learning Objectives with Test Items

Instructions: Below are four test item categories labeled A, B, C, and D. Following these test item categories are sample learning objectives. On the line to the left of each learning objective, place the letter of the most appropriate test item category.

- A = Objective Test Item (multiple choice, true-false, matching)
 B = Performance Test Item
 C = Essay Test Item (extended response)
 D = Essay Test Item (short answer)

1. Name the parts of the human skeleton
2. Appraise a composition on the basis of its organization
3. Demonstrate safe laboratory skills
4. Cite four examples of satire that Twain uses in **Huckleberry Finn**
5. Design a logo for a web page
6. Describe the impact of a bull market
7. Diagnose a physical ailment
8. List important mental attributes necessary for an athlete
9. Categorize great American fiction writers
10. Analyze the major causes of learning disabilities

Answers: 1-A, 2-C, 3-B, 4-D, 5-B, 6-C, 7-B, 8-D, 9-A, 10-C

Generally...

Creating a test is one of the most challenging tasks confronting an instructor.

Unfortunately, many of us have had little, if any, preparation in writing tests.

Well constructed tests motivate students and reinforce learning. Well constructed tests enable teachers to assess the students mastery of course objectives. Tests also provide feedback on teaching, often showing what was or was not communicated clearly.

While always demanding, test writing may be made easier by considering the following suggestions for general test construction.

General Tips About Testing

Length of Test

In theory, the more items a test has, the more reliable it is. On a short test a few wrong answers can have a great effect on the overall results. On a long test, a few wrong answers will not influence the results as much. A long test does have drawbacks. If a test is too long, and particularly if students are doing the same kind of item over and over, they may get tired and not respond accurately or seriously. If a test needs to be lengthy, divide it into sections with different kinds of tasks, to maintain the student's interest.

Clear, Concise Instructions

It is necessary to give clear, concise instructions. It is useful to provide an example of a worked problem, which helps the students understand exactly what is necessary. What seems to be clear to the writer may be unclear to someone else.

Mix It Up!

It is often advantageous to mix types of items (multiple choice, true-false, essay) on a written exam or to mix types of exams (a performance component with a written component). Weaknesses connected with one kind of item or component or in students' test taking skills will be minimized.

Test Early

It is helpful for instructors to test early in the term and consider discounting the first test if results are poor. Students often need a practice test to understand the format each instructor uses and anticipate the best way to prepare for and take particular tests.

Test Frequently

Frequent testing helps students to avoid getting behind, provides instructors with multiple sources of information to use in computing the final course grade (thus minimizing the effect of "bad days"), and gives students regular feedback. It is important to test various topics in proportion to the emphasis given in class. Students will expect this practice and will study with this expectation.

Check For Accuracy

Instructors should be cautious about using tests written by others. Often, items developed by a previous instructor, a textbook publisher, etc., can save a lot of time, but they should be checked for accuracy and appropriateness in the given course.

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Quiz Answers

1. *Essay exams are easier to construct than are objective exams.*

TRUE Essay items are generally easier and less time consuming to construct than are most objective test items. Technically correct and content appropriate multiple choice and true-false test items require an extensive amount of time to write and revise.

2. *Essay exams require more thorough student preparation and study time than objective exams.*

?(QUESTION MARK) According to research findings it is still undetermined whether or not essay tests require or facilitate more thorough (or even different) student study preparation.

3. *Essay exams require writing skills where objective exams do not.*

TRUE Writing skills do affect a student's ability to communicate the correct "factual" information through an essay response. Consequently, students with good writing skills have an advantage over students who do not.

4. *Essay exams teach a person how to write.*

FALSE Essays do not teach a student how to write but they can emphasize the importance of being able to communicate through writing. Constant use of essay tests may encourage the knowledgeable but poor writing student to improve his/her writing ability in order to improve performance.

5. *Essay exams are more subjective in nature than are objective exams.*

TRUE Essays are more subjective in nature due to their susceptibility to scoring influences. Different readers can rate identical responses differently, the same reader can rate the same paper differently over time, the handwriting, neatness or punctuation can unintentionally affect a paper's grade.

6. *Objective exams encourage guessing more so than essay exams.*

?(QUESTION MARK) Both item types encourage some guessing. Multiple choice, true-false and matching items can be correctly answered through blind guessing, yet essay items can be responded to satisfactorily through well written bluffing.

7. *Essay exams limit the extent of content covered.*

TRUE Due to the extent of time required to respond to an essay question, only a few essay questions can be included on an exam. A larger number of objective items can be tested in the same amount of time, covering more content.

8. *Essay and objective exams can be used to measure the same content or ability.*

TRUE Both item types can measure similar content or learning objectives. Research has shown that students respond almost identically to essay and objective test items covering the same content.

9. *Essay and objective exams are both good ways to evaluate a student's level of knowledge.*

TRUE Both objective and essay test items are good devices for measuring student achievement. However, as seen in the previous quiz answers, there are particular measurement situations where one item type is more appropriate than the other.

Suggestions For Writing Multiple Choice Test Items

1. When possible, state the stem as a direct question rather than as an incomplete statement.

Undesirable:

Alloys are ordinarily produced by...

Desirable:

How are alloys ordinarily produced?

2. Present a definite, explicit and singular question or problem in the stem.

Undesirable:

Psychology...

Desirable:

The science of mind and behavior is called...

3. Eliminate excessive verbiage or irrelevant information from the stem.

Undesirable:

While ironing her formal, Jane burned her hand accidentally on the hot iron. This was due to a transfer of heat between...

Desirable:

Which of the following ways of heat transfer explains why Jane's hand was burned after she touched a hot iron?

4. Include in the stem any word(s) that might otherwise be repeated in each alternative.

Undesirable:

In national elections in the United States the President is officially:

- A. chosen by the people.
- B. chosen by members of Congress.
- C. chosen by the House of Representatives.
- D. chosen by the Electoral College.✓

Desirable:

In national elections in the United States the President is officially chosen by

- A. the people.
- B. members of Congress.
- C. the House of Reps.
- D. the Electoral college. ✓

Remember...

- Use at least four alternatives for each item to lower the probability of getting the item correct by guessing.
- Use capital letters (A, B, C, D) as response signs rather than lower case letters ("a" gets confused with "d" and "c" with "a" if the type or duplication is poor).
- Randomly distribute the correct response among the alternative positions throughout the test, having approximately the same proportion of alternatives A, B, C, and D as the correct response.
- Avoid irrelevant clues such as grammatical structure, well known verbal associations or simplistic connections between stem and answer.
- When possible, present alternatives in some logical order (e.g., chronological, most to least, alphabetical).
- Use the alternatives **none of the above** and **all of the above** sparingly. When used, such alternatives should occasionally be used as the correct response.

Remember...

- In testing for definitions, use the term in the stem rather than as an option.
- List alternatives on separate lines (rather than including the options as part of the stem) so that all options can be clearly distinguished.
- Keep all alternatives in a similar format (i.e., all phrases, all sentences, etc.).
- Try to make alternatives for an item approximately the same length. (Making the correct response consistently longer is a common error.)
- Use misconceptions students have indicated in class or errors commonly made by students in the class as the basis for incorrect alternatives.
- Way to judge a good stem: students who know the content should be able to answer before reading the alternatives.

Multiple choice exams provide easier conditions for cheating than essay tests since single letters or numbers are easier to see than extensive text. Cheating can be minimized by using alternative test forms and controlling seating.

5. Use negatively stated stems sparingly. When used, underline and/or capitalize the negative word.

Undesirable:

Which of the following is not cited as an accomplishment of the Kennedy administration?

Desirable:

Which of the following is NOT cited as an accomplishment of the Kennedy administration?

6. Make all alternatives plausible and attractive to the less knowledgeable or skillful student.

Undesirable:

What process is most nearly the opposite of photosynthesis?
A. Digestion
B. Assimilation
C. Respiration ✓
D. Catabolism

Desirable:

What process is most nearly the opposite of photosynthesis?
A. Digestion
B. Relaxation
C. Respiration ✓
D. Exertion

7. Make the alternatives mutually exclusive.

Undesirable:

The daily minimum required amount of milk that a 10 year old child should drink is
A. 1-2 glasses.
B. 2-3 glasses. ✓
C. 3-4 glasses. ✓
D. at least 4 glasses.

Desirable:

What is the daily minimum required amount of milk a 10 year old child should drink?
A. 1 glass.
B. 2 glasses.
C. 3 glasses. ✓
D. 4 glasses.

8. Make alternatives approximately equal in length.

Undesirable:

The most general cause of low individual incomes in the United States is:
A. lack of valuable productive services to sell. ✓
B. unwillingness to work.
C. automation.
D. inflation.

Desirable:

What is the most general cause of low individual incomes in the United States?
A. A lack of valuable productive services to sell. ✓
B. The population's overall unwillingness to work.
C. The nation's increased reliance on automation.
D. An increasing national level of inflation.

***Plan to progress
through the exam
in three ways:***

- Read every question carefully but quickly, answering only those of which you are 100% certain. Put a "?" on those that need more thought.
- Then, examine/study the questions not yet answered. Answer those you are reasonably sure of without pondering too long on each. Erase the "?".
- Finally, study the remaining unanswered questions. If you cannot come to a decision by reasoning or if you run out of time, guess. Erase the "?". Note that some examinations penalize "guessing" by subtracting points for incorrect answers.

***If there is no penalty,
then a guess is better
than a blank.***

5. Plan your time

Often you are required to answer up to 70 multiple choice questions in an hour or less. This means you may have less than a minute, on average, to spend on each question. Some questions, of course, will take you only a few seconds, while others will require more time for thought.

6. Changing answers

Research has shown that changing answers on a multiple choice or true-false exam is neither good nor bad: if you have a good reason for changing your answer, change it. The origin of the myth that people always change from "right" to "wrong" is that those (i.e. the wrong ones) are the only ones you will see when you review your exam—you will not notice the ones you changed from "wrong" to "right."

This will pay dividends on future exams...

**Study your marked and returned exam in order
to learn from your successes and mistakes.**

**After Your Exam
Has Been Returned**

1. Examine each question you did get correct. Remember how you knew that the information was important when you studied. How did you study?
2. Examine each question you did not get correct in order to understand the distinction between the correct alternative and the incorrect alternatives. Ask yourself why the correct answer is correct and why the other alternatives are incorrect.
3. Determine the level of thought your instructor expects of you by reading through all of the questions. Are you expected to recognize, analyze, synthesize and/or apply the material that has been presented to you? Study accordingly for the next exam.

Multiple Choice Test Items: Conclusion

Ask yourself:

Why are these multiple choice questions crummy?

1. How frequently do you take a sick day from work?
A. never
B. once or twice a year
C. 3 to 5 times a year
D. 6 to 12 times a year
E. at least once a month
2. Identify the issue that you believe is most critical to this country's future.
A. the economy
B. education
C. integrity in government
D. national defense
E. some other issue

"Understand that there is always one clearly best answer. My goal is not to trick students or require them to make difficult judgments about two options that are nearly equally correct. My goal is to design questions that students who understand will answer correctly and students who do not understand will answer incorrectly."

John A. Johnson
Dept. of Psychology,
Penn State University

Aim for Higher Levels of Learning

Most teachers find it easier to construct multiple choice items to test recall and comprehension and to use essay items to test higher-level learning objectives. But other possibilities exist. Multiple choice items that require students to do such things as classify statements as fact or opinion go beyond simple recall of facts.

Here are two examples of multiple choice test items designed for higher order thinking skills.

A common goal of the Salt March in India, the Boxer Rebellion in China, and the Zulu resistance in southern Africa was to:

- A. overthrow totalitarian leaders
- B. force upper classes to carry out land reform programs
- C. remove foreign powers
- D. establish Communist parties to lead the governments

In western Europe, which development caused the other three?

- A. decline of trade
- B. fall of Rome
- C. breakdown of central government
- D. rise in the power of the Roman Catholic Church

One way to write multiple choice questions that require more than recall is to develop questions that resemble miniature "cases" or situations. Provide a small collection of data, such as a description of a situation, a series of graphs, quotes, a paragraph, or any cluster of the kinds of raw information that might be appropriate material for the activities of your discipline.

Then develop a series of questions based on that material. These questions might require students to apply learned concepts to the case, to combine data, to make a prediction on the outcome of a process, to analyze a relationship between pieces of the information, or to synthesize pieces of information into a new concept.

Summarizing the Argument for the Value of True-False Test Items

- The essence of educational achievement is the command of useful verbal knowledge.
- All verbal knowledge can be expressed in propositions.
- A proposition is any sentence that can be said to be true or false.
- The extent of students' command of a particular area of knowledge is indicated by their success in judging the truth or falsity of propositions related to it.

Ebel and Frisbie (1991)

Since true-false questions tend to be either extremely easy or extremely difficult, they do not discriminate between students of varying ability as well as other types of questions do.

Making the Case for True-False Items

- **Versatility**—True-false items are adaptable to the measurement of a wide variety of learning outcomes.
- **Scoring accuracy and economy**—Scoring keys can be economically applied by machine or clerical assistants.
- **Reliability**—True-false tests that are highly reliable can be constructed.
- **Amenable to item analysis**—True-false items are amenable to item analysis, by means of which they can be improved.
- **Efficiency**—More test responses can be obtained from a given amount of written material and in a given amount of time than from other forms.
- True-false items are useful in testing misconceptions.
- True-false items can be expressed in few words, making them less dependent on reading ability.

Check Your Knowledge of True-False Test Items

Directions: For each question below, circle A or B.

1. Is it recommended to take statements directly from the text to make good true-false questions?
A. Yes
B. No
2. Two ideas can be included in a true-false statement if the purpose is to show cause and effect.
A. Yes
B. No
3. When a true-false statement is an opinion, it should be attributed to someone in the statement.
A. Yes
B. No
4. Underlining or circling answers is preferable to having the student write them.
A. Yes
B. No

Circle "Good" if it describes a good practice in true-false questions, circle "Poor" if it characterizes a poor practice.

5. Complex statements are used to measure higher order thinking. **Good Poor**
6. If negatives, such as "not," are used, they should be highlighted in some way. **Good Poor**
7. True and false statements should be approximately the same length. **Good Poor**
8. There should be a recognizable pattern in the answers, such as TFTFTFTF. **Good Poor**
9. The following are examples of words that should be avoided: "all," "none," "never," "sometimes," "generally," and "often." **Good Poor**

Answers: 1-B, 2-A, 3-A, 4-A, 5-Poor, 6-Good, 7-Good, 8-Poor, 9-Good

Suggestions For Writing True-False Test Items

Remember...

- Keep language as simple and clear as possible.
- Use a relatively large number of items (75 or more when the entire test is T/F).
- Be aware that extremely long or complicated statements will test reading skill rather than content knowledge.
- Require students to circle or underline a typed "T" or "F" rather than to fill in a "T" or "F" next to the statement, thus avoiding having to interpret confusing handwriting.
- If a proposition expresses a relationship, such as cause and effect or premise and conclusion, present the correct part of the statement first and vary the truth or falsity of the second part.
- Make true and false items of approximately equal average length throughout the test.
- Randomize the sequence of true and false statements.
- Make use of popular misconceptions/beliefs as false statements.
- Write items so that the incorrect response is more plausible or attractive to those without the specialized knowledge being tested.

1. Base true-false items upon statements that are absolutely true or false, without qualifications or exceptions.

Undesirable:

Nearsightedness is hereditary in origin.

Desirable:

Geneticists and eye specialists believe that the predisposition to nearsightedness is hereditary.

2. Express the item statement as simply and as clearly as possible.

Undesirable:

When you see a highway with a marker that reads, "Interstate 80" you know that the construction and upkeep of that road is maintained by the state and federal government.

Desirable:

The construction and maintenance of interstate highways are provided by both state and federal governments.

3. Express a single idea in each test item.

Undesirable:

Water will boil at a higher temperature if the atmospheric pressure on its surface is increased and more heat is applied to the container.

Desirable:

Water will boil at a higher temperature if the atmospheric pressure on its surface is increased.

4. Include enough background information and qualifications so that the ability to respond correctly to the item does not depend on some special, uncommon knowledge.

Undesirable:

The second principle of education is that the individual gathers knowledge.

Desirable:

According to John Dewey, the second principle of education is that the individual gathers knowledge.

5. Avoid the use of extreme modifiers or qualifiers.

Undesirable:

—**All** sessions of Congress are called by the President. (F)
—The Supreme Court **frequently** rules on the constitutionality of law. (T)
—An objective test is **generally** easier to score than an essay test. (T)

Desirable:

—The sum of the angles of a triangle is **always** 180°. (T)
—The galvanometer is the instrument **usually** used for the metering of electrical energy used in a home. (F)

6. Avoid lifting statements from the text, lecture or other materials so that memory alone will not permit a correct answer.

Undesirable:

For every action there is an opposite and equal reaction.

Desirable:

If you were to stand in a canoe and throw a life jacket forward to another canoe, chances are your canoe would jerk backward.

7. Avoid using negatively stated item statements.

Undesirable:

The Supreme Court is not composed of nine justices.

Desirable:

The Supreme is composed of nine justices.

8. Avoid the use of unfamiliar vocabulary.

Undesirable:

According to some politicians, the *raison d'être* for capital punishment is retribution.

Desirable:

According to some politicians, justification for capital punishment is retribution.

Writing Hint...

One method for developing true-false items is to write a set of true statements that cover the content, then convert approximately half of them to false statements. **Remember:** When changing items to false (as well as in writing the true statements initially), state the items positively, avoiding negatives or double negatives.

Extreme Modifiers:

all	none
always	never
only	nobody
invariably	no one
best	absolutely
worst	absolutely not
everybody	certainly
everyone	certainly not

Qualifiers:

usually	frequently
often	sometimes
some	seldom
many	much
probably	a majority
apt to	most
might	a few
may	unlikely

Remember...

- Determine that the questions are appropriately answered by "True" or "False" rather than by some other type of response, such as "Yes" or "No."
- Arrange the statements so that there is no discernible pattern of answers (such as T, F, T, F, T, F and T, T, F, F, T, T, F, F) for True and False statements.
- Avoid the tendency to add details in true statements to make them more precise. The answers should not be obvious to students who do not know the material.
- Be sure to include directions that tell students how and where to mark their responses.

Attention Students: True-False Test Taking Tips

- When you do not know or cannot remember information to determine the truth of a statement, assume that it is true.
- There are generally more true questions on true-false exams than false questions because instructors tend to emphasize true questions.
- If there is specific detail in the statement, it may also tend to be true. For example, the statement "There are 980 endangered species worldwide" has specific detail and is likely to be true.
- Look for extreme modifiers that tend to make the question false. Extreme modifiers, such as always, all, never, or only make it more likely that the question is false.
- Identify qualifiers that tend to make the question true. Qualifiers (seldom, often, many) make the question more likely true.
- Questions that state a reason tend to be false.
- Words in the statement that cause justification or reason (since, because, when, if) tend to make the statement false because they bring in a reason that is incorrect or incomplete.

Variations in Writing True-False Test Items

The True-False-Correction Question...

In this variation, true-false statements are presented with a key word or brief phrase that is underlined. It is not enough that a student correctly identify a statement as being false. To receive credit for a statement labeled false, the student must also supply the correct word or phrase which, when used to replace the underlined part of the statement, makes the statement a true one.

This type of item is more thorough in determining whether students actually know the information that is presented in the false statements. While a student might correctly guess that a statement is false, no credit would be given unless the student could change the statement to a true one by writing word/words to replace underlined word(s).

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Variations in Writing True-False Test Items

(continued)

The teacher decides what word/phrase can be changed in the sentence; if students were instructed only to make the statement a true statement, they would have the liberty of completely rewriting the statement so that the teacher might not be able to determine whether or not the student understood what was wrong with the original statement.

If, however, the underlined word/phrase is one that can be changed to its opposite it loses the advantage over the simpler true-false question because all the student has to know is that the statement is false and change **is** to **is not**.

The Yes-No Variation...

In the yes-no variation, the student responds to each item by writing, circling or indicating yes-no rather than true-false. An example follows:

*What reasons are given by students for taking evening classes? In the list below, circle **Yes** if that is one of the reasons given by students for enrolling in evening classes; circle **No** if that is not a reason given by students.*

Yes	No	They are employed during the day.
Yes	No	They are working toward a degree.
Yes	No	They like going to school.
Yes	No	There are no good television shows to watch.
Yes	No	Parking is more plentiful at night.

The A-B Variation...

The example below shows a question for which the same two answers apply. The answers are categories of content rather than true-false or yes-no. This is another form of forced choice question because for each item the student must choose between **A** and **B**.

*Indicate whether each type of question below is a selection type or supply type by circling **A** if it is selection, **B** if it is supply.*

Select	Supply	
A	B	Multiple choice
A	B	True-False
A	B	Essay
A	B	Matching
A	B	Short Answer

True-False Test Items: Conclusion

Ask yourself:

Why are these true-false questions crummy?

1. There is no advantage for not using specific determiners in true-false items. **T F**
2. Test validity is a function of test reliability, which can be improved by using fewer items. **T F**
3. A nickel is larger than a dime. **T F**
4. An eagle's range of sight is precisely 1,000 ft. **T F**
5. The telephone was invented a long time ago. **T F**

"A major distinction between the true-false test item and items in a multiple choice format, is that the true-false statement contains no criterion for answering the question. Each examinee must ask the question: *True or false with respect to what?* Each true-false item must be unequivocally true or unequivocally false. It is imperative that proper wording and the elimination of extraneous clues are more crucial with the true-false item than with any other test format."

Writing Test Items, na, Michigan State University
Dept. of Education, Dec. 1999

Aim for Higher Levels of Learning

While true-false and other forced choice questions are generally used to measure knowledge and understanding, they could also be used at higher levels. Students could be provided with a set of information new to them, perhaps a portfolio, set of data, or a written work of some type, then asked various forced choice questions related to the content or the presence/absence of certain characteristics in the work.

Anticipate Scoring Ranges

Scores on true-false items tend to be high because of the ease of guessing correct answers when the answer is not known. With only two choices (true or false) the student could expect to guess correctly on half of the items for which correct answers are not known.

If a student knows the correct answers to 10 questions out of 20 and guesses on the other 10, the student could expect a score of 15. The teacher can anticipate scores ranging from approximately 50% for a student who did nothing but guess on all items to 100% for a student who knew the material.

In the final analysis...

The true-false test is probably the best known of the various types of objective test items. It is the easiest to construct and at the same time the most abused. The students learn the weaknesses that are inherent in many such items and are able to obtain high scores by noting the grammatical construction, the choice of words or other clues.

The true-false test can be used effectively as an instructional test to promote interest and introduce points for discussion. This perhaps is the most important use for the plain true-false item. It is a valuable type of test to use in giving short, daily quizzes that may be used to motivate the students for a new assignment, to review a previous lesson, to locate points to be retaught or to introduce controversial points for class discussion.

Matching Test Items

Matching questions provide a most efficient way to test knowledge in courses in which events, dates, names, and places are important. Matching questions are also appropriate for the sciences in which numerous experiments, experimenters, results, and special terms and definitions have to be remembered.

Section Summary

Good for:

- Knowledge level
- Some comprehension level, if appropriately constructed

Types:

- Terms with definitions
- Phrases with other phrases
- Causes with effects
- Parts with larger units
- Problems with solutions

Advantages:

- Maximum coverage at knowledge level in a minimum amount of space/preptime
- Valuable in content areas that have a lot of facts

Disadvantages:

- Time consuming for students
- May not be appropriate for higher levels of learning

A simple matching item consists of two columns: one column of **stems** or problems to be answered, and another column of **responses** from which the answers are to be chosen. Traditionally, the column of stems is placed on the left and the column of responses is placed on the right. An example is given below.

Directions: On the line next to each children's book in Column A print the letter of the animal or insect in Column B that is a main character in that book. Each animal or insect in Column B can be used only once.

Column A

- ____ 1. Charlotte's Web
- ____ 2. Winnie the Pooh
- ____ 3. Black Beauty
- ____ 4. Tarzan
- ____ 5. Pinocchio
- ____ 6. Bambi

Column B

- A. Bear
- B. Chimpanzee
- C. Cricket
- D. Deer
- E. Horse
- F. Pig

The student reads a stem (Column A) and finds the correct response from among those in Column B. The student then prints the letter of the correct response in the blank beside the stem in Column A. An alternative is to have the student draw a line from the correct response to the stem, but this is more time consuming to score.

In the above example notice that the stems in Column A are assigned numbers (1, 2, 3, etc.). The items in Column B are designated by capital letters. Capital letters are used rather than lower case letters in case some students have reading problems. Also there are apt to be fewer problems in scoring the student's hand-written responses if capital letters are used.

Also in the above example, the student only has to know five of the six answers to get them all correct. Since each animal in Column B can be used only once, the one remaining after the five known answers have been recorded is the answer for the sixth premise. One way to reduce the possibility of guessing correct answers is to list a larger number of responses than premises.

Test Your Knowledge of Matching Test Items

1. Problem: Faulty directions.

Directions: "Place the letter of the term in the right hand column on the line to the left of the definition column."

Circle the letter(s) that describe the best way to revise these directions:

- A. Add: "Match the following"
- B. Add: "Each term may not be used more than once"
- C. Change the order of the directions provided
- D. No changes needed

2. Problem: Unrelated topics.

- | | |
|--|--------------------------|
| ____ 1. Year in which WWII began | A. Joseph Stalin |
| ____ 2. British Prime Minister in WWII | B. Franklin D. Roosevelt |
| ____ 3. U.S. President during WWII | C. 1939 |
| ____ 4. German dictator in WWII | D. Winston Churchill |
| | E. Adolf Hitler |

Circle the letter(s) that describe the best way to revise this matching test.

- A. Change one of the descriptions to read: "Russian dictator in WWI"
- B. Add an item to the left hand column
- C. Add a description that reads: "Year in which WWI began"
- D. Remove option C. from the right hand column
- E. Remove all stimuli and responses that do not concern leaders in WWII

3. Problem: Mixing matching with completion.

Directions: On the line to the left of each statement write the letter of the atomic particles from the right hand column that the statement describes. Use each particle only once.

- | | |
|---|-------------|
| ____ 1. An ____ orbits the nucleus. | A. Electron |
| ____ 2. Positively charged particles are called ____. | B. Neutron |
| ____ 3. A ____ has no charge. | C. Protons |
| ____ 4. The ____ is located in the center of an atom. | D. Nucleus |
| | E. Ion |

Circle the letter(s) that describe the best way to revise this matching test.

- A. Edit all the stimuli on the left to be complete statements.
- B. Remove all the blanks from the stimuli on the left.
- C. Change the order of the responses on the right.
- D. Edit the stimuli to be grammatically unbiased (i.e. singular/plural)

Answers: 1-C, 2-E, 3-A, B & D

Test Your Knowledge of Matching Test Items

4. **Directions:** The four statements presented below refer to the structure of the matching test, specifically what elements should be in Column A and what elements should be in Column B. At the left of each statement are the letters **A** and **B**. Circle **A** if Column A is the best choice; circle **B** if Column B is the best choice.

- A B 1. When presenting words and their definitions, which column should contain the definitions, which are longer than the words?
- A B 2. Items arranged in chronological order would be found in which column?
- A B 3. Premise is the term applied to the items in which column?
- A B 4. Items are designated by numbers in which column?

5. **Directions:** For the four learning objectives listed below, decide whether a matching exercise would be an appropriate method of assessment (Assume that you can construct a list of 6-8 items for the matching question.) Circle **YES** if appropriate; circle **NO** if not appropriate.

- YES NO** A. The student will be able to recognize the cities in/near which the major battles in the American Revolution took place.
- YES NO** B. The student will be able to differentiate between words that are spelled correctly and those spelled incorrectly.
- YES NO** C. The student will be able to identify the elements with their symbols from the periodic table.
- YES NO** D. The student will be able to identify the English words for various fruits that are represented by their Spanish language counterparts.

6. **Directions:** On the lines following this matching question supply four recommendations to improve this question.

- | | |
|----------|--|
| Hitler | A. Year in which WWII began |
| Mulroney | B. A Canadian Prime Minister |
| Tank | C. A German dictator during the WWII |
| 1939 | D. An armored vehicle used originally to break the trench war stalemate in WWI |

Recommendations:

1. _____
2. _____
3. _____
4. _____

Answers: 4-A, B, A, A; 5-Yes, No, Yes, Yes; 6-Examples: Need directions, reverse Column A and Column B, make items similar, increase the number of responses

Suggestions For Writing Matching Test Items

Remember...

- Review your teaching objectives to make sure that a matching component is appropriate.
- Keep matching items brief, limiting the list of stimuli to 10 - 15.
- When possible, reduce the amount of reading time by including only short phrases or single words in the response list.
- Use the more involved expressions in the stem and keep the responses short and simple.
- Arrange the list of responses in some systematic order if possible (chronological, alphabetical).
- Make sure that there are never multiple correct responses for one stem (although a response may be used as the correct answer for more than one stem).
- Avoid breaking a set of items (stems and responses) over two pages. (Students go nuts flipping pages.)

1. Include directions which clearly state the basis for matching the stimuli with the responses.

Explain whether or not a response can be used more than once and indicate where to write the answer.

Undesirable:

Directions: Match the following.

Desirable:

Directions: On the line to the left of each identifying location and characteristics in Column I, write the letter of the country in Column II that is best defined. Each country in Column II may be used more than once.

2. Use only items that share the same foundation of information.

Unrelated topics included in the same matching item may allow for obvious matches and mismatches.

Undesirable:

Directions: Match the following.

- | | |
|--------------------------------------|---------------------|
| 1. Water | A. NaCl |
| 2. Discovered Radium | B. Fermi |
| 3. Salt | C. NH ₃ |
| 4. Ammonia | D. 1942 |
| 5. Year of the first Nuclear Fission | E. H ₂ O |
| | F. Curie |
| | G. 1957 |

Desirable:

Directions: On the line to the left of each compound in Column I, write the letter of the compound's formula presented in Column II. Use each formula only once.

- | Column I | Column II |
|-----------------------|-----------------------------------|
| ____ 1. Water | A. H ₂ SO ₄ |
| ____ 2. Salt | B. HCl |
| ____ 3. Ammonia | C. NaCl |
| ____ 4. Sulfuric Acid | D. H ₂ O |
| | E. H ₂ HCl |

3. Avoid grammatical or other clues to the correct response.

Undesirable:

Directions: Match the following in order to complete the sentences on the left.

- | | |
|--|--------------------------------------|
| _____ 1. Plato insisted that government was | A. The Prince. |
| _____ 2. Machiavelli wrote about achieving political unity in | B. desirable and inevitable |
| _____ 3. Hobbes argued that human nature made absolute monarchy | C. a science requiring experts. |
| _____ 4. Marx was a German philosopher and economist who founded | D. organized along industrial lines. |
| | E. Communism. |

Desirable:

Directions: On the line to the left of each statement write the letter of the philosopher from the right hand column that the statement describes. Use each philosopher once.

- | | |
|---|----------------|
| _____ 1. Thought government was a science requiring experts. | A. Hobbes |
| _____ 2. Described methods of achieving political unity. | B. Marx |
| _____ 3. Founded Communism. | C. Machiavelli |
| _____ 4. Believed that human nature made absolute monarchy desirable and inevitable | D. Durkheim |
| | E. Plato |

4. The column of stimuli on the left should set the question clearly.

Undesirable:

Directions: Match the following.

- | | |
|---------------------------|------------------------|
| _____ 1. City dwellers | A. Wild animals |
| _____ 2. Hunter-gatherers | B. Farm |
| _____ 3. Pastoral nomads | C. Apartment buildings |
| | D. Graze animals |

Desirable:

Directions: On the line to the left of each definition, write the letter of the term in the right hand column that is defined. Use each term only once.

- | | |
|--|---------------------|
| _____ 1. Live in areas of high population density. | A. Pastoral nomads |
| _____ 2. Move from one place to another in search of wild animals. | B. Ranchers |
| _____ 3. Move from one place to another with grazing animals. | C. Hunter-gatherers |
| _____ 4. Till land for cash crops. | D. City dwellers |
| | E. Farmers |
-

Attention Students: Matching Test Taking Tips

- Read the directions. There are usually two lists that need to be matched. Take a look at both lists to get a feel for the relationships and build your confidence.
- Use one list as a starting point and go through the second list to find a match. This process organizes your thinking. It will also speed your answers because you become familiar with the second list and will be able to go straight to a match that you saw when looking through the lists a previous time.
- Move through the entire list before selecting a match. If you make a match with the first likely answer, you may make an error, because an answer later in the list may be more correct.
- Cross off items on the second list when you are certain that you have a match. This seems simplistic, but it helps you feel confident and stay organized.
- Do not guess until all absolute matches have been made. If you guess early in the process, you will likely eliminate an answer that could be used correctly for a later choice.

How to Study For a Matching Test

If your instructor usually includes a matching section in a typical exam, here is one way to prepare for it. As you read the textbook, be alert for facts and ideas that are associated with people's names. On a separate sheet, list the names and facts opposite each other, resulting in two distinct vertical columns, as in the following example.

NAMES	FACTS OR IDEAS	SUBJECT
Susan B. Anthony	Women's movement	Sociology
Jack London	Call of the Wild	Literature
George Washington Carver	Agricultural chemist	Science
Lewis and Clark	American explorers	History
George A. Miller	Magic number seven	Psychology
William James	Pragmatism	Philosophy
Mozart	Marriage of Figaro	Music

To master your list, cover the fact column with a sheet of paper. Look at each item in the name column, and recite and write the corresponding fact or idea. Then, to make sure that you learn the material both ways, block out the name column and use the facts as your clues. The example given above includes items from various subject areas.

Variations for Creating Matching Tests

Keylists or Masterlists Example

A (Na ¹¹)	B (Cl ¹⁷)	C (H ¹)
22.9898	35.453	1.00797
1	+ 1, 3, 5, 7	1
(Ne)35	(Ne) 3s ² 3p ⁵	1s ¹
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:

- ___ 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?

Ranking Example

TOPIC: Social Studies, Western Civilization

Directions: 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 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

Note in the above example the implied column of responses is 1, 2, 3, 4, 5, 6, 7, 8.

Aiming for Higher Order Thinking Skills

Usually matching items measure recognition of factual **knowledge** rather than higher order thinking skills such as analysis and synthesis. This does not mean, however, that variations cannot be constructed to aim for higher levels of thinking.

One variation, presented below, combines elements of a multiple choice test item with a matching component.

Item Components

- A. Correct answer(s)
- B. foil(s)
- C. option(s)
- D. stem(s)

- ___ 1. The components of a multiple choice item are a
- ___ 2. a. stem and several foils.
- ___ 3. b. correct answer and several foils.
- ___ 4. c. stem, a correct answer, and some foils.
- ___ 5. d. stem and a correct answer
- ___ 6.

In the above example it is necessary to answer the multiple choice item in order to answer the matching item. Note also that the responses (item components) in the list at the top have an (s) added to each response to eliminate singular-plural clues.

Answers: 1-D, 2-B, 3-B, 4-A, 5-B, 6-C

Completion or Fill-in-the-Blank Test Items

Section Summary

Good for:

- Knowledge levels
- Recall and memorization of facts

Advantages:

- Good for **who, what, where, when** content
- Minimizes guessing
- Encourages more intensive study. Student must know the answer vs. recognizing the answer.
- Can usually provide an objective measure of student achievement or ability

Disadvantages:

- Difficult to assess higher levels of learning because the answers to completion items are usually limited to a few words
- Difficult to construct so that the desired response is clearly indicated
- May overemphasize memorization of facts
- Questions may have more than one correct answer
- Scoring is time consuming

No-Hint Test Construction

Completion items are especially useful in assessing mastery of factual information when a specific word or phrase is important to know. They preclude the kind of guessing that is possible on limited-choice items since they require a definite response rather than simple recognition of the correct answer. Because only a short answer is required, their use on a test can enable a wide sampling of content.

A completion item requires the student to answer a question or to finish an incomplete statement by filling in a blank with the correct word or phrase. For example,

According to Freud, personality is made up of three major systems, the _____, the _____ and the _____.

What About Synthesis and Evaluation?

Completion items tend to test only rote, repetitive responses and may encourage a fragmented study style since memorization of bits and pieces will result in higher scores. They are more difficult to score than forced-choice items and scoring often must be done by the test writer since more than one answer may have to be considered correct.

Is Short Answer the Same Thing?

A distinction should be made between completion—often referred to as fill-in-the-blank—and short answer questions. With completion questions the response is usually one or two words that fit on a line provided by the tester. Short answer questions may require one sentence or even a paragraph to fully answer the question.

Short answer questions are appropriate in measuring a student's understanding of principles or the ability to solve problems or apply principles. Short answer questions go beyond simple recall or recognition. They require students to consider various factors and to arrive at solutions, whether they deal with mathematical or other situations.

(Continued on next page...)

Short Answer (continued from previous page...)

Strategies for developing short answer questions are similar to those concerning completion but have an added dimension requiring strategies appropriate for essay questions. As an example, scoring completion questions can be more *objective* than scoring short answer questions which require a subjective *interpretation* on the teachers part. The information contained in this section primarily focuses on **completion** or **fill-in-the-blank** questions.

On the whole, completion test items have little advantage over other item types unless the need for specific recall is essential.

Test Your Knowledge of Completion Items

Directions: Fill in the blanks.

1. A fill-in-the-blank question asks students to supply rather than _____ the answer.
2. The main problem in constructing completion items is to limit the number of possible _____.
3. Put blanks at the _____ of the statement rather than the _____.
4. Completion items are faster to answer than _____ items because there are no alternatives to consider.
5. Make the _____ of equal length.
6. A direct _____ is often more desirable than an incomplete _____.
7. When doing fill-in-the-blank test items, read the _____ with the intent to give an answer that is _____ correct.
8. Always concentrate on the _____ of blanks to fill in.
9. When you do not know the exact _____, provide a descriptive answer.
10. Scoring completion items is less _____ than multiple choice or true-false because the student supplies the response.

Answers: 1-select; 2-answer; 3-end, beginning; 4-multiple choice; 5-blanks; 6-question, sentence; 7-question; 8-number; 9-response; 10-objective

Suggestions For Writing Completion Test Items

Remember...

- When possible, provide explicit directions as to what amount of variation will be accepted in the answers.
- Give much more credit for completions than for true-false or matching items.
- Avoid using a long quote with multiple blanks to complete.
- When working with definitions, supply the term, not the definition, for a better judge of student knowledge.
- For numbers, indicate the degree of precision/units expected.
- Facilitate scoring by having the students write their responses on lines arranged in a column to the left of the items.

Suggestion...

It is difficult to write completion items so that there is only one correct answer. When preparing a scores key, list the correct answer and any other acceptable alternatives. Be consistent in using the key; it would not be fair to accept an answer as right on one paper and not accept it on others.

1. Omit only significant words from the statement.

Undesirable:

Every atom has a central _____ called a nucleus.

Desirable:

Every atom has a central core called a(n) _____.

2. Do not omit so many words from the statement that the intended meaning is lost.

Undesirable:

The _____ were to Egypt as the _____ were to Persia and as _____ were to the early tribes of Israel.

Desirable:

The Pharaohs were to Egypt as the _____ were to Persia and as _____ were to the early tribes of Israel.

3. Avoid obvious clues to the correct response.

Undesirable:

Most of the United States' libraries are organized according to the _____ decimal system.

Desirable:

Which organizational system is used by most of the United States' libraries? _____.

4. Be sure there is only one correct response.

Undesirable:

Trees which shed their leaves annually are _____.

Desirable:

Trees which shed their leaves annually are called _____.

5. Avoid grammatical clues to the correct response.

If the indefinite article is required before a blank, use **a(n)** so that the student does not know if the correct answer begins with a vowel or a consonant.

Undesirable:

A subatomic particle with a negative electric charge is called an _____.

Desirable:

A subatomic particle with a negative electric charge is called a(n) _____.

6. If possible, put the blank at the end of a statement rather than at the beginning.

Asking for a response before the student understands the intent of the statement can be confusing and may require more reading time.

Undesirable:

_____ is the measure of central tendency that is most affected by extremely high or low scores.

Desirable:

The measure of central tendency that is most affected by extremely high or low scores is the _____.

Ask yourself:

Why are these completion items crummy?

- The _____ of _____ took place in the year _____.
- _____ was a crucial event to German history.

Beware of Clever Students

Nudity, infancy, and bliss are some of the answers for the following completion item:

- George Washington was born in the state of _____.

Attention Students: Completion Test Taking Tips

- Read the question with the intent to give an answer and make the sentence grammatically correct. In this process it is important to focus on how the sentence is written. For example, if the blank is preceded by the article "an," you know the word that goes in the blank must start with a vowel.
 - Concentrate on the number of blanks in the sentence and the length of the space. The test maker is giving you clues to the answer by adding spaces and making them longer.
 - Provide a descriptive answer when you cannot think of the exact word or words. The instructor will often give you credit or partial credit when you demonstrate that you have studied the material and can give a credible answer, even when you have not given the exact words.
-

Essay Test Items

Essay tests present a realistic task to the student. In real life, a person is required to organize and communicate thoughts rather than respond to multiple choice questions.

Section Summary

Good for:

- Application, synthesis and evaluation levels

Types:

- Extended response: synthesis and evaluation levels; a lot of freedom in answers
- Restricted response: more consistent scoring, outlines parameters of responses

Advantages:

- Students less likely to guess
- Easy to construct
- Stimulates more study
- Allows students to demonstrate ability to organize knowledge, express opinions, show originality.

Disadvantages:

- Can limit amount of material tested, therefore has decreased validity.
- Subjective, potentially unreliable scoring.
- Time consuming to score.

A typical essay test usually consists of a small number of questions to which the student is expected to recall and organize knowledge in logical, integrated answers. An essay test item can be an extended response item or a short answer item. An example of each type follows.

Extended Response

Compare the writings of Bret Harte and Mark Twain in terms of settings, depth of characterization, and dialogue styles of their main characters. (10 pts. 20 minutes)

Short Answer

Identify research methods used to study the S-R (Stimulus-Response) and S-O-R (Stimulus-Organism-Response) theories of personality. (5 pts. 10 minutes)

The Benefits of Essay Tests

The main advantages of essay and short answer items are that they permit students to demonstrate achievement of such higher level objectives as analyzing and critical thinking. Written items offer students the opportunity to use their own judgment, writing styles, and vocabularies. They are less time consuming to prepare than any other item type.

Research indicates that students study more efficiently for essay type examinations than for selection (multiple choice) tests. Students preparing for essay tests focus on broad issues, general concepts, and interrelationships rather than on specific details. This studying results in somewhat better student performance regardless of the type of exam they are given. Essay tests also give the instructor an opportunity to comment on students' progress, the quality of their thinking, the depth of their understanding, and the difficulties they may be having.

Unfortunately...

Essay tests consisting only of written items permit only a limited sampling of content learning due to the time required for students to respond. Essay items are not efficient for assessing knowledge of basic facts and provide students more opportunity for bluffing, rambling, and *showing* than limited choice items. They favor students who possess good writing skills and neatness. They are pitfalls for students who tend to go off on tangents or misunderstand the main point of the question.

I'd like to use essay tests, but...

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The Professional & Organizational Development Network in Higher Education

Essay question:

"Discuss the importance of the nature/nurture controversy in the shaping of current developmental theory."

Student answer:

"The nature/nurture (*sic*) controversy was very impotent (*sic*) in shaping current developmental theory becuse (*sic*) it was needed to help people who were doing work in that area to come up with their current theories."

Do you cringe when you read the kind of tortured prose and fractured thinking that is represented by the example on the left? Or plow through paragraph after paragraph of detail in a student's answer in hopes of finding an original thought.

It has been our habit in the past to blame the students, the school system and the English department for not teaching our students how to write a solidly argued, concisely worded essay answer. But we must face the fact that we are as much to blame for their imprecise prose as those other entities.

Part of the problem may lie in the way instructors help (or fail to help) students prepare for writing essay tests. Learning specialists have known for a long time that the kind of preparation needed for responding to essay questions is different from that needed for objective tests. Unfortunately, many of our students prepare for all exams with the same learning strategies, and then are ill-equipped to tackle the kind of thinking needed during essay tests.

(See **page 56** for a continuation of this essay.)

Read 'Em and Weep Essay Test Items*

History: Describe the history of the papacy from its origins to the present day, concentrating especially, but not exclusively, on its social, political, economic, religious, and philosophical impact on Europe, Asia, America, and Africa. Be brief, concise, and specific.

Biology: Estimate the differences in subsequent human culture if our form of life had developed 500 million years earlier, with special attention to its probable effect on the English parliamentary system. Prove your thesis.

Psychology: Based on your knowledge of their works, evaluate the emotional stability, degree of adjustment, and repressed frustrations of each of the following: Alexander the Great, Rameses II, Gregory of Nica, Hammurabi. Support your evaluation with quotations from each man's work, making appropriate references. It is not necessary to translate.

Sociology: Estimate the sociological problems which might accompany the end of the world. Construct an experiment to test your theory.

Economics: Develop a realistic plan for refinancing the national debt. Trace the possible effects of your plan in the following areas: Cubism, the Donatist controversy, the wave theory of light.

Physics: Explain the nature of matter. Include in your answer an evaluation of the impact of the development of mathematics on science.

Philosophy: Describe everything in detail. Be objective and specific.

*Just kidding

Test Your Ability to Construct Essay Test Items Requiring Higher Order Thinking Skills

Directions: In the blank to the left of the essay item statement, place the letter of the learning level that is best indicated by the words contained in this statement.

A=Knowledge B=Comprehension C=Application
D=Analysis E=Synthesis F=Evaluation

- _____ 1. Essay items may begin with *modify, prepare, or solve*.
- _____ 2. Essay items may begin with *define, label, outline, or state*.
- _____ 3. Essay items may begin with *convert, predict, or estimate*.
- _____ 4. Essay items may begin with *appraise, interpret, or criticize*.
- _____ 5. Essay items may begin with *categorize, compile, or re-arrange*.
- _____ 6. Essay items may begin with *diagram, illustrate, or separate*.

Directions: Use the above letters to identify the learning level of the essay test items listed below. Place your answer in the blank to the left of each item.

- _____ 1. In the president's State of the Union Address, which statements are based on facts and which are based on assumptions?
- _____ 2. How would you restructure the school day to reflect children's developmental needs?
- _____ 3. Why is Bach's Mass in B Minor acknowledged as a classic?
- _____ 4. Calculate the deflection of a beam under uniform loading
- _____ 5. Summarize the basic tenets of deconstructionism.
- _____ 6. List the steps involved in titration.

Directions: Write a test item for each learning level.

My topic: _____

1. Knowledge _____

Example Topic: Asbestos: What is asbestos?

2. Application _____

Example Topic: Asbestos: Consider the crystal structures of chrysotile and crocidolite. Why should the most common mineral be the less hazardous?

3. Synthesis _____

Example Topic: Asbestos: Design a study to reasonably demonstrate the dangers posed by asbestos to the general populace.

4. Evaluation _____

Example Topic: Asbestos: The "asbestos hazard" is either (1) nothing more than a costly bureaucratic creation or (2) a hazard that accounts for tens of thousands of deaths annually. Which of the two controversial arguments has the best scientific support?

Suggestions For Writing Essay Test Items

Standard Phrases for Writing Essay Test Items

Agreement or Disagreement: The student is being asked to assert and support a thesis with evidence.

Analyze: Analyzing is a picking apart of the whole.

Classification and Division: Grouping items into a category according to a consistent principle.

Compare/Contrast: Comparing shows similarities, while contrasting points out differences.

Cause and Effect: Establishes a link between two things and also to describe the outcome.

Define: Consists of three parts: term, class, and differentiating characteristics.

Define and give an example of: Asks students to not only define the term, but to supply an example.

Describe: Requires students to explain something in detail.

Discuss: Too vague and may elicit vague, overgeneralized, unsupported responses.

Illustrate: Give examples and/or analogies to demonstrate a particular process/idea or steps in a series.

Summarize: The overall view of some process, speech, play, concept, etc.

1. Formulate the question so that the task is clearly defined for the student.

Use words that *aim* the student to the approach you want them to take. Words like discuss and explain can be ambiguous. If you use *discuss*, then give specific instructions as to what points should be discussed.

Undesirable:

Discuss Karl Marx's philosophy.

Desirable:

Compare Marx and Nietzsche in their analysis of the underlying problems of their day in 19th century European society.

2. Pay attention to the number of items.

In order to obtain a broader sampling of course content, use a relatively large number of questions requiring shorter answers (one-half page) rather than just a few questions involving long answers (2-3 pages).

3. Avoid the use of optional questions on an essay test.

When students answer different questions, they are actually taking different tests. If there are five essay questions and students are told to answer any three of them, then there are ten different tests possible. It makes it difficult to discriminate between the student who could respond correctly to all five, and the student who could answer only three.

Use of optional questions also affects the reliability of the scoring. If we are going to compare students for scoring purposes, then all students should perform the same tasks. Another problem is that students may not study all the course material if they know they will have a choice among the questions.

(Continued on next page...)

5. Write essay items at different levels of learning.

The goal is to write essay items that measure higher cognitive processes. The item should represent a situation that tests the student's ability to use knowledge in order to analyze, justify, explain, contrast, evaluate, and so on.

Try to use verbs that elicit the kind of thinking you want the students to demonstrate. Instructors often have to use their best judgment about what cognitive skill each question is measuring. Ask a colleague to read the questions and classify them according to Bloom's taxonomy.

5. Choose a scoring model.

The major task in scoring essay tests is to maintain consistency, to make sure that answers of equal quality are given the same number of points. There are two approaches to scoring essay items: (1) analytic or point method and (2) holistic or rating method.

1. **Analytic:** Before scoring, prepare an ideal answer in which the major components are defined and assigned point values. Read and compare the student's answer with the model answer. If all the necessary elements are present, the student receives the maximum number of points. Partial credit is given based on the elements included in the answer. In order to arrive at the overall exam score, the instructor adds the points earned on the separate questions.
2. **Holistic:** This method involves considering the student's answer as a whole and judging the total quality of the answer relative to other student responses or the total quality of the answer based on certain criteria that you develop.

5. Prepare students to take essay exams.

Essay tests are valid measures of student achievement only if students know how to take them. Many college freshmen do not know how to take an essay exam, because they have not been required to learn this skill in high school.

Take some class time to tell students how to prepare for and how to take an essay exam. Use old exam questions and let students see what an "A" answer looks like and how it differs from a "C" answer.

Remember...

- Make essay questions comprehensive rather than focused on small units of content.
- Provide clear directions as to the expectations.
- Allow students an appropriate amount of time. (It is helpful to give students some guidelines on how much time to use on each question, as well as the desired length and format of the response, such as full sentences, phrases only, outline, etc.)
- Inform students, in advance of answering the questions, of the proportional value of each item in comparison to the total grade.
- Require students to demonstrate command of background information by asking them to provide supporting evidence for claims and assertions.
- Students should be informed about how you treat such things as misspelled words, neatness, handwriting, grammar, etc.
- Decide how to treat irrelevant or inaccurate information contained in students' answers.
- Write comments on the students' answers. Teacher comments make essay tests a good learning experience for students. Comments serve to refresh your memory should the student question the grade.

A Four-Step Process in Grading Essay Test Items

Step One

When the assignment is given...

- Figure out what the purpose of the assignment is, and generate grading criteria based upon that purpose.
- Share the criteria you decide upon with your students: hand it out in class, and post it on your door.
- Provide models of your grading criteria to your students.

Step Two

When the assignments are turned in...

- Quickly overview a percentage of the papers to get an overall sense of how the group did on the assignment.
- Skim some papers that you feel are representative of the range of quality in the student work.
- Use these papers to start four piles: High, Medium High, Medium Low, and Low.

Step Three

Start the grading...

- Always use a pencil on your first run through: as you develop your sense of how the students did, you will probably go back and fine-tune the papers you graded first!
- Having separated the papers into piles (high, medium, low: not letter grades yet), do an initial read through and assign a preliminary, holistic grade based upon a general impression of the work. Do not get bogged down in details yet, short of marking a plus (+) or minus (-) in the margins next to issues that strike you.
- Now re-read each paper for how it addresses the criteria identified for the assignment. Two papers may address the same criteria differently. Focus first on what the paper does, before getting to what it does not. After a sympathetic read, give it a critical read.

Step Four

Mark up the papers...

- Interactive grading poses questions and presents problems the student needs to resolve. For example: "Is this (x) what you mean? How does this connect to your main point?"

Research Shows That a Number of Factors Can Bias the Grading of Essay Tests

- Different scores may be assigned by different readers or by the same reader at different times.
- A context effect may operate; an essay preceded by a top quality essay receives lower marks than when preceded by a poor quality essay.
- The higher the essay is in the stack of papers, the higher the score assigned.
- Papers with strong answers to items appearing early in the test and weaker answers later will fare better than papers with the weaker answers appearing first.
- Scores are influenced by the expectations that the reader has for the student's performance. If the reader has high expectations, a higher score is assigned than if the reader has low expectations. If we have a good impression of the student, we tend to give him/her the benefit of the doubt.
- Scores are influenced by quality of handwriting, neatness, spelling, grammar, etc.

Etc...Etc...Etc...

Remember...

Purpose of Testing

- To provide a record for assigning grades
- To provide a learning experience for students
- To motivate students to learn
- To communicate to students their level of understanding of the course objectives and serve as a guide for further study
- When utilizing pretests, feedback is provided regarding the knowledge students bring to the content
- To assess how well students are achieving the stated goals and course objectives
- To provide the instructor with an opportunity to reinforce the stated objectives and highlight what is important for students to remember

Tips on Test Construction

1. Assess information indicative of the material stressed in class, not trivial information
2. Have students submit 1 or 2 test questions and give extra credit for appropriate questions. Have them write a question with a correct answer and source
3. To determine how much time the student will need to take the test use the following:
 - 30 seconds per true-false item
 - 60 seconds per multiple choice item
 - 120 seconds per short answer item
 - 10-15 minutes per essay question
 - 5 to 10 minutes to review the work
 - Or, allow triple the amount of time it takes you to complete the exam
4. Select items that at least 50 to 70% of the students can correctly answer, or are of average difficulty
5. In terms of test reliability, longer tests are considered more reliable than shorter tests
6. Be aware that many of the test banks and/or reviews in textbooks rarely assess higher levels of learning

Test Layout Tips

1. Include simple, succinct directions to include the following:
 - How to record answers if they are not to write on the exam
 - Whether or not to show work on problems
 - The point value for different items
 - Directions on how to use an answer sheet if provided
2. Avoid splitting a test item between two different pages
3. Leave the appropriate amount of space for each item
3. Leave wide enough margins for your comments, points, etc.
4. Group similar items together
5. If it is a large exam, it might be worthwhile to group items according to content as well
6. Leave space for the students name if they write on the exam.
7. Start with your easiest items in each section

Returning Tests and Giving Students Feedback Regarding Tests

1. Return exams promptly. If this is not possible, post a corrected copy immediately after the exam
2. When you return a test make sure the score is not showing (turn the test over; put the score on the last page)
3. Give feedback to the class as a whole regarding the following:
 - Items most missed
 - Mistakes most frequently made
 - What was done particularly well
4. When going over the test with the class, ask the students to refer to their class notes (For example, "Look back at your notes on 12-5-01. What do you have regarding this topic?")
5. Do not respond to specific questions regarding the details of an individual students answer.
6. Consider having students prepare their case in writing if they want you to give them credit for a question
7. Consider full or partial credit for valid arguments.
8. Ask students to come up with specific questions versus "Why is my test score so low?"
9. When giving one-on-one feedback, do not overwhelm a student whose performance was overall poor with so much information that they do not know where to begin.
10. Let students know when they have improved, even if it did not result in extremely high marks.
11. Instead of explaining to a student why they missed a question, ask them to "think out loud". In other words, have them answer the question and tell you out loud their thinking process.
12. To account for missed tests/quizzes you might want to drop the lowest quiz score or double the highest quiz score.

Have Students Complete an Exam Evaluation

Include some or all of the following:

- How well did the exam questions reflect the content and what was emphasized?
- What questions challenged you to think?
- Which questions seemed like trick questions and why?
- How difficult did you find the exam?
- How much time did you spend studying for the exam?
- Were you clear as to what the questions were asking? List the numbers of those questions you were unclear about.
- Are you satisfied with your answers to the questions?
- What grade would you assign to this test?

Cognitive Domain Guide

Use this chart when the major topic or task primarily involves the acquisition and processing of knowledge.

Level	If the student must...	Then use these key words in objectives, assignments and evaluations		
Knowing	...recall or recognize this knowledge; giving it back in nearly the same form as it was received.	define describe identify label	list match name recall	recite recognize select state
Comprehending	...demonstrate an understanding of this knowledge, seeing relationships and telling in their own words what it means.	associate compare discriminate	distinguish explain match	paraphrase restate illustrate translate
Applying	...use this knowledge in a concrete situation other than in which it was learned.	apply compute convert demonstrate dramatize employ estimate extend	generalize illustrate infer interpret modify operate perform practice	predict produce relate rewrite show how solve transform use
Analyzing	...analyze or break down this knowledge into its essential parts, and differentiate between facts, opinions, assumptions, hypotheses and conclusions.	analyze break down categorize compare contrast detect determine	diagram differentiate distinguish find isolate outline point out	separate separate out show how subdivide trace the logic
Synthesizing	...produce something unique and original from this knowledge by synthesizing or combining the elements from an analysis into a new structure or organization.	arrange a new assemble combine construct create design develop from	devise formulate generalize harmonize integrate organize parallel	plan problem solve reconcile relate summarize
Evaluating	...form judgments about the value or worth of this knowledge.	access appraise conclude critique defend	evaluate judge justify rank by refute	select based on support test validate

Affective Domain Guide

Use this chart when the major topic or task is primarily concerned with acquiring new attitudes, values or beliefs.

Level	If the student must...	Then use these key words in objectives, assignments and evaluations	
Receiving	...receive information about or give attention to this new attitude, value or belief.	be alert to be aware of be sensitive to experience listen to look at	perceive existence receive information on take notes on take notice of willingly attend
Responding	...participate in, or react to this new attitude, value or belief in a positive manner.	allow other to answer questions on contribute to cooperate with dialog on	discuss openly enjoy doing participate in reply to respect those who
Valuing	...show some definite involvement in or commitment to this new attitude, value or belief.	accept as right accept as true affirm belief/trust in associate himself with assume as true consider valuable	decide based on indicate agreement influence others justify based on seek out more detail
Organizing	...integrate this new attitude, value or belief, with the existing organization of attitudes, values and beliefs, so that it has a position of priority and advocacy.	advocate integrate into life judge based on place in value system	prioritize based on persuade others systematize
Characterizing	...fully internalize this new attitude, value or belief so that it consistently characterizes thought and action.	act based on consistently carry out consistently practice fully internalize	know by others as characterized by sacrifice for view life based on