Question Types

Prepared by Bryan Guarente and Tsvetomir Ross-Lazarov

While there are numerous types of questions that can be used in online learning, we recommend that you use the following types:

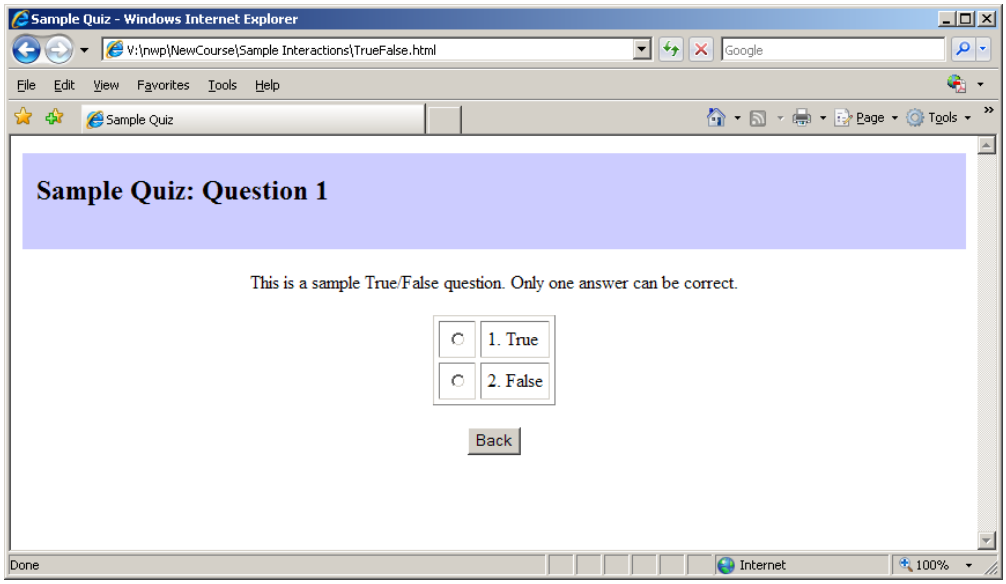
1. True/False
2. Multiple Choice (one answer, including true/false)
3. Multiple Response (select all that apply)
4. Matching Drop Down
5. Selection-box-in-a-paragraph Question
6. Matching
7. Essay

There is no limit to the number of times a question type can be used and not all types need to be included in a quiz. All question types can include either a static graphic or a flash file, if appropriate for the question and learning objectives.

The seven question types are reviewed below with examples of when each should be used.

True/False question

1. What does it look like?



2. Why/When would I use this question?
   "Probably the most common use of the true/false item is in measuring the ability to identify the correctness of statements of fact, definitions of terms, statements of principles, and the like. For measuring such simple learning outcomes, a single declarative statement is used with any one of several methods of responding." (Gronlund, p.158)

3. How do I make one?
   Identify the learning outcome that you wish to cover with this question type. If the outcome includes the mastery of "statement of fact, definitions of terms, statement of principles," write out your declarative statement. For example:
   (T) F The green coloring material in a plant leaf is called chlorophyll.
   T (F) The corolla of a flower includes petals and sepals.
   (T) F Photosynthesis is the process by which leaves make a plant's food…" (Gronlund, p. 158)

"Avoid broad general statements if they are to be judged true of false. Most broad statements are false unless qualified, and the use of qualifiers provides clues to the answer.

"T (F) The President of the United States is elected to that office.
(T) F The President of the United States is usually elected to that office.

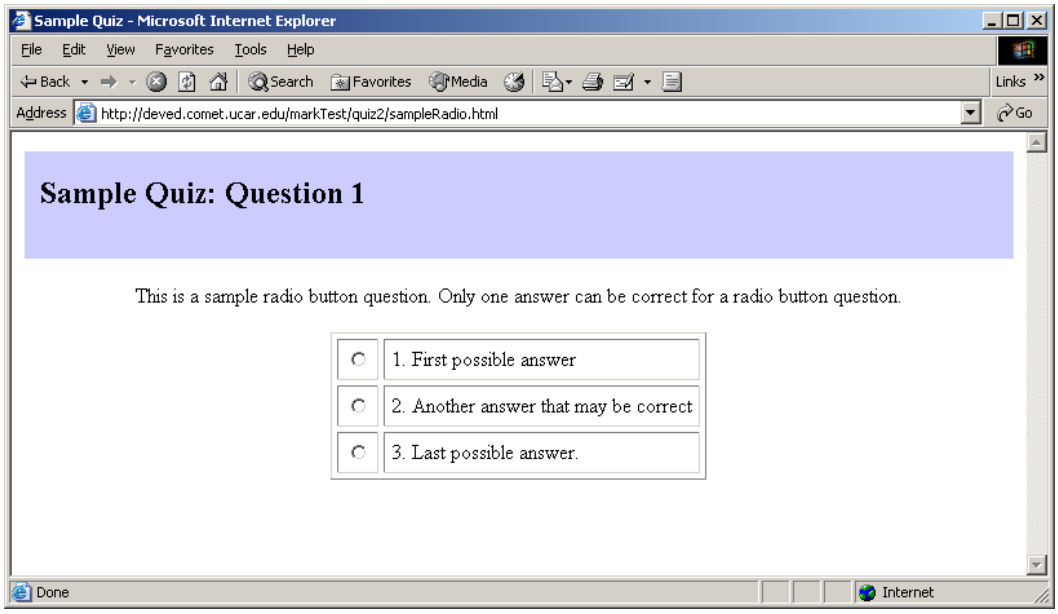
"In this example, the first version is generally true but must be marked false because there are exceptions, such as when the vice president takes office in the event of the president's death. In the

second version, the qualifier usually makes the statement true but provides a definite clue. Words such as usually, generally, often, and sometimes are most likely to appear in true statements, and absolute terms such as always, never, all, none, and only are more apt to appear in false statements." (Gronlund, p. 162)

If you plan to use a true/false type question on the quiz after the lesson, remember that true/false items are very susceptible to guessing.

Multiple Choice (Radio Button) Questions

1. What does it look like?



2. Why/When would I use this question?
   "The multiple-choice item is the most versatile type" of question available. "It can measure a variety of learning outcomes from simple to complex, and it is adaptable to most types of subject-matter content."(Gronlund, p. 175)

   This type of question can be used to present one correct and several plausible but incorrect answers to the student. Multiple-choice questions are deceptively simple to create, yet with careful writing they can be very powerful practice and assessment tools because they cover a range of learning objectives. Multiple choice questions are very versatile, but multiple choice questions shouldn't be the only question type in your presentation or quiz.

3. How do I make one?
   Identify the learning outcome that you wish to cover with this question type. If the outcome includes the mastery of "statement of fact, definitions of terms, statement of principles,

methods and procedures, application of facts and principles, interpretation of cause and effects relationship," then write out your question stem. It is very important that you take care when constructing multiple-choice questions as "This involves formulating a clearly stated problem, identifying plausible alternatives, and removing irrelevant clues to the answer." For example:

Poor	Better
"South America a. is a flat, arid country. b. Imports coffee from the United States c. has a larger population than the United States. (d.) was settled mainly by colonists from Spain.	Why did Spanish colonists settle most of South America? e. They were adventurous. (f.) They were in search of wealth. g. They wanted lower taxes. h. They were seeking religious freedom." (Grondlund, p. 185-6)

In the poor example above, the question stem includes an incomplete statement. "These are not multiple choice items but, rather, a collection of true/false statements placed in multiple-choice form. A properly constructed multiple-choice item presents a definite problem in the stem that is meaningful without the alternatives." (Gronlund, p. 185)

"Use a negatively stated stem only when significant learning outcomes require it. Most problems can and should be stated in positive terms. This avoids the possibility of students' overlooking *no, not, least*, and similar words used in negative statements. In most instances, it also avoids measuring relatively insignificant learning outcomes. Knowing the least important method, the principle that does not apply, or the poorest reason are seldom important learning outcomes. We are usually interested in students' learning the most important method, the principle that does apply, and the best reason." (Grondlund, p.186)

"An item should have only one correct or clearly best answer…the answer must be agreed upon by authorities in the area. The best-answer type is especially subject to variations of interpretations and disagreement concerning the correct answer. Care must be taken to make certain that the answer is clearly the best one. Frequently, rewording the problem in the stem will correct an otherwise faulty item.
"In the first version of the following item, different alternatives could be defended as correct, depending on whether the *best* refers to cost, efficiency, cleanliness, or accessibility. The second version avoids this problem by making the criterion of *best* explicit.

Poor	Better
"Which one of the following is the best source of electricity for home use? a. Coal b. Sunlight c. Gas d. Oil	"In the desert states of the United States, which one of the following is the cleanest source of electricity for home use? a. Coal (b.) Sunlight c. Gas d. Oil (Gronlund, p. 190)

"All distracters should be plausible…to the student who has not achieved the learning outcome being tested, the distracters should be at least as attractive as the correct answer and preferably more so." (Gronlund, p. 191)

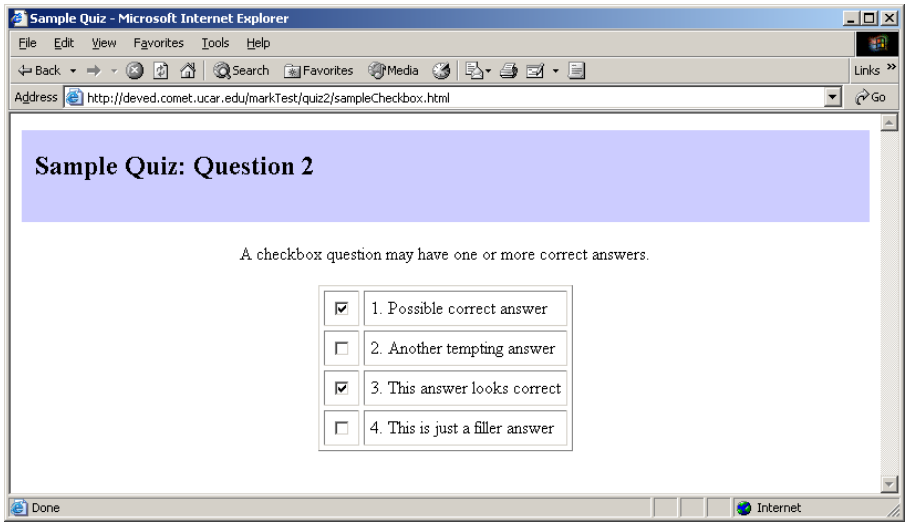
"The correct answer should appear in each of the alternative positions an approximately equal number of times but in random order. Some teachers often bury the correct answer in the middle of the list of alternatives. As a consequence, the correct answer appears in the first and last positions far less often than it does in the middle positions. This of course, provides an irrelevant clue to the alert student." (Gronlund, p. 194)

"Do not use multiple-choice items when other item types are more appropriate…When there are only two possible responses (e.g. fact or opinion), the true/false item is more appropriate…In certain problem-solving situations in mathematics and science, for example, [fill-in-the blank] items are clearly superior." (Gronlund, p. 196)

Much more can be said about the construction of multiple-choice questions; the information above is a very quick introduction. Please consult with the instructional designers if you have any questions about how to create a multiple-choice question.

Multiple Response (Checkbox) Questions

1. What does it look like?



2. Why/When would I use this question?
   The multiple-response question is a variant of the multiple-choice question and can be used for similar purposes. It provides an opportunity to place several correct statements in the same question and thus measure the learner's understanding of two or more related learning outcomes. In addition, this type of question is useful to make sure the different facets of a concept are understood by the learner properly. For example, warm air advection will cause local warming, and it will also cause rising motion. These two processes pertain to warm air advection - they aren't mutually exclusive.

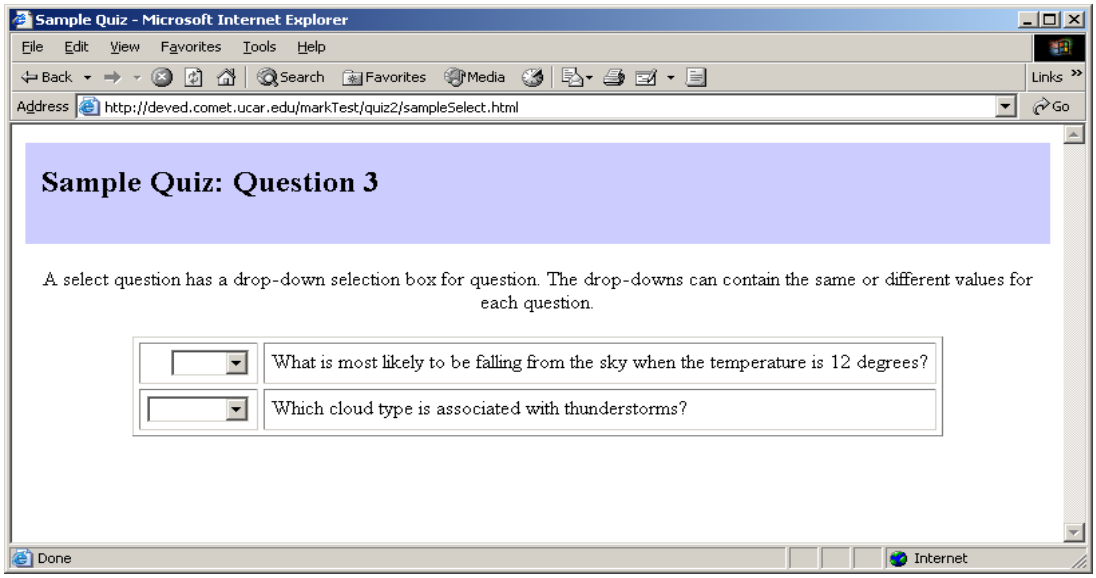
3. How do I make one?
   This question type is related to the section on multiple-choice questions, so you can review the information on multiple-choice questions above. The major difference between them is that the multiple-select question has more than one correct answer. Thus, the stem of this question type will also include a phrase similar to, "Choose all that apply," or "Select all that apply." For example:

   "How do companies that distribute software that gives you access to free music make their money? (Select all that apply.)

   a. They receive grants from the federal government.
   b. They sell advertisements.
   c. They sell information about their users.
   d. They make money from user subscriptions

Matching Drop-Down Questions

1. What does it look like?

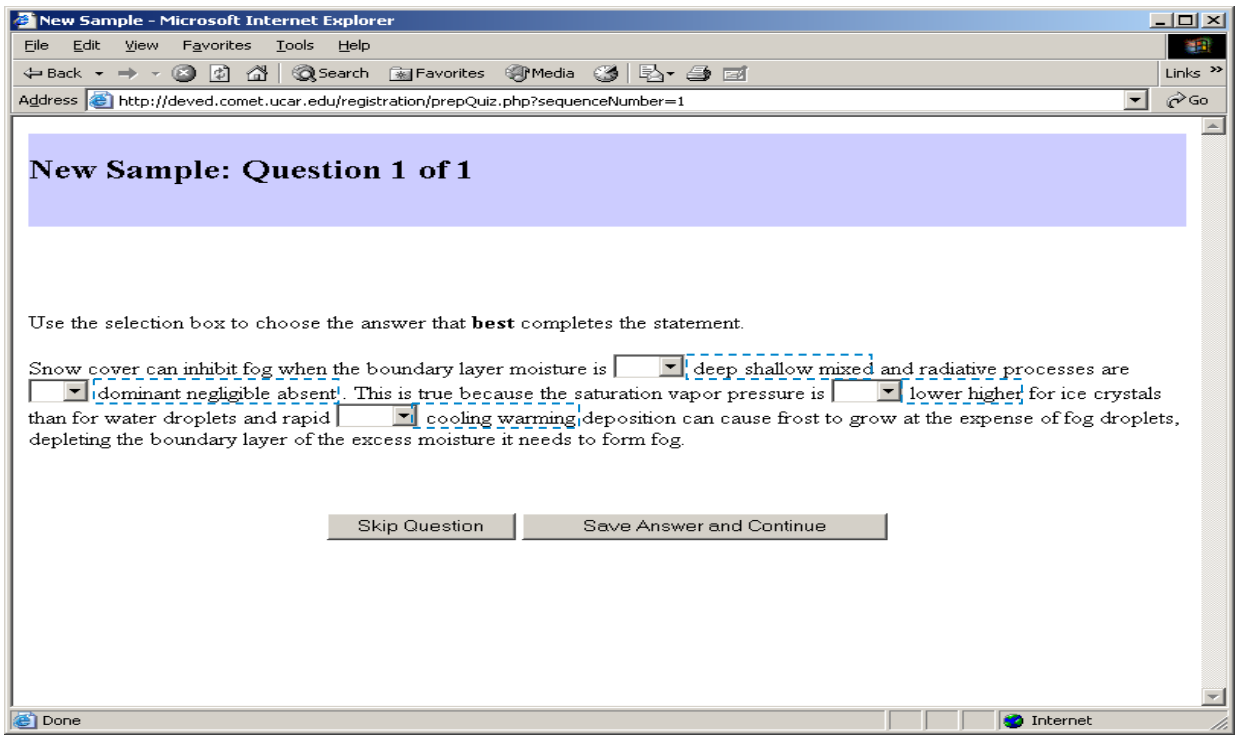


2. Why/When would I use this question?
   This question type provides an efficient way to test multiple concepts or facts related to the same principle. The question type is a variant of the true/false question. Please review the suggestions for true/false questions above.

3. How do I make one?
   Choices are presented in a drop down box where only one answer per question is correct. Each drop down box can have unique answers, but it is common to use the same answers in each box with a different corresponding question for each.

Selection-box-in-a-paragraph Question

1. What does it look like?



2. Why/When would I use this question?
   This question type is useful for checking the learner's understanding of definitions, principles, and procedures. This question type is a variant of the short-answer question. The selection-box-in-a-paragraph question is a "supply-type test item that can be answered by a word, phrase, number, or symbol… [it] uses a direct question." (Gronlund, p. 148) Use this type of question when it measures the learning objective most effectively.

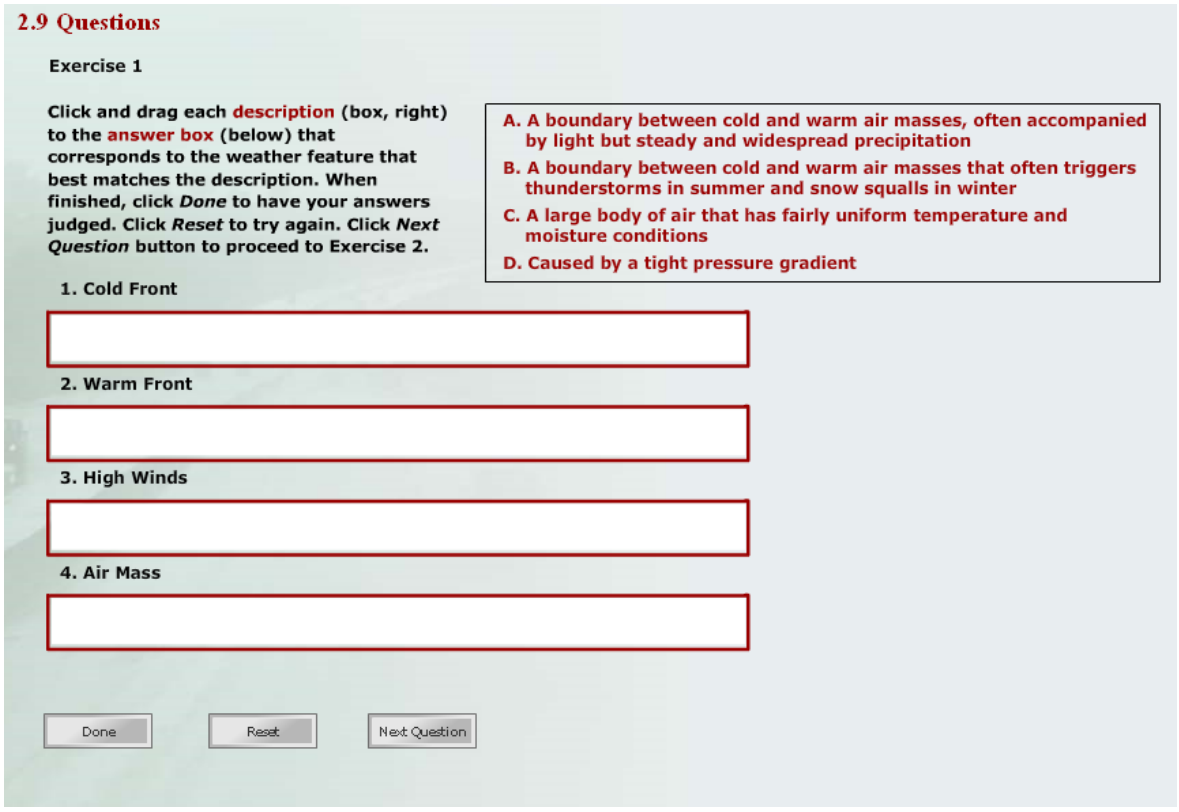
3. How do I make one?
   Selection boxes are embedded in a paragraph for this type of question. Each selection box can have a different number of answers and different values, although that is not required. You must clearly indicate the options you wish to be included in the pull-down box.

   When you are constructing this question type please follow this example:
   Snow cover can inhibit fog when boundary layer moisture is (insert box here with these 3 options: deep, shallow, mixed) and radiative processes are (insert box here with these 3 options: dominant, negligible, absent). This is true because the saturation vapor pressure is (insert box here with these 2 options: higher, lower) for ice crystals than for water droplets and rapid (insert box here with these 2 options: cooling, warming) deposition can cause frost to grow at the expense of fog droplets depleting the boundary layer of the excess moisture it needs to form fog.

In the final version, the options will be included in the pull-down box.

Matching Questions

1. What does it look like?
   Multiple choices are presented in a box that has clickable/draggable components. These answers are to be placed in the right boxes below. Answers are checked upon pressing "Done".



2. Why/When would I use this question?
   The typical matching exercise is limited to measuring factual information based on simple associations. Whenever learning outcomes emphasize the ability to identify the relationship between two things and a sufficient number of homogeneous statements can be obtained, a matching exercise seems most appropriate." (Gronlund, p. 167)

   Some examples of relationships include:
   a. "Terms….Definitions
   b. Rules….Examples
   c. Symbols….Concepts
   d. Principles…Illustrations

e. Objects…Names of objects."(Gronlund, p. 167)

3. How do I make one?

"In its traditional form, the matching exercise consists of two parallel columns with each word, number, or symbol in one column being matched to a word, sentence, or phrase in the other column… The basis for matching [statements] is sometimes self-evident but more often must be explained in the directions. In any case, the student's task is to identify the pairs of items that are to be associated on the basis indicated." (Gronlund, p. 166)

"Use only homogeneous material in a single matching exercise… It is without a doubt the most important rule of construction and yet the one most commonly violated. (Grondlund, p. 167)

The following is an example of using homogeneous material:

"Directions: On the line to the left of each United States space event in Column A, write the letter of the astronaut in Column B who achieved that honor. Each name in Column B may be used once, more than once, or not at all.

Column A	Column B
_G_ 1. First United States astronaut to ride in a space capsule.	A. Edwin Aldrin
_E_ 2. First United States astronaut to orbit the Earth.	B. Neil Armstrong
_H_ 3. First United States astronaut to walk in space.	C. Frank Borman
_B_ 4. First United States astronaut to step on the moon.	D. Scott Carpenter
	E. John Glenn
	F. Wally Schirra
	G. Alan Shepard
	H. Edward White
	(Gronlund, p. 166)

"This matching exercise illustrates an imperfect match; that is there are more names in Column B than are needed to match each event in Column A. The directions also indicate that an item may be used once, more than once, or not at all. Both of these procedures prevent students from matching the final pair of items on the basis of elimination…the items in the list of the premises in Column A are homogeneous, as they are all concerned with important space events. Such homogeneity is necessary if a matching exercise is to function properly." (Gronlund, p. 167)

Essay Question

1. What does it look like?
   Essay questions are presented next to or above a box that can accept user text. Answers are checked by the instructor once they are submitted.

2. Why/When would I use this question?
   The distinctive feature of essay questions is the freedom of response. Learning outcomes concerned with the abilities to select, organize, integrate, relate, and evaluate ideas require the freedom of response and the originality provided by essay questions. In addition, these outcomes are of such great educational significance that the expenditure of energy in the difficult and time-consuming task of evaluating the answers can be easily justified. ” (Gronlund, p. 220)

   Some examples of essay questions include:
   a. Why is the barometer one of the most useful instruments for forecasting weather? Answer in a brief paragraph
   b. Write a scientific evaluation of the Copernican theory of the solar system. Include scientific observations that support your statements.

c. Describe two situations that demonstrate the application of the law of supply and demand. Do not use those examples discussed in class. (Gronlund, p. 221-222)

3. How do I make one?

"Restrict the use of essay questions to those learning objectives that cannot be measured satisfactorily by objective items…Construct questions that will call forth the behavior specified in the learning outcomes. Like objective items, essay questions should measure the achievement of clearly defined instructional objectives. If the ability to apply principles is being measured, for example, the question should be phrased in such a manner that they call forth that particular behavior. Essay questions should never be hurriedly constructed in the hope that they will measure broad, important (but unidentified) education objectives." (Gronlund, p. 226)

"Phrase the question so that the student's task is clearly indicated. The purpose a teacher had in mind when developing the question is often not conveyed to the student because of ambiguous phrasing. Students interpret the question differently and give a hodgepodge of responses. Because it is impossible to determine which of the incorrect or off-target responses are due to misinterpretation and which is a lack of achievement, **the results are worse than worthless**: They may actually be harmful if used to measure student progress toward instructional objectives. (Grondlund, p. 228)

Poor	Better
Why do birds migrate?	State three hypothesis that might explain why birds migrate south in the fall. Indicate the most probably one and give reasons for your selection.(Gronlund, p. 228)

"The improved version presents the students with a definite task. Although some students may not be able to give the correct answer, they all will certainly know what type of response is expected. Note also how easy it would be to relate such an item to a specific learning outcome such as 'the ability to formulate and defend tenable hypothesis ." (Gronlund, p. 228)

How do I score one?

"Prepare an outline of the expected answer in advance. This should contain the major points to be included, the characteristics of the answer (e.g. organization) to be evaluated, and amount of credit to be allotted to each. For a short question calling for three hypothesis, for example, a list of acceptable hypothesis would be prepared, and a given number of scoring points would be assigned to each. For extended essay questions, the major points or aspects of the answer would be outlined. In addition, the relative amount of credit to be allowed for such characteristics as accuracy of the factual information, pertinence of examples, skill of organization, and effectiveness of presentation would be indicated…

There are two common methods for scoring essay questions. One is called the analytic method and the other the holistic method. With the analytic method, each answer is compared with the ideal answer in the scoring key, and a given number of points is assigned according to the adequacy of the answer. With the holistic method, each paper is placed in one of a number of piles as the answer is evaluated. These piles represent degrees of quality and determine the credit assigned to each. If eight points are allotted to a question, for example, nine piles might be used ranging in value from eight points to none. Usually, between five and ten categories are used with the holistic method…

Evaluate all responses to one question before going to the next one. … A paper with average answer may appear to be of much higher quality when it follows a failing paper than when it follows a near-perfect one. One way to minimize this is to score all answer to the first question, reorder the papers to be evaluated, then score all answers to the second question and so on…

When possible, evaluate the answers without looking at the student's name. The general impression we form about each student during our teaching is also a source of bias in evaluating essay questions. (Gronlund, p. 231-232)

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References:

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Alessi, S., & Trollip, S., (2001). Multimedia for Learning, Methods and Development. Needham Heights, MA: Allyn & Bacon.