

# DEVELOPING WRITTEN TESTS

This job aid describes several types of written tests and explains when each type is best used. It includes a discussion on using graphics in test questions.

This job aid will help you to:

- decide on the most appropriate test questions for assessing learning
- match test questions with desired learning outcomes
- develop effective short-answer, long-answer, multiple-choice, and true/false test questions
- construct test questions that include graphics

**net** Includes techniques for online courses.



## Developing written tests

Evaluation may include several types of tests including essays, presentations, practical tests, laboratory skill tests, interviews, and so on. Written tests are mostly for evaluating knowledge-based learning outcomes. However, they may also test skills or attitudes. They are part of the overall evaluation plan for students.

Test questions may be open-ended, requiring answers in the form of an essay or short statements in the students' own words. These reveal the students' learning but also test their ability to express their thoughts in written English. They are also very time-consuming to mark. Test questions that reduce marking time may be short-answer, true/false, multiple-choice or matching. The type of question to use depends on what types of information you wish to test.

This job aid discusses several types of test questions and when to use them. It includes a discussion of using graphics in test questions.

Whatever type of test you decide to use, you must ensure that it fits within your overall evaluation plan. You must also ensure that it measures the desired learning outcomes for your course. You can greatly improve your test by evaluating its effectiveness—see the section below on testing the test and checking the scoring.

## Plan your evaluation

Make an evaluation plan for your course. Decide when you expect students to complete the written tests and other evaluations you may use. When completed, your evaluation plan becomes part of your course outline.

As you plan your evaluation, use the following checklist.

*To make an evaluation plan, I need to:*

- List the learning outcomes to be tested
- Determine the most suitable type of test for the skill, knowledge, or attitude to be tested (see also the job aid *Developing Checklists and Rating Scales*)
- Decide at which points during the course written tests and other evaluations will be conducted
- Decide how many percentage points each evaluation will be worth, for a total of 100%

## Write the test items

As you design and use your written tests, refer to the desired learning outcomes for the course. (You may wish to refresh your understanding of learning outcomes by using our job aid *Writing Learning Outcomes*.)

Ask yourself the following questions:

- Before:*
1. Are my learning outcomes clear and measurable?
  2. Is my evaluation plan complete and suitable for the learning outcomes?
- After:*
3. Do my tests match my desired learning outcomes?

As you write your test items, take care with the details. This job aid will help you do this. Group similar test items together. Remember that clear instructions, consistent punctuation, and good layout improve a test. Be sure to include a cover page.

## Test the test and check the scoring

Remember to test the test—give it to other instructors or past students to check for multiple answers and unclear questions. Do several people give the same incorrect answer? If so, maybe the question is unclear or ambiguous.

Make sure that the scoring will give accurate information about the students' abilities. Ask yourself the following:

- Did I double-check that each question is clear and unambiguous? (Your test of the test will help you do this.)
- Have I checked that there is only one possible correct answer?
- Did I define any partially correct answers and how they will be scored?
- Does each question test at the desired level of knowledge, skill, or attitude?

## Use and revise your test

As you administer your tests and judge your students' performances, use the following checklist.

*When using and revising my tests, I need to:*

- Ensure students are anonymous when I mark their tests (fold back the cover page with student's name when tests are handed in)
- Promptly assign grades and inform students
- Analyze the results and note frequently missed questions
- Decide which questions or directions need revising
- Revise and re-test the test

## Types of test items described in this job aid

This job aid includes guidelines and checklists for constructing the following types of test items:

- short-answer
- long-answer
- multiple-choice and matching
- true/false (alternative choice)

This is followed by a brief discussion on the use of graphics in test questions. It is important to use the appropriate types of tests in your evaluations.

## Short-answer questions

Use short-answer questions when you wish to:

- test recall rather than recognition of information
- reduce the chances of guessing answers
- check computational skills
- check knowledge of sequence for procedures

Below are some forms of short-answer questions.

### Question

This form requires the student to write a list, a sentence, a phrase, or even a paragraph in response to a direct question. This form is used most often because it is easier to read and answer.

*Example:* What is the first thing you should do if a fire starts in a shop?

\_\_\_\_\_

### Completion (fill-in-the-blank)

This form requires the student to insert the correct word, phrase, number, or symbol into an incomplete sentence. These are more difficult for students to understand—use them sparingly.

*Example:* A range of motion exercise that requires the nurse to provide the energy for movement is called a/an \_\_\_\_\_ exercise.

### Direction

In this form, students are asked to do something such as name or list objects, characteristics, or actions. Blanks may or may not be provided. The students must recall several pieces of information in a single question.

*Example:* List two characteristics of a good short-answer question.

1. \_\_\_\_\_
2. \_\_\_\_\_

### Identification

In this form the student must supply answers for a given list of words, phrases, numbers, or symbols. This reduces the amount of reading by grouping several items.

*Example:* In the blanks on the right below, write the metric symbols for the measures listed on the left.

1. litre \_\_\_\_\_
2. metre \_\_\_\_\_
3. decagram \_\_\_\_\_

## Writing short-answer questions

Use the checklist below to guide you in writing good short-answer test questions.

*When writing short-answer test questions, I need to:*

- Use a clear statement or question
- Use language that is appropriate to the job situation
- Avoid grammatical clues
- Give directions that refer clearly to a graphic if one is used
- Specify units and the required degree of precision for answers
- Ensure that writing spaces are long enough for the correct answer

*When asking students to fill in blanks, I need to:*

- Omit only important words for blanks
- Place blanks toward the end of the statement
- Ensure that each blank calls for a single idea
- Ensure that blank lines are the same length

## Long-answer questions

Long-answer questions can take several forms including essay questions, case studies, or scenarios that require the student to apply, analyze, synthesize, or evaluate related products, processes, information, ideas, or procedures. There are two types of long-answer questions:

- **extended response**—used when there is no limit on scope, time, or length, and no reference to any resource

*Example 1: Describe how you would improve the operation of a diesel engine.*

*Example 2: Discuss the pros and cons of using the problem-solving process in your work.*

- **restricted response**—used when you wish to limit the time, length, number of examples, or anything else about the answer

*Example 1: Evaluate the wiring diagram below according to the BC Building Code.*

*Example 2: Analyze the situation provided and prepare a one-page recommendation for response to the client.*

## When to use them

Long-answer questions are useful when you wish to test:

- writing ability
- organization of thought and ideas
- synthesis of ideas into something new
- analysis and evaluation
- ability to recall
- ability to explain

## Scoring them

Problems associated with scoring long-answer questions are:

- the time it takes
- the difficulty of scoring responses evenly

Base your scoring on an ideal answer, which must include all the points that match the specific criteria in your marking scheme (correct grammar and spelling might be included, for example). You can share the marking scheme with students in advance as well.

To create and use the marking scheme:

1. Determine the criteria you will use to evaluate the long-answer question.
2. Determine the marks for each of the criteria. You can also give part marks for each of the criteria.
3. Apply the marking scheme when you mark the written test.

## Constructing long-answer questions

Use the following checklist when constructing long-answer test questions.

*When constructing long-answer test questions, I need to:*

- Give clear instructions on how to answer the question
- Use words that the student can understand
- Test only essential abilities
- Clarify any limits on the required answer (e.g., number of pages, word count)
- Identify the assigned grade value of the question
- Construct my scoring method before giving the test
- Ensure that students understand how their answers will be scored



## Multiple-choice questions

In a multiple-choice question, the student is presented with several alternatives from which to choose the most correct response to a given question or statement.

*Example: The purpose of a countersink is to:*

- a. smooth the edges of an existing hole*
- b. allow for adjustment of the screw*
- c. accommodate the head of a fastener*
- d. clamp the sink to the countertop*

Basic multiple-choice questions are the most commonly used test items. They are easy to score and can be scored more objectively than short- or long-answer questions.

### When to use them

Use multiple-choice questions when you wish to:

- measure many learning outcomes during a single test session
- present a list of similar choices for the student to differentiate between
- reduce the guess factor in simple alternative choice decisions (e.g., true/false)

### Limitations

These types of questions have several limitations:

- They test whether students recognize information rather than what they can supply.
- They rarely measure problem-solving skills accurately.
- They cannot test organization and presentation of ideas.
- They are difficult to construct so that the choices are believable.

## Terminology

Special terms are used for describing the structure of multiple-choice questions:

*Stem:* first part of question—an incomplete statement or a direct question

*Alternatives:* 3 to 6 options for the student to choose from in completing the statement or answering the question (including 1 answer and 2 to 5 distractors)

*Answer:* correct response

*Distractors:* incorrect responses—distract the student from the answer (they should be believable alternatives to the answer, not obviously wrong)

You can use the checklist on the next page to help you to construct multiple-choice test items.

Multiple-choice test items are more complex than the other types discussed in this job aid. Further guidance for constructing multiple-choice test questions may be obtained from an Instructional Development Consultant.

## Matching questions

A matching question can be used to consolidate a number of multiple-choice questions into a single question, when there are a limited number of alternatives shared among the questions. An example of a matching question is shown below.

Match the following descriptions with the types of test questions:

_____ tests organization of thought and ideas	A. short-answer
_____ tests recognition of a correct statement of fact or opinion	B. long-answer
_____ tests recall rather than recognition of information	C. multiple-choice
_____ presents a list of similar choices for the student to differentiate between	D. matching
_____ can be used to consolidate a number of multiple-choice questions	E. true/false

## Checklist for writing multiple-choice test items

When writing multiple-choice test items, use the following checklist.

*To write good stems, I check that:*

- The stem presents a clearly stated problem
- Words are kept to a minimum
- Normal language of the job is used
- Stems are stated positively wherever possible
- Important words are emphasized
- The stem doesn't provide grammatical clues to the answer (e.g., in the use of "a/an" or singular/plural words)
- Only officially recognized abbreviations are used

*To write good alternatives, I check that:*

- Repetition in all the alternatives is avoided
- Similar wording in stem and alternative is avoided
- All the alternatives are parallel in form
- "All of the above" and "None of the above" are avoided
- Alternatives are listed logically (e.g., in order of numerical size, rather than randomly)
- Alternatives are all about the same length
- Normal language of the job is used
- Absolute words such as "never" and "always" are avoided

*To include the answers, I check that:*

- Answer is the only correct one, or clearly the best
- Answer is not obvious because of another question
- There is no pattern to the position of an answer in the alternatives list

*To write good distractors, I check that:*

- All distractors are believable
- Distractors are similar in form or otherwise harmonious with the answer

## True/false (alternative choice) questions

The choices offered in these types of questions may be True/False, Yes/No, Fact/Opinion, High/Low, Agree/Disagree, and so on. There must be only one correct response to the question.

Use true/false questions to test a student's ability to:

- recognize a correct statement of fact or opinion
- identify relationships (including cause)
- identify attitudes, values, and beliefs
- identify a new situation where known principles apply

These types of questions are useful when a large amount of course material must be quickly tested. Their advantages are that relatively little reading is required to take the test and they are easy to score. Their disadvantage is that they may reveal when a student knows something is incorrect, but this does not mean that the student knows what the right answer is.

## Scoring true/false (and multiple-choice) test questions

If you are not using optically scanned cards to score the tests, you may find it helpful to have the students indicate their responses near the left margin of each page.

## Writing true/false questions

Use the checklist below to guide you in writing good true/false questions.

*When writing true/false test questions, I need to:*

- Use statements that are absolutely true or false
- Use language appropriate to the job situation
- Ensure that statements are simple and easy to read
- Ensure that each statement tests only one idea
- Avoid negatives unless they are very important
- Check that statements are specific and direct, not implied
- Ensure that parts of each statement are either all true or all false
- Name the authority when opinions or values are tested
- Avoid direct quotes from the textbook
- Use approximately the same number of true and false statements
- Try to make the lengths of statements about equal

## Using graphics in tests

A graphic is a picture, drawing, diagram, map, graph, or table. Sometimes graphics are used in a written test question, or the student may be required to produce or adapt a graphic while answering a question.

If the student could answer the question from general information without referring to a graphic, do not include a graphic. Use a graphic when:

- similar diagrams are used on the job—for example, electrical wiring diagrams, blueprints
- the student's ability to produce graphics is important—for example, for presentation overhead transparencies in business
- identifying parts or reading instruments is important and more efficiently done on paper than in a performance test

## Writing good questions referring to graphics

If a test question refers to a graphic, make it clear whether the required answer is a drawing or a written response. If the question requires the student to:

- *look* at a graphic, the student needs to know exactly where to find it and also where to put the answer. An example of this is shown below.
- *produce* a graphic, use rules similar to those for constructing long-answer questions.

Use the example checklists on the next page to help you construct good test questions that refer to graphics.

6. Identify each of the types of lines labelled A, B, and C in Figure 1 below.

- A \_\_\_\_\_  
 B \_\_\_\_\_  
 C \_\_\_\_\_

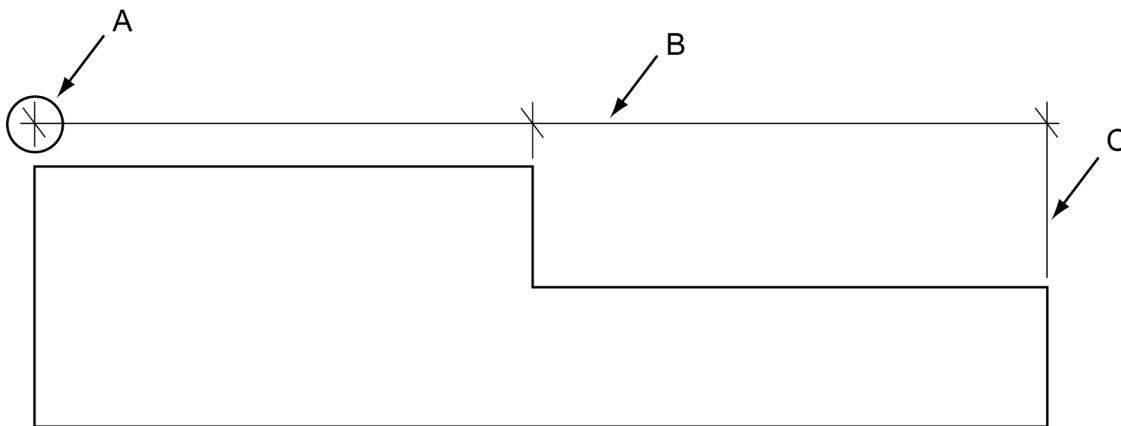


Figure 1: Diagram for Test 1 Question 6

## Constructing test questions that refer to graphics

Use the following checklist when constructing questions referring to graphics.

*When referring to graphics in test questions, I need to:*

- Indicate clearly where to find the diagram (examples: opposite; page 4; back of the test)
- Identify which diagram or part of diagram is being referenced (examples: Figure 2; Diagram 5b)
- Ensure that it is easy to view the graphic while answering
- Describe the graphic and its focus (example: schematic of a circuit board for a small computer) unless students are asked to identify it
- Ensure that the question cannot be answered without referring to the graphic
- Ensure that the graphic is clear, complete, and has needed labels
- Ensure that the graphic is as simple as possible

## Constructing test questions asking the student to produce graphics

Use the following checklist when constructing questions asking for a graphic.

*When asking a student to produce a graphic, I need to:*

- Give clear instructions on what type of graphic is required (examples: sketch, schematic, blueprint)
- Use words that the student can understand
- Test only essential graphics abilities
- Clarify the limits of detail and scope of the required drawing
- Identify the assigned grade value of the question
- Construct my scoring method ahead of the test
- Ensure that students understand how their answers will be scored

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## **net** Online written tests

The practical advice in this job aid applies equally to creating test questions for online written tests. However, there are a few further considerations for the online testing environment.

### Scoring

Online testing software will automatically score multiple-choice, true/false and matching questions. You will still need to continue marking short- and long-answer questions. Online testing software also allows you to hand mark those questions scored automatically.

### Immediate feedback

Online testing software often provides the opportunity to give students immediate feedback based on their answers. Receiving relevant and immediate feedback can be motivating for students. Selecting this option is often beneficial in self-tests. Ensure that your feedback responses are related to the content of the question and are providing help to the student.

### Random question order

Online testing software often provides the opportunity to alter the order of the questions for each test-taker. If you decide to use this feature, it is important that the questions on your written test do not refer to or depend on previous questions. Ensure that each question can appear in any order.

### Test banks

Some online testing software allows you to create an exam that draws questions from a test bank. For example, you can create a test of 100 questions but the software pulls these 100 questions from a test bank of more than 100 questions. No two test-takers will get the same questions on the exam. When creating test banks, ensure that each question is of equal value and applies to the same learning outcome. Consider creating subgroups of questions based on learning outcomes within a test bank, so that the software will draw on a breadth of questions covering all the learning outcomes.

### Number of attempts

Most online testing software will ask you to set how many attempts students will be allowed to take a test. Your decision will be based on the purpose of the written test. Commonly, we give students unlimited attempts to complete self-assessments and one or two attempts to complete a scored written test.

## Duration of the test

You will need to determine how much time the student will have to complete the online written test. You can also allow an unlimited duration. Once the test is launched, most online testing software counts down the time and will close the exam after the time period is over. After you create your written test, you will need to determine the time in which a student can reasonably be expected to complete it. A good time to determine this is when you are testing your test.

## Sample quiz

It is a good practice to provide students with a sample quiz to try before they are to take the written test. A sample quiz gives them the opportunity to learn the testing software before they take the written test. A sample quiz also allows them to test the compatibility of their own computers with the testing software. Allow enough lead time for a sample quiz before the written test so that students will have time to resolve any technical difficulties.

## Checklist for online written tests

Use the following checklist when constructing online written tests.

*When constructing my online written test—I have:*

- Determined the purpose of the test: scored or self-assessment
- Determined the duration of the test
- Determined the number of attempts
- Determined the order in which I want questions to appear to the student
- Ensured my feedback responses relate to the question asked
- Tested the online written test
- Provided a sample quiz