## Writing Tests – The Rules

<table>
<thead>
<tr>
<th>Type Test</th>
<th>Writing Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>True-False Item Rules</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Keep items simple.</strong></td>
<td>The longer and more complicated the item is, the more you are testing learners' reading ability instead of their technical knowledge. Longer items also give learners more opportunities to &quot;read into&quot; the statement an interpretation you didn't intend. Simple items can be more clearly true or false. Furthermore, many teachers tend to write true items that are consistently longer than false items. This is because, often, a statement must be qualified or modified to be sure it really is true. Experienced test-takers soon realize that a long item is likely to be true, thereby improving their chances of guessing correctly.</td>
</tr>
<tr>
<td><strong>Make each item entirely true or entirely false.</strong></td>
<td>Sometimes teachers write items that are partly true, partly false. Consider the following example:</td>
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### Avoid negative items.

Negative statements are more difficult for learners to read and consequently favor learners with higher reading skills. You should avoid items with negative words—*not, never, nothing, no*, and so on. You should especially avoid double negatives, as in the following example:

<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken ears are a not uncommon defining characteristic of breeds of swine.</td>
<td></td>
</tr>
</tbody>
</table>

If learners are unable to decode the double negative *not uncommon*, it won't matter whether they know the information you are testing for. The item could be improved by stating it in positive terms, as follows:

<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken ears are a common defining characteristic of breeds of swine.</td>
<td></td>
</tr>
</tbody>
</table>

### Avoid specific determiners.

Certain words are usually associated with either true or false statements. Statements are usually false if they contain the words *always, never, all,* or *none*. On the other hand, the words *sometimes, some, may,* and *should* generally appear in true statements. If you use these words in your items, you are giving learners an unnecessary clue to the answer.

### Use equal numbers of true and false statements.

While you don't need to take this point literally you should have about the same number of true and false statements. If you consistently have more of one kind than the other, learners can use this as a clue in guessing. When you have finished writing all your items, you can count your true and false items and add items as necessary to make them roughly equal.

### Prepare a scoring key.

Scoring is very easy if you prepare a key. The best would be a stencil—a copy of the test with the correct answers punched out of the *T* and *F* columns. You can place this over learners' papers and see their answers at a glance. If you use a stencil, you should have learners mark their answers by placing an × over the *T* if the statement is true or over the *F* if the statement is false. If they circle their answers, they could make their circles bigger than the holes in your stencil and you wouldn't see them.

### Give simple and clear directions.

You should always tell learners clearly and simply what they are to do. Your directions should include how learners are to mark their answers (e.g., place an × over the *T* or *F*). The following is an example of directions for true-false items:

**Directions:** Each of the following statements is either true or false. Read each statement and decide whether it is true or false. Indicate your answer by placing an × over the *T* if the statement is true or over the *F* if the statement is false.

### Watch out for patterns of answers.

If you always use two true items followed by two false items, learners will soon recognize this pattern. You should review the answers when you have finished writing your items. If you notice any pattern in the answers, you can use various procedures to distribute the answers randomly (e.g., rolling dice or pulling numbered slips out of a hat).

### Don't quote from the textbook.

This practice only places a premium on rote learning and does not encourage higher-level cognitive activities. In addition, many textbook statements are ambiguous when removed from their original context.

## Completion item Rules

### Use your own words.

Many authorities feel that the main weakness of the completion item is that it only measures recall of rote learning, thus encouraging lower-level cognitive activity at the expense of higher-level activity. Lifting textbook quotes verbatim to use as completion items encourages rote learning even more.

### Test only for significant bits of knowledge.

You will need to use your own judgment to determine what knowledge is significant in your own area. Using that judgment, you can ensure that your completion items focus on significant knowledge in the area. Learners might truly
need to know that a particular technological development occurred in your field in 1962. It is unlikely, however, that learners need to know that this development took place on a Wednesday morning.

Perhaps the most common mistake teachers make in writing completion items is in not being clear enough. Consider the following example:

The cathode ray tube with fluorescent screen was first introduced by K. F. Braun in ________.

How many possible answers are there to this item? The tube in question was first introduced by Braun: In 1897? In the laboratory? In Germany? Learners could legitimately give any one of these three answers. And what if a cagey learner wrote the answer "in modern times", is that right or wrong? The item could be saved by rephrasing it. Learners could be asked specifically in what year or in what country, for example, the cathode ray tube was introduced by Braun, as in the following examples:

In what year was the cathode ray tube with fluorescent screen first introduced? ________

In what country was the cathode ray tube with fluorescent screen first introduced? ________

This guideline is closely related to the previous one. If you put too many blanks in one item, there won't be enough significant information left in the item for learners to know how to answer it. The following is an example of too many blanks spoiling the broth:

In the _____________, ________________ enters the _________________.

There really is no way for learners to know how to complete this item. However, you could delete the first blank, replacing it with the word it stands for, and improve the item as follows:

In the lungs, ________________ enters the _________________.

The item is now clear enough that learners should be able to supply the correct answers (i.e., oxygen enters the bloodstream). If you have any question concerning how many blanks you can put in a given item, remember that fewer is usually better. If necessary, you should write several items, each with one blank, to replace a single item with several blanks that is impossible to understand.

Let the learner know ahead of the blank what information you want him or her to address in the answer before coming to the blank. Remember, your goal is to find out what the learner knows, not have him or her miss an item because of confusion about what information is called for.

As stated previously, another name for the completion item is the short-answer item. Completion items differ from essay items mainly in the length of the answer required. You should ensure that your completion items are not really essay items (even miniessay items) in disguise. This point applies particularly to completion items in the form of questions.

In practice, this means that all blanks should be long enough for the longest answer to be used in the test. You should never leave a short blank for a short answer, medium blank for a medium answer, and so on. Learners will quickly
Many learners will be able to use their knowledge of the English language to help answer this item. The verb remove in the item is plural (he, she, or it removes; they remove). Any learner who realizes this will also realize that a plural answer is required to be the subject of the verb. Otherwise, the sentence would be grammatically incorrect. This example could be rewritten as follows:

Waste substances are removed from the blood by the ____________.

There are no grammatical clues in this version, since we use “the” with both singular and plural nouns in English. You should also avoid having either “a” or “an” immediately before the blank. The indefinite article “a” tells learners that the next word starts with a consonant, and “an” indicates that the next word starts with a vowel. Consider the following example:

Which organ removes waste substances from the blood? ____________________.

There are no grammatical clues in this version, since we use “the” with both singular and plural nouns in English. You should also avoid having either “a” or “an” immediately before the blank. The indefinite article “a” tells learners that the next word starts with a consonant, and “an” indicates that the next word starts with a vowel.

It is helpful to put all the blanks in one column, in either the left or right margin. Learners actually write their answers in this column of blanks. A short blank in the middle of items can indicate which word or phrase learners are to supply. The following is an example:

Explosive gas is used as an energy source in the ________(3)_________ engine.                 (3) __________________

This can make scoring a lot easier, especially if you put all the blanks in a column. List the correct answers to the items as you write them. Then, as you score the test, you may find other answers that are acceptable in learners’ papers. You should add these to your key as well.

Each blank should test learner recall of a significant bit of knowledge. Each answer should thus have the same weight, since each item should be of comparable importance and difficulty. This also makes computation of learners’ scores on the test easier.

This guideline always applies, no matter what type of item is involved. Learners should not have to switch from one type of item to another—from one mode of reasoning and answering to another—any more than necessary.

Item analysis has repeatedly shown that the correct response tends to be longer than the distracters. Often, the correct answer must be qualified with extra words and phrases just in order to make it true. If your answers are usually longer than your distracters, however, test-wise learners are provided with a clue to the correct response.

Some testing experts say that the best stem for a multiple-choice item is one that would make a good completion item if you didn’t supply responses to choose from.
Frying is a form of cooking by contact with:
  a. dry heat.
  b. hot oil.
  c. flame.
  d. steam.

The stem should state the question or problem sufficiently so that only the right choice is justified as the answer. Only if the stem states the problem or question clearly can learners be sure of what the item is asking and how to answer. The following is a poor example of a stem:

**The ignition in a car:**
  a. supplies current to the spark plugs.
  b. is part of the ignition system.
  c. consists of distributor, points, and coil.
  d. is likely to be electronic today.

In fact, all the responses in this example are correct. Learners would have an extremely hard time answering the item if they had to choose the one correct response. They would have to rely on their knowledge of the teacher's own way of thinking and teaching in order to guess which of these correct responses was the "right" one. This, of course, would not test learners' knowledge of ignitions, but rather their knowledge of the teacher's personality. In other words, the item would not be valid.

This stem could be improved by asking some questions about it. For example, what knowledge about the ignition are you trying to evaluate with the item—its function, its component parts, or its technology? The stem could be rewritten as follows to evaluate learners' knowledge of the function of ignitions:

**The function of the ignition in a car is to:**

You may have occasion to test learners' knowledge of opinion. You may justifiably want learners in an automotive mechanics program to know that some experts think that diesels will replace internal combustion engines within 25 years. Consider the difference, however, between the following two examples:

**Diesels will replace combustion engines within:**
  a. 6 years.
  b. 10 years.
  c. 20 years.
  d. 25 years.

**According to the June 1982 issue of Diesel Weekly,** diesels will replace internal combustion engines within:
  a. 6 years.
  b. 10 years.
  c. 20 years.
  d. 25 years.

In the first example, learners must essentially guess what your opinion would be so that they can agree with it. In the second, you have identified a specific authority as the source of the opinion, so that learners can use their knowledge of this authority's opinion as the basis for their answer.
Don't end your stem with a give-away.

Sometimes, the last word in the stem can give the answer away if you are not careful in writing your responses. In the following example, notice that the stem ends with the word *an*.

*A physician who specialize sin the structure, functions, and diseases on the eye is an:*
   a. hematologist.
   b. optician.
   c. optometrist.
   d. ophthalmologist.

Many learners will be able to rule out the first response just on the basis of their knowledge of the English language -you don't say "an hematologist." One way to remedy this error is to end the stem at the word *is* and to include the word *a* or *an*, as appropriate, in each response.

This rule is closely related to the preceding one. If your stem is an incomplete statement, each response should be stated in a form that correctly completes the statement in the stem. In the following example, learners could again use their knowledge of the English language to rule out the second response.

*Farmers rotate their crops in order to:*
   a. spread out the work load.
   b. ease of marketing.
   c. conserve the soil.
   d. balance the diet.

Once again, the stem does not combine with the second response to form a grammatically correct sentence in English.

Item analysis has repeatedly shown that the correct response tends to be longer than the distracters. Often, the correct answer must be qualified with extra words and phrases just in order to make it true. If your answers are usually longer than your distracters, however, test-wise learners are provided with a clue to the correct response.

**All distracters should be plausible.**

The correct alternative in each item is called the answer, and the remaining alternatives are called **distracters** (also called decoys or foils). You might, for example, be writing a multiple-choice item to test learners' knowledge of the name of an inventor (e.g., *The sewing machine was invented by*). If so, Christopher Columbus is not a plausible answer, at least for secondary or postsecondary learners. You could expect any teenager or adult to be able to rule out Columbus on the basis of general knowledge. You would be presenting, again, a clue to the correct response. An excellent source of plausible distracters is the incorrect answers learners have given to related completion items in the past.

Logically, it might well seem that there should be no problem in the following example:

**Avoid using negative statements in the stem.**

*Which of the following woods is not a hardwood?*
   a. maple
   b. oak
   c. cherry
   d. pine

The question does not appear difficult-four woods are listed, one of them is not a hardwood, so which one is it? Research shows consistently, however, that learners do less well on multiple-choice items that have a negative statement in the stem.
| Avoid any pattern of response. | Apparently, the small word *not* is often simply overlooked in the pressure of the testing situation.

Furthermore, most experts agree that it is less than ideal to emphasize negative learning. Why not, they say, rewrite the previous example so that the stem asks, *Which of the following woods is a softwood?* Now, the item emphasizes the positive fact that pine belongs to the softwoods.

The same experts also agree, however, that it may sometimes be necessary to test for negative knowledge (e.g., *Which of the following things should you NOT do when using a radial arm saw?*). When this is so, you should at least underline the negative word or write it in all capital letters, to make it stand out as much as possible.

Finally, in avoiding negatives, you should never write a stem containing a double negative, especially a combination of *not* and a negative adjective (e.g., *not impossible* or *not unlikely*). This, again, only serves to introduce irrelevant difficulty into the item. Such an item may test learners’ skill in using the English language more than their knowledge of technical content. |
| Avoid all of the above and none of the above responses. | Some teachers tend to put the correct response in the middle of the list, apparently because they feel that putting it in the first or last position will make the correctness of the answer too obvious. Test-wise learners, however, will notice this pattern and use it to rule out incorrect responses.

Likewise, learners are likely to notice any other pattern you might use. It is best to go back to each item after you have completed writing all items and to distribute all responses randomly. In that way, you can ensure that there will be no pattern of responses for learners to use as a clue.

Don't give clues to one item in another. An obvious example of this would be the following two stems:

- The catalytic converter, in common use since 1975, was invented by:
  - When did the catalytic converter first come into common use?

The example probably seems extreme, especially since the two items are right next to each other. However, you can very easily write two such items and not notice it yourself when you have written several other items in between. It is best to review all items together to ensure that none of them contain clues to any of the others. |
| Fit the item to the objective it covers. | Using these responses can, once more, provide clues to experienced test-takers. Learners can assume that, if they find two responses that they know to be correct, the answer has to be *all of the above*. On the other hand, if learners can find one answer that they know is correct, they can automatically rule out *none of the above*. They may, therefore, select the correct response not through knowledge, but through the process of elimination. |
| Use four or five responses in each item. | If your objective is for learners to apply knowledge, then your multiple-choice item should actually test their ability to do that. The item must present a new situation in which learners are to apply knowledge. If you use the same example on the test that you used in a classroom discussion, all you are testing is learners' recall of your earlier example. You are not testing learners' ability to use information in a situation different from the original learning context. The more responses there are in an item, the less likely it is that learners will be able to get the correct answer by guessing or by process of elimination. Four or five items seems to be the best number. The element of pure chance is reduced, yet all the responses can still be read fairly quickly. |
Keep all multiple-choice items together. If your test contains more than one kind of item, you should keep all the items of one kind together. This keeps to a minimum the number of times learners have to get the right mindset for the type of item. They don't have to switch back and forth from a true-false item to a multiple-choice item to a completion item and back to another multiple-choice item. If you mix your types of items all together this way, you are also testing learners' ability to switch rapidly from one mode of reasoning and answering to another.

Your learners are very likely to know that there are different ways to answer multiple-choice items. You might want them to choose the one correct answer, the one best answer of several that are all correct to varying degrees, all possible correct answers no matter how many, and so on. Consequently, it is important that you state clearly and completely how learners are to respond.

You should also be sure to tell learners how to mark their answers. Depending on how you plan to score the finished tests, you may want learners to mark their answer sheet in different ways. For example, if tests are to be computer-scored, learners will need to be told to use the computer answer form and a #2 pencil. Or you can ask learners to place the correct letter or number in a particular blank, to mark an X through each correct response, or to circle the correct response, and so on.

### Selecting a single correct response:

Directions: Each of the items below is followed by four possible responses. For each item, only one of the responses is correct; the others are incorrect. Select the one correct response for each item. Indicate your answer by placing an X over the number of the correct response is:

**EXAMPLE:** The commonly accepted industry-wide standard for beginning-level typists
- a. 40 words per minute, error-free.
- b. 40 words per minute, with a minimum of five errors.
- c. 45 words per minute, with a minimum of three errors.
- X d. 45 words per minute, error-free.

### Selecting a single BEST response:

Directions: Each of the items below is followed by four possible responses. For each item, any or all of the responses could be correct. Select the response that is best for each item. Indicate your answer by placing an X over the number of the best response.

**EXAMPLE:** You have just typed a letter for your supervisor, Mrs. Stanton. She gives it back to you and says that she has decided that she doesn't want to include the last paragraph in the letter after all. What would you do to remove that last paragraph?
- 1. use correction tape
- 2. cut and paste
- X 3. retype the letter
- 4. use correction tape
**Selecting ALL correct responses:**

Directions: Each of the items below is followed by four possible responses. For each item, any or all of the responses could be correct. Select all the correct responses for each item. Indicate your answer by placing an X over each correct response for each item.

**EXAMPLE:** You can thicken gravy with:

- 1. cornstarch.
- 2. cornmeal
- ![X](image) 3. wheat flour.
- 4. baking soda.

<table>
<thead>
<tr>
<th>Prepare a scoring key.</th>
<th>Scoring learners’ responses will be much easier and more reliable if you use a scoring key. If, for example, you ask learners to simply mark an X through the number or letter of each correct response, then your key can be a stencil-type. A stencil is a copy of the test with hole punched through each correct response. When you place your key over each completed learner test, each response showing through a hole should be marked with an X or the response is wrong.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constructing Essay and Oral Items</strong></td>
<td><strong>Develop clear, precise items.</strong> Your essay and oral items should always communicate your intent to learners with no room for misinterpretation. In practice, restricted-response items are usually preferable. Each item should tell learners, as clearly as possible, what information is required in the answer and how that information should be presented. Clear, precise items allow less opportunity for learners to misunderstand an item. They also reduce the opportunities for learners to evade responding to an item by speaking or writing at length in generalities. Scoring also becomes easier when the required content and form of the response are clearly indicated in the item.</td>
</tr>
<tr>
<td></td>
<td><strong>Require learners to answer all items.</strong> Teachers sometimes make some essay or oral items optional. Learners might be directed, for example, to respond to any one of three items. However, when different learners answer different items, it is almost impossible to get comparable scores because learners have not been performing comparable tasks. With optional items, you end up testing different groups of learners on different bodies of information and different ways of treating those different bodies of information.</td>
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<td></td>
<td><strong>Use a larger number of shorter items.</strong> Since learners take more time in responding to essay or oral items, you cannot sample as wide a range of knowledge as with objective items. The best way to make your sample as wide as possible is to use a larger number of items that require shorter answers. Your essay or oral items will then evaluate a wider variety of instructional objectives.</td>
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<tr>
<td></td>
<td><strong>Develop items for higher-level objectives and content.</strong> Given the nature of essay and oral items, you should use them to measure only appropriate, high-level instructional achievement. Objective items should be used to measure the lower cognitive levels (i.e., knowledge and comprehension)—a task they can accomplish accurately and efficiently. The use of each type of item—subjective and objective—should be restricted to the levels of accomplishment for which each is most suited.</td>
</tr>
<tr>
<td><strong>Provide full and clear directions.</strong></td>
<td>In your directions, you should tell learners exactly what their task is—for example, to answer each of the three items provided on a written essay test. You should tell learners what the point value of each item is and how much time is available for each item or for the whole test. Learners will then know approximately how much time to spend on each item. Learners must also be told if their scores will be affected by mechanical factors (e.g., spelling and handwriting on essay items, grammar on essay or oral items).</td>
</tr>
<tr>
<td><strong>Give learners advance notice and practice tests.</strong></td>
<td>You should give your learners warning of upcoming essay or oral tests. This provides them with an opportunity to review the material to be covered from the appropriate perspective. You probably know from your own experiences that preparing for an essay test requires the use of different study skills than preparing for objective tests. Furthermore, learners should be given practice tests. Some learners may never have been required to respond to essay or oral items before. They may have had no experience in organizing and presenting a body of information, as these items require. They may not be aware that they will need to spend some of the time allotted for the test in planning their answers. Learners should have the chance to practice answering oral or essay items before being evaluated on their performance of these skills.</td>
</tr>
<tr>
<td><strong>Prepare a structured key for scoring.</strong></td>
<td>The subjectivity of scoring can be minimized if you write a structured scoring key, a model answer to the essay or oral item, usually in outline form. As you write your own answer to the item, you can assign specific point values to specific aspects of the answer. Learners' answers can then be compared to the key to assign point values to their answers. It is a good idea to have your scoring key reviewed by a colleague who is also knowledgeable in your occupational area. He or she may identify other information to include in your model answer. Likewise, you may find information in learners' answers that is correct but that you did not anticipate. Learners might include facts not mentioned in your key, or they might organize and present their facts in a way you hadn't thought of. Any such information should be added to your key as well.</td>
</tr>
<tr>
<td><strong>Read all learners' answers to one essay item at one sitting.</strong></td>
<td>The best way to score answers to essay items consistently is to read all learners' answers to one item at one sitting. In other words, don't read one learner's entire test before reading another's. You can review your key for the item you are scoring and concentrate on that item. If possible, you should not even know whose answer you are reading. Studies have shown that the &quot;halo effect&quot; is real—teachers tend to score answers higher for learners who are known to be more capable.</td>
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<td><strong>Score mechanical factors separately.</strong></td>
<td>Experts disagree on whether such factors as handwriting, spelling, or grammar should be considered at all in scoring learners' answers. Some are all for it; some are equally against it. You will need to use your own judgment to determine whether to score learners' answers for these factors. If these skills are important for success in the occupation, then they should, at some point and in some way, be evaluated. And, you should indicate to the students that they will be assessed as part of the evaluation. If you do score for these factors, however, you should assign a score separate from that for technical content. Regardless of how important skill in communicating may be in your occupational area, the technical content of learners' answers should be scored on its own merit.</td>
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**Case Studies and Problem-Solving Items**

<p>| <strong>Describe a realistic situation.</strong> | A marketing and distributive education instructor for example, could write a case study describing how a retail clerk waited on customers and ask learners to critique the clerk's customer service. The clerk's performance should be realistic—neither all good nor all bad, since people are neither one nor the other. Also, mistakes in performance should not be obvious. Don't, for example, |</p>
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<tr>
<th>Practice Suggestion</th>
<th>Example</th>
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<td><strong>Give learners all the detail they will need for the task.</strong></td>
<td>For example, a case study might list the symptoms of a malfunctioning carburetor. Learners could be asked to identify probable causes of the trouble. They could even be asked to describe how they would verify their diagnoses. To complete this task successfully, they would need to know all the relevant detail from reading the case study. If you expect learners to identify a particular cause for a problem, be sure they have enough information to come to that conclusion.</td>
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<td><strong>You can still hold your learners responsible for other knowledge in the task, of course.</strong></td>
<td>If a case study involves the application of Ohm’s Law to an electronic circuit design, the instructor could legitimately expect learners to know what Ohm’s Law is and how to apply it (assuming they have studied those things already). That, in fact, would be one of the things the instructor would be testing in this item. He or she would have to be sure, however, to supply in the case study all the information learners would need on the circuit design.</td>
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<td><strong>Clearly state the task to be performed.</strong></td>
<td>Learners should be told clearly what they are to do with the case study or problem once they have read it. If there are objective items for learners to answer, you need to tell them to answer the items using the information in the case study or problem statement. If learners are to write longer, essay-type responses (e.g., analyzing, critiquing, evaluating), you need to tell them how detailed their answers should be.</td>
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<td><strong>Follow good item-writing guidelines.</strong></td>
<td>As stated previously, you might ask learners to answer true-false items about a case study, multiple-choice items about a circuit diagram, or essay items evaluating a worker’s safety practices. In each case, you should follow all the guidelines for writing that type of item. Specifically, you should provide directions for answering the items. The type of item you use should be chosen to fit the learning activity being evaluated.</td>
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<td><strong>Write items in terms learners can understand.</strong></td>
<td>Your case studies or problem-solving items should not penalize learners with lower reading or oral communication skills. You should use technical terms that learners know or define those terms in your items.</td>
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<td><strong>Use appropriate scoring keys and procedures.</strong></td>
<td>You should prepare scoring keys (e.g., outlines of model answers) for your case studies or problem-solving items. Likewise, you should use appropriate procedures for scoring learner responses to the items you have used. Scoring keys must list each required item that should be included in the learner’s answer.</td>
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