

Selected-Response Format: Developing Multiple-Choice Items

“Good tests consist of good test items.”

—THOMAS HALADYNA

Although a good blueprint provides the foundation for a quality test, it does not guarantee quality results. While the blueprint is a pivotal step in the process, careful attention must be focused on developing appropriate, well-crafted items that meet the specifications of the blueprint. No matter how well developed the blueprint is, if the items fail to address the objectives and content of the course as specified in the blueprint, the validity of the test will be impaired. If poorly written items are included on the test, students will be unable to decipher what is being asked, and the reliability of the test results will be diminished. In either situation, inappropriate decisions could be made based on the test results.

The key to effective test development is to avoid trivia and instead focus on testing important concepts, then select the question format that is most appropriate for measuring those concepts. There is no perfect format that fits all tests; every format has advantages and disadvantages. The chapters that follow help you to capitalize on the strengths and minimize the weaknesses of each format type when you are developing items.

The selected-response item format has several advantages. One of the most important advantages is the ability to test a wider range of material than constructed-response type items. Selected-response items include the multiple-choice, true–false, and matching formats. These item types have many qualities in common as well as several unique characteristics. An understanding of these qualities will guide you in selecting the most appropriate format for your testing needs. This chapter and Chapter 6, “Writing Critical Thinking Multiple-Choice Items,” focus on the most popular selected-response type item, the multiple-choice format.

True-false and matching formats are reviewed in Chapter 7, “Selected-Response Format: Developing True-False and Matching Items.”

Advantages of Multiple-Choice Items

The multiple-choice format is the most versatile type of item format. Those who object to multiple-choice items usually object to all selected-response test formats in favor of constructed-response format questions. Although multiple-choice items do have limitations, they also have several advantages over constructed-response questions.

When written effectively, the multiple-choice format can be used to assess a wide range of learning outcomes across all cognitive levels. Multiple-choice items are adaptable to all types of subject matter, their scoring is accurate and efficient, and they provide students with practice for the types of items they will encounter on licensure and certification exams.

The issue of content sampling on a test is most efficiently addressed by the multiple-choice format. When compared with constructed-response questions, multiple-choice items require much less time for recording answers. Therefore, multiple-choice exams can include many more items and afford a more representative sample of course content on a test than constructed-response items, particularly essay questions.

While the constructed-response type format is susceptible to subjective scoring, multiple-choice items provide objective measurement of student achievement. The difficulty level of multiple-choice items, which contributes to test reliability, is easier to control than with essay questions. Multiple-choice exams are compatible with efficient and accurate computerized scoring and lend themselves to statistical item analysis, which enables the teacher to determine how well the items functioned with the group of students tested. In addition, item analysis data, which includes difficulty levels and discrimination indices of the items, provide valuable information for item revision. Last, but certainly not least, computer software can store multiple-choice items in an item bank for future use. Item banking, which is an invaluable tool for test development, is addressed in Chapter 15, “Instituting Item Banking and Test Development Software.”

Limitations of Multiple-Choice Items

No item format is perfect. They all have flaws. Constructed-response items are easier to write than multiple-choice items, but they are time consuming to score and are susceptible to subjective scoring. On the other hand, multiple-choice items are time consuming to develop, particularly because it can be difficult to compose plausible incorrect options.

Opponents of objective testing point out that the constructed-response format is a more accurate measure of a student’s ability to apply knowledge because it requires students to construct their own response, rather than to simply respond to a proposed answer. Another criticism of multiple-choice items is that they have a tendency to be written at the recall level. Even when multiple choice items are written at higher cognitive levels, students might only need to recognize the correct answer; they do not need to organize and construct their own response. The format is also faulted because it is susceptible to guessing and tends to favor test-wise students who can spot the cues in poorly written items.

Well-developed multiple-choice items can refute all these criticisms. Effective multiple-choice items do not enable students to choose the correct answer by simple rote memory. Rather, they require the student to reason out the basis for selecting the correct response. Carefully designed multiple-choice items eliminate the cues that test-wise students depend on. They can be designed so that students have to use critical thinking skills to make the subtle distinctions necessary to reason out the correct answer.

The debate over the qualities of different item formats should not be the main focus of test developers. One format is not inherently superior to another. Remember the basic principle: Select the item format that is most suitable for measuring the desired learning outcome. As Linn and Gronlund (2000) point out, while it is important to take advantage of the flexibility and applicability of the multiple-choice format, it should not be used when the objective requires performance-based assessment.

Multiple-choice items only fulfill their potential when they are appropriately constructed. The ability to write effective, high-level, multiple-choice items requires a skill that only develops with practice over time. The old adage, “Rome wasn’t built in a day,” certainly applies here. The guidelines in this chapter are designed to assist you to develop the skills you need to become a proficient multiple-choice item writer.

Relevance of Multiple-Choice Items

As previous discussions established, the choice of item format must be directed by the specific learning outcome you are assessing. Whatever format you choose, the items should be designed to elicit knowledge related to the course outcomes at higher-order levels of thinking, as designated by the test blueprint. Multiple-choice items can be designed to address specific content and learning outcomes and are well suited for measuring achievement across cognitive levels.

Documenting that a test is assessing learning outcomes, not trivia, is an essential requirement for establishing content-related evidence of the validity of test results. Every test item should represent both course content and a learning outcome. When evaluating a test item, ask yourself, “How does this question relate to both the content and an objective on the test blueprint?” Only items that directly relate to the blueprint should be included on a test. Another important question to ask is, “Why is this information important for a nurse to know?” Questions that are dubious or inconsequential should be omitted. The multiple-choice format is easily adapted for measuring intended learning outcomes; it is your professional judgment that determines the relevance of individual items for the test.

Item Writing Logistics

There are no longer any excuses for unprofessional looking tests. Test development software enables you to create professional-looking exams. If you do not have access to this software, the availability of current electronic word processing programs can provide you with the tools that will give your classroom tests a professional appearance. Carelessness with grammar, spelling, and punctuation reflect poorly on you, the test developer. Additionally, if educators expect to hold students to high

standards on their written assignments, they must hold themselves to even higher standards. Remember, nothing you write will ever be as highly scrutinized as the questions on your classroom exams will be by the students who must answer them.

A key requirement for item development is that all faculty members use the same procedure for creating test items. The ultimate goal for every nursing program should be to establish a working item bank. Because consistency is a paramount concern for item bank development, it is beneficial for faculty members to come to a consensus on several key issues at the outset of the item-development process. Chapter 15 “Instituting Item Banking and Test Development Software,” explores the use of electronic item banking and test development software.

Once the blueprint for a test is agreed on, faculty members can start writing items. It is a good idea to develop more questions than you need for each area of the blueprint, as these extra items can be stored in the item bank. Another practical suggestion is to write a few questions each day, particularly after a classroom or a clinical experience when the material is fresh in your mind. Just be careful not to use the same examples that you used to illustrate a point in class or you will be writing at the recall cognitive level. If a particularly interesting illustration of a concept occurs with a group of students, use the experience to write an item and bank it for next year.

Style Guide

Consistency of style improves test validity and reliability by decreasing ambiguity, increasing item quality, and increasing student respect for your tests. When all exams in a nursing program follow a style guide, a consistent and professional test appearance is created. Consistency of style also establishes the basis for developing an item bank. All items in a bank should follow a particular style so they create a professional impression when used together on a test.

A group consensus is necessary for adoption of a test and item-writing style guide. If you use a test development software program, the program dictates some of these decisions. However, it is helpful to start the process of developing a guide with some suggestions. Basic style suggestions are proposed in Appendix C, “Basic Style Guide.” These basic style rules are the ones I found to be most conducive to the development of professional-looking and effective multiple-choice items. You will note that all the items presented in this book follow these style suggestions. Obviously, you should adapt your style to the needs of your individual group. The essential requirement is that a style be followed consistently so the items look like they are professionally developed and that they belong together when used on a test.

Electronic Item Development

In this era of electronic word processing, you are wasting your time if you hand write items and then type them into a test. It is essential that you create your items in an electronic file. If you are not already doing so, start composing your items with a word processing program. You will get a much better feel for the item when you see it in typeface, and with very little practice you will be electronically cutting and pasting your way to item-writing proficiency.

Once you have your items in an electronic form, your items will be available for future use and you will have the basis for item banking. If you are writing your items in a word processing program, it is helpful to print each item on an individual sheet of paper for review by your colleagues. Having each item on a separate sheet also facilitates reviewing and sorting the items into a test.

Multiple-Choice Format

The multiple-choice format consists of two parts (see **Exhibit 5.1**):

1. The stem, which identifies the problem or the question
2. The options, which present the response alternative

The key is the option that is the correct answer, and the distractors are the options that appear plausible to the uninformed but are incorrect responses to the stem.

Although the multiple-choice format appears to be very straightforward, item writing is a demanding project. There are many subtle intricacies involved with developing multiple-choice items that *work*. Effective multiple-choice items reduce errors by minimizing the possibility of confusing the informed students—and at the same time minimizing the chance that the uninformed students will guess the

Exhibit 5.1 Multiple-choice format

Question

All of these foods are on the lunch tray for a client who is following a low-residue diet. Which one should a nurse advise the client to remove?

- | | |
|-------------------------|------------|
| A. Chicken noodle soup. | Distractor |
| B. Mashed potatoes. | Distractor |
| C. Broiled flounder. | Distractor |
| D. Steamed broccoli. | KEY |

Incomplete Statement

All of these foods are on the lunch tray for a client who is following a low-residue diet. A nurse should advise the client to remove the

- | | |
|-------------------------|------------|
| A. chicken noodle soup. | Distractor |
| B. mashed potatoes. | Distractor |
| C. broiled flounder. | Distractor |
| D. steamed broccoli. | KEY |

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}STEM
}OPTIONS
}STEM
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correct answer. In this way effective items increase item discrimination and the overall reliability of the test results.

Most faculty members have no difficulty in identifying what they want to test; however, many faculty members have difficulty crafting items. As with any skill, the more you write, the better you become. Following the guidelines presented here will set you in the right direction for developing new items, editing your old items, and improving items from textbook item banks. Chapter 12, “Interpreting Test Results,” provides direction for improving your items based on item analysis data.

Stem Formats

The stem should present a problem that relates directly to a learning outcome. Referring to your learning outcomes every time you develop a stem ensures that each item is designed to assess the achievement of your course objectives. The most important requirement of a stem is that it stands alone; The student should not have to read the options to determine what problem the stem is presenting.

Multiple-choice stems can be framed as either a question or an incomplete statement (see **Exhibit 5.1**). While it is true that most experts prefer the question format, the completion format can be a viable approach for developing effective stems.

Question

Presenting the stem as a question is the format that many experts prefer for writing multiple-choice items. When the problem is formulated as a question, the item writer is compelled to state the problem clearly and completely in the stem. In real life when we want a student to solve a problem, we ask a direct question. We do not propose an incomplete sentence and expect the student to finish our thought.

Asking a question is the most direct way to pose a problem. This method of presentation puts a minimum demand on reading skills and ensures that the problem is completely framed in the stem. It also decreases the possibility of introducing grammatical cues with the options. Although a question might require a longer response in the options, a stem that is written as a question is often more effective than framing the stem as an incomplete sentence. **Exhibit 5.2** is an example of a stem presented as a question.

Completion

In some situations a stem can be presented more concisely as an incomplete sentence than as a question. The completion format increases the cognitive complexity of the item, however, because students have to rephrase it as a question before

Exhibit 5.2 Question stem format

Which of these instructions should a nurse give to a client who is taking digoxin (Lanoxin)?

responding. This format may require some students to keep rereading the stem to identify which option correctly completes the sentence. Students lose time when they have to keep reading the stem. This situation poses a particular difficulty for students who are learning the English language (English Language Learners or ELL) and for students who have learning disabilities. Remember, the key objective of an achievement test is to identify what a student has achieved in a particular domain. A good item removes all obstacles that would interfere with a student's maximum performance.

Although there are arguments against the completion format, they are not sufficient to necessitate that this format never be used. The recommended approach is to attempt to write the stem as a question first; if you have difficulty keeping the problem clear and concise as a question, use the completion format. Make sure that each option completes the stem to form a grammatically correct complete sentence. In some cases the completion format can do a better job of clarifying the problem than the question format. **Exhibit 5.3** shows a stem that uses the completion format.

To compose effective multiple-choice items, the writer must have a mastery of the subject and familiarity with the level of expertise of the students.

Item Writing Guidelines

As Anderson (2003) describes it, item writing is a craft, a little bit art and a little bit science: The science provides the guidelines, while the art provides the flexibility to operate within the guidelines.

Guidelines and suggestions for developing multiple-choice items have been published by a host of experts in the field of classroom assessment (Anderson, 2003; Haladyna, 2004; Miller, Linn, & Gronlund, 2009; Nitko & Brookhart, 2011; Popham, 2003; Reynolds & Wilson, 2008; Schoolcraft, 1989; Trice, 2000). While there is agreement among the authorities in the field that there are no hard-and-fast rules for test development, there is also remarkable overlap and agreement in their suggestions for test and item development.

The guidelines presented here reflect both the suggestions of these authorities and my own experience with developing multiple-choice items that are dependable indicators of student achievement. These guidelines represent the aspects of item writing that are salient enough to be discussed and practiced. It is your own creative touch that you must cultivate and combine with these guidelines to develop your personal item writing style.

The level of detail presented in these guidelines might seem daunting at first. Actually, you will find that many of these suggestions reflect basic common sense and can be readily incorporated into your item-writing repertoire. Other suggestions are more easily understood once you actually start to implement them.

Exhibit 5.3 Completion stem format

A nurse should monitor a client who is receiving intravenous potassium chloride for side effects, which include

Incorporate these suggestions at your own pace. Begin slowly, but get started. Your tests will benefit from your effort.

These guidelines are not rules; rather, they are suggestions. Because testing specialists advocate these guidelines, however, you should seriously consider adopting them. The quality of your items will improve if you review these guidelines and gradually incorporate them into your own creative item-writing style. These guidelines are particularly helpful when reviewing the item analysis data. Chapter 15, “Instituting Item Banking and Test Development Software,” discusses methods for using item analysis data in conjunction with these guidelines to further improve items.

General Guidelines

To yield reliable and valid results, achievement tests must be direct and meaningful measures of learning that provide students with the opportunity to display the knowledge they have acquired. The paramount requirement for test reliability is well-constructed test items; therefore, clarity is essential. Tests are not intended to assess a student’s cleverness. We want students to spend test time figuring out the correct answer, not trying to figure out what the question is asking.

Anderson (2003) summarizes the rules for item writing: first be clear, second be reasonable, and third do not give the answer away (p. 54). If students have attained a learning outcome, a test should afford them the opportunity to demonstrate that attainment. It is unfair if students answer incorrectly because of factors that are extraneous to the purpose of the test. These factors limit and modify student responses and prevent them from showing their true level of achievement. Unfair factors that might prevent students from performing at their best should be eliminated from a test.

The recommended strategy for developing multiple-choice items is to write the stem and the correct answer first. Then, use the correct answer to model the development of the distractors, and keep the distractors grammatically and contextually parallel to the correct answer. Effective items are written so that the only difference between those who do well on the test and those who do not is the possession of the knowledge that is being measured. These guidelines will help you minimize extraneous differences.

A testing situation in itself is anxiety provoking—a factor that we obviously cannot eliminate. Although we cannot completely remove the anxiety factor, we can take measures to modify it. Students will scrutinize each question for meaning (expressed and implied). Ambiguous items cause confusion and increase anxiety. Therefore, the precise meaning of every item should be communicated as efficiently as possible. This responsibility puts great demands on the vocabulary and writing skills of the item developer.

Concerns about clarity bring up the issue of reading comprehension. Achievement tests are not tests of reading comprehension. In fact, you should design your achievement tests to be below the reading ability of the students so as not to confound the measurement of reading comprehension with the measurement of skill in the content domain. However, while it is important to avoid unfamiliar vocabulary, it is also important to include healthcare terminology. Table 5.1 illustrates examples of vocabulary to include and to exclude from your test items.

Table 5.1 Vocabulary for Item Writing

Examples of Vocabulary to Avoid	Examples of Vocabulary to Include
Circumvent	Circumoral
Ludicrous	Diaphoresis
Superfluous	Hematemesis
Domicile	Auscultate
Unequivocal	Opportunistic Extravasation
Cryptic	Endotracheal
Meander	Fibrillation
Embellish	

In addition to minimizing complicated vocabulary, you should avoid bias in your test questions. Be aware of vocabulary that can confuse students—ELL students are particularly susceptible to misinterpreting words or phrases they are not familiar with. Table 5.2 provides several examples of words that could be easily misinterpreted by ELL students. Be especially careful when including foods in a question, as foods are often related to culture and may be unfamiliar to ELL students.

Another issue related to clarity is the use of homonyms, which are words that have more than one meaning. Students may misunderstand the meaning of the word or miss the meaning the teacher intended (**Exhibits 5.4 & 5.5**). Always double-check a thesaurus to identify if a word that has two meanings could confuse ELL students.

Having a colleague critique your exams is a good way to minimize complicated vocabulary, decrease words that may introduce bias, and eliminate words that could be misconstrued by the students. Be sure to remind your colleague to carefully review the incorrect options. Faculty members often have the habit of reading the stem and only the correct answer. The most effective approach is to give your colleague an unkeyed copy of the test to see whether you agree on the correct answer.

When developing items you must ensure that each item stands alone. Answering an item correctly should not depend on answering another item correctly. If

Table 5.2 Vocabulary That Can Be Confusing or Misinterpreted

Examples of Vocabulary to Avoid	Examples of Vocabulary to Include
Crackerjack	Nifty
Kibosh	Backbone
Stressed out	Value added
Cold turkey	A fifth of vodka
Green thumb	Blindsided
In concert with	Sponge cake

Exhibit 5.4 Words with double meanings

Which of these instructions should a nurse include when teaching a client who is scheduled to start taking furosemide (Lasix)?

- A. "Take the medication before you retire."
- B. "Limit the amount of fluid you drink each day."
- C. "Be careful to arise slowly from a sitting position." *
- D. "Don't drive while taking this medication."

The word retire can confuse the students. Was the client going to bed or leaving his job?

Exhibit 5.5 Confusing homonym and colloquialism

A client says to a nurse, "I am really upset. The podiatrist just told me that I have to have an operation to remove a bunion. But I refused to have the procedure?" Which of these responses should the nurse offer?

- A. "There is no need to worry. That is a very minor procedure."
- B. "I see you're tearing up. Let's talk about what's upsetting you."
- C. "I know the podiatrist has a very good track record for that procedure."
- D. "The decision is up to you. You have to suit yourself."

There are two confusing homonyms in this item. "Tearing" can refer to crying or to ripping something apart. "Suit," in this case, means to "please." It is also used to describe a set of clothes. Both of these words could confuse ELL students. This item also uses a phrase that introduces bias. "Track record" is a colloquialism that may not be familiar to ELL students.

students miss the first item in a group of connected items, they will miss all subsequent items in the group. A student might well have been able to answer the second question if it were independent of the first item. When answering a question, students should not have to refer specifically to the answer that was given in a previous question, as **Exhibit 5.6** illustrates.

Most experts agree that the best approach to item writing is to compose the stem and the key first and then create the distractors that parallel the correct answer. It is important to be especially careful about the grammatical structure of all options when you use the completion format. Because the correct answer is written with the stem, it usually completes the stem appropriately. It can be all too easy to overlook grammar when you are focused on writing believable distractors. Furthermore, if you change an item after you edit it, be sure to double-check the grammatical consistency of all options. If only one option is grammatically synchronized with the stem, the students will be inclined to choose it. This problem, as illustrated in **Exhibit 5.7**, is not encountered with the question format.

Exhibit 5.6 Connected items

1. A nurse should recognize that a client who has elevated intracranial pressure will most likely receive which of these medications?
 - A. Mannitol (Osmitrol).
 - B. Digoxin (Lanoxin).
 - C. Indomethacin (Indocin).
 - D. Nadolol (Corgard).
2. The nurse should plan to monitor the client for side effects of this medication, which include
 - A. hyponatremia.
 - B. bradycardia.
 - C. hematuria.
 - D. agranulocytosis.

The answer to item 2 here depends on a correct answer to item 1. Therefore item 1 has a higher scoring weight on the test. Students who miss item 2 because they answered item 1 incorrectly may have been able to answer item 2 correctly if it had been independent of item 1.

Exhibit 5.7 Examples of grammatical inconsistency and consistency**Grammatical Inconsistency**

When assessing the health needs of a community, a nurse should consider that spirituality refers to an

- A. participation in an organized religious group.
- B. practices and rituals of a particular religion.
- C. dimension that is outside the realm of health assessment.
- D. individual's beliefs about the meaning of life and death. *

Grammatical Consistency

When assessing the health needs of a community a nurse should consider that spirituality refers to

- A. participation in an organized religious group.
- B. practices and rituals of a particular religion.
- C. a dimension that is outside the realm of health assessment.
- D. an individual's beliefs about the meaning of life and death. *

In the inconsistent example the stem is only consistent with the correct answer. This provides the uninformed student with an obvious cue.

Exhibit 5.8 Misplaced Modifiers

ORIGINAL

A nurse is caring for a client post gastric resection with a nasogastric tube.

REVISION

A nurse is planning care for a client who had a gastric resection and has a nasogastric tube connected to continuous suction.

Be careful, misplaced modifiers can change the meaning of a sentence. Who has the nasogastric tube in the original, the nurse or the client? Make sure to structure your sentences so that the modifier is closest to the noun it is modifying.

ORIGINAL

A client was referred to a nutritionist with a serious weight problem.

REVISION

A client, who has a serious weight problem, was referred to a nutritionist.

The author here intended to say that the client had a serious weight problem. However the sentence says that the nutritionist has a serious weight problem. The revision clears up the confusion by placing the modifier close to the noun it is modifying, the client.

Exhibit 5.8 illustrates another type of grammatical error, the misplaced modifier. A misplaced modifier is a word or phrase that is placed too far from the noun it is describing. The result is a sentence that is confusing and often unintentionally funny. Because we want our test items to be clear and taken seriously, it is important to remove misplaced modifiers.

If you use the completion format, make sure you do not leave a blank at the beginning or middle of a stem. As **Exhibit 5.9** demonstrates, this action interrupts the students' reading continuity and makes the stem confusing and difficult to answer. It is much easier to understand a completion stem if the proposed answers are presented as conclusions to an incomplete statement.

Characteristics of Effective Stems

The stem is the core of a multiple-choice question. It introduces the student to the central problem being posed. Stems should be clear, succinct, focused, and have a positive approach. If students cannot understand the stem, they will not be able to answer the question. The best stems introduce novel problems for students to solve, rather than paraphrase a textbook (which encourages rote learning). The stem should completely pose the problem to be solved; the student should not have to read the options to figure out what the question is asking.

Complete The students should understand what the stem is asking before they read the options. After you write a stem, read it alone before you write the

Exhibit 5.9 Internal blank

Internal Blank

A nurse is caring for a client who has a normal-functioning, double-barrel, transverse colostomy. The nurse should document that the proximal stoma is producing _____ and the distal stoma is producing _____.

Revised

A nurse is caring for a client who has a normal-functioning, double-barrel, transverse colostomy. The nurse should expect the client to have which of these types of drainage from the distal stoma of the colostomy?

This question is really two questions. If a student answered the original item incorrectly, you would not be able to determine which part of the question the student did not understand.

options. When reviewing a colleague's questions, cover the options and read the stem alone. Ask yourself, "What is the problem or potential problem that the stem is posing?" If you cannot determine what the stem is asking, it should be rewritten. **Exhibits 5.10** and **5.11** contrast incomplete stems with complete stems. The complete stem poses the complete problem for the student, while the incomplete stem requires the student to read all of the options to determine what the question is asking.

Succinct While it is important to include all the necessary information that is needed to solve the problem in the stem, you must keep your stems clear and to the point. One sentence is not necessarily the best choice, as complex sentences can confuse students. It is better to use two or more sentences if including all the information in one sentence makes the sentence too complex. The objective is to communicate the problem as efficiently and clearly as possible. Students should be able to read and answer each item in less than 1 minute.

The key to writing effective stems is to specify all the conditions necessary to have the intended response be the only definitely correct answer to the problem while excluding any unnecessary information (**Exhibits 5.12** and **5.13**). Extraneous information does not increase the cognitive level of an item; it increases ambiguity and lengthens the processing time that is required for students to understand what the question is asking.

Focused Each item should serve one and only one purpose. Therefore, it is important to keep the stem focused on a single problem. Although an item might require a student to progress through a problem-solving sequence, there should be only one problem to solve. If students incorrectly answer a question that includes more than one problem, the teacher will be unable to identify which problem the students missed.

Exhibit 5.10 Incomplete and complete stems

Incomplete Stem

Steroids

- A. pose a risk for immunosuppression. *
- B. can cause renal shutdown.
- C. increase metabolism.
- D. alter pulmonary function.

Complete Stem

A nurse should advise a client who is taking an oral steroid preparation to report signs of adverse effects, which include

- A. sore throat. *
- B. urinary retention.
- C. weight loss.
- D. dyspnea.

Exhibit 5.11 Incomplete vs Complete Stem

Incomplete Stem

Dehydration

- A. leads to postural hypotension.
- B. results in hyponatremia.
- C. causes Kussmaul breathing.
- D. is associated with bradycardia.

Complete Stem

Which of these client manifestations should indicate to a nurse that the client is developing fluid volume deficit?

- A. Bradycardia.
- B. Hyponatremia.
- C. Postural hypotension.
- D. Kussmaul breathing.

Instructional information in the stem qualifies as extraneous information and can reduce the effectiveness of an item. Irrelevant material that does not contribute to the basis for answer selection only serves to complicate the reading comprehension of the item. Keep each item focused on the problem at hand, as the focused stem in **Exhibit 5.14** illustrates.

Positive Approach Experts concur that negative stems should be avoided. At the very least, you should always attempt to reword a negative stem positively. The

Exhibit 5.12 Diffuse and succinct stems**Diffuse Stem**

A 58-year-old accountant has been experiencing substernal chest pressure on exertion for the past 6 months. He is now admitted to the cardiac care unit for diagnosis and management. Right jugular pulmonary artery and right radial lines are inserted. During the cardiac assessment, the nurse finds that the client has cold clammy skin, gray skin color, weak rapid pulse, and a blood pressure of 80/50 mm Hg. The nurse most likely interpreted the client's condition to be related to

Succinct Stem

A nurse is assessing a client who is experiencing severe substernal chest pain. The client is diaphoretic and has cold, clammy, gray-colored skin, a weak and rapid pulse, and a blood pressure of 80/50 mm Hg. The nurse should recognize that these client manifestations are most likely related to

The succinct stem decreases the reading time by almost half yet includes all pertinent information. Eliminating extraneous information focuses the student on the problem and makes the item more direct and easier to understand.

Exhibit 5.13 Diffuse vs. succinct stems**Ambiguous Stem**

A client with hepatic cirrhosis has repeated massive paracentesis. Which concurrent nursing implementation will be most effective in reducing recurrence of ascitic fluid with fewest complications?

- A. Administer salt poor albumin intravenously *
- B. Restrict dietary intake of protein foods
- C. Administer thiazide diuretics by mouth.
- D. Encourage upright posture and mobility as tolerated.

Succinct Stem

A client who has hepatic cirrhosis had several paracenteses with repeated recurrence of ascites. The client has all of these prescriptions. A nurse should recognize that which one will most effectively decrease the recurrence of ascites?

- A. Administer intravenous salt poor albumin to the client. *
- B. Restrict the client's dietary intake of protein.
- C. Administer the oral diuretic to the client.
- D. Maintain the client on bedrest.

When you are revising an item, ask yourself, "What is the point of this question?" In this case the item is testing an important concept; does the student understand the effect of option A? The succinct version specifies that the options are not nursing interventions, they are prescriptions and it requires the student to identify which option is most effective for reducing ascites.

Exhibit 5.14 Unfocused and focused stems**Unfocused Stem**

Documentation is a critical component of the nursing process when caring for rape victims. Which of the following entries most accurately represents a woman who comes to the emergency room reporting that she has been raped by a former boyfriend?

Focused Stem

A woman comes to an emergency department and tells a nurse, “I was raped by my former boyfriend.” When documenting the event, which of these entries by the nurse most accurately represents the interaction between the nurse and the woman?

The purpose of an exam is to measure knowledge, not to provide instruction. The focused stem eliminates the instructional material and provides a much clearer description of what transpired between the nurse and the woman than the unfocused stem.

correct answer to a negative stem has to be a false statement. Because students are usually focused on finding correct statements, a negative stem can easily confuse them. In addition, the anxiety generated in a testing situation can cause students to overlook a negative word in a stem. Even when students recognize a negative word, reading time is increased because these stems require a reversal of thought patterns. **Exhibit 5.15** demonstrates how a negative stem can be reworded as a positive stem and demonstrates the effectiveness of the positive approach for framing stems.

It is very easy to misinterpret a negative question. We do not want a student to miss an answer because of carelessness or anxiety. Remember that the point of the test is to determine what the student knows, not what the student can detect. In order to alert the student that the correct answer is the incorrect option, highlight the negative word; bold, italicize, and capitalize so that negative words REALLY stand out, as the negative stem in **Exhibit 5.16** illustrates.

Only words that reverse the meaning of the stem should be highlighted. Once you start to highlight adjectives and adverbs, such as first, last, most, least, and priority, the impact of highlighting diminishes. Students are then more likely to overlook the emphasis put on the word. Additionally, highlighting can become very subjective. Faculty members will not always agree on what to highlight, and the results will be inconsistent. Students will pick up on the inconsistency and might even argue that they missed a question because you forgot to highlight an adjective or adverb. Keep it simple. Highlight only those words that reverse the meaning of the stem so that the correct answer is the one incorrect option. As long as you explain in the test directions that students should read all options and select the best answer, students will not be placed at a disadvantage.

Present Tense Keeping the problem in the present tense eliminates confusion—the problem in the stem should be happening now, not at some other point in time. It is particularly important to avoid the passive voice. Include events from the past or identify the client’s history while asking the students to solve a problem that is happening now, as illustrated in **Exhibit 5.17**.

Exhibit 5.15 Negative stem versus positive stem**Negative Stem**

A nurse is assessing a client who has pneumonia. Which of these assessment findings indicates that the client does NOT need to be suctioned?

- A. Diminished breath sounds.
- B. Absence of adventitious breath sounds. *
- C. Inability to cough up sputum.
- D. Wheezing after bronchodilator therapy.

Positive Stem

Which of these assessment findings, if identified in a client who has pneumonia, indicates that the client needs to be suctioned?

- A. Absence of adventitious breath sounds.
- B. Respiratory rate of 18 breaths per minute.
- C. Inability to cough up sputum.*
- D. Wheezing before bronchodilator therapy.

The negative stem in the first example is particularly confusing because the correct answer is also negative (absence). Although the positive stem tests the same concept, it is much clearer. It certainly is more important to know when a client needs to be suctioned.

Exhibit 5.16 Negative Stem

A nurse reviews self-care with a client who had a cataract extracted from the right eye this morning. Which of these statements, if made by the client, indicates that the client needs *FURTHER* instruction?

- A. "I will avoid becoming constipated."
- B. "I can take a short walk with my wife."
- C. "I will stay on bed rest for three days." *
- D. "I can watch the football game on television."

When students take a test their mindset is to search for the correct option. When confronted with a negative stem they can easily overlook the negative word and miss the question, even though they have mastered the material. One way to decrease this problem is to highlight the negative word, in this case FURTHER.

Qualities of Effective Options

The goal of a well-written test item is to have the stem and options be so clearly written that the informed students, although they are challenged, select the correct option and are not tricked into choosing an incorrect option. At the same time, all

Exhibit 5.17 Present tense versus passive voice

Passive Voice

A 4-year-old child who had a tonsillectomy this morning has been assessed by a nurse. Which of these findings should be followed up by the nurse?

- A. The child states, "My throat is very sore."
- B. The child's swallowing has increased. *
- C. The child has not urinated.
- D. The child is drowsy.

Present Tense

A nurse is assessing a 4-year-old child who had a tonsillectomy one hour ago. Which of these findings, if identified in the child, is the priority for the nurse to follow up?

- A. The child states, "My throat is very sore."
- B. The child is swallowing repeatedly. *
- C. The child has not urinated.
- D. The child is drowsy.

The initial item is poorly constructed. This would be particularly confusing for ESL students. The revised item keeps the action in the present tense while identifying that the child had surgery in the past. The revised item also clarifies that all the findings should be monitored but that option B is the priority.

options should appeal equally to those who are uninformed (the low achievers on the test). When the low achievers choose the correct option and/or the high achievers choose the incorrect option, or if no one chooses a particular option, the test item is not functioning properly.

Keep the options succinct. Long options become a test of reading ability and tend to confuse the reader. If the options are longer than two lines, the question probably was not fully developed in the stem. As a general rule of thumb, keep the options shorter than one line and certainly shorter than the stem.

How many options should be offered in a multiple-choice question? If the distractors are effective, a higher the number of distractors will yield a more discriminating item. Many standardized multiple-choice exams use four options. Good distractors are hard to write, however, and there is no magic in four options. Most importantly, we want to avoid distractors that trick or confuse high-achieving students or that fail to attract low-achieving students. We do not want students to get to the right answer by process of elimination due to the weakness of the distractors.

Four options reduce the chance of guessing, but it is better to use three options if you are unable to come up with a fourth option that is plausible. Having one correct answer and two plausible distractors is better than including a distractor that is implausible just to keep the number of options at four. In fact, if you use three options, you reduce the reading time per question and can include more items on

the test. For example, if you administer a test that has 50 items with four options each, you could administer a 60-item test that had three options for each item in the same time frame. This approach allows you to sample a wider range of content from the course and increases the validity of the test results.

It is acceptable to include questions with both three and four options on a test. It is less confusing for students and more conducive to face validity to keep all items with a uniform number of distractors, however. The major difficulty with four options is that posed with writing distractors. One of the goals of this chapter is to assist you with developing skill in the ability to write plausible distractors.

A key requirement for item plausibility is homogeneity—all options should look alike. Listing the options vertically allows the best visual comparison. They should all be approximately the same length or be listed in ascending length. If one of the options is a disproportionate length compared with the others, as shown in **Exhibit 5.18**, it causes a cuing error in the item. In some cases it could attract students; in other situations it could cause students not to select that option. In either situation, a student's choice of an option should not be related to cuing; it should be based solely on knowledge, or lack of knowledge, in the content area.

Another requirement for item options is to place those associated with a value in numerical, chronological, or sequential order. Either ascending or descending order can be chosen. An answer that requires a numerical response causes confusion if the student has to hunt for the answer. It is much more effective to place such answers in sequential order. **Exhibit 5.19** illustrates the advantage of ordering options.

Many test development software programs scramble options to create different versions of a test. If you want options to remain in a particular order, be sure to disable this feature for the item. If you are storing your items in hard copy, make a notation that the options should not be scrambled.

The more precisely you word your items, the more accurate they are. Therefore, it is important to provide appropriate labels for answers that relate to values such as vital signs or laboratory values. **Exhibit 5.20** illustrates how labeling values clarifies their meaning and limits student speculation.

Exhibit 5.18 Disproportionate option length

A client says to a nurse, "I have a living will, but I haven't told my family, because I don't want to worry them." Which of these replies would be appropriate for the nurse to make?

- A. "You have a right to privacy about this matter."
- B. "I won't tell your family, but I have to note it in your chart."
- C. "I have to tell your doctor, but I won't tell anyone else."
- D. "You should discuss this with your family and doctor so that if a health crisis did occur they would have first-hand information of your wishes so that they could act as you would want them to." *

Option D is disproportionately long, providing a cue to its correctness.

Exhibit 5.19 Option order

Disordered Options

A client is to receive quietane (Seroquel) syrup 50 mg po bid. The bottle of Seroquel syrup contains 25 mg per 5 mL. How many milliliters of syrup should a nurse give the client for each dose?

- A. 10*
- B. 25
- C. 5
- D. 20

Ordered Options

A client is to receive quietane (Seroquel) syrup 50 mg po bid. The bottle of Seroquel syrup contains 25 mg per 5 mL. How many milliliters of syrup should a nurse give the client for each dose?

- A. 5
- B. 10*
- C. 20
- D. 25

Notice how the disordered example causes the student to hunt for the correct answer. Keeping the option in order decreases confusion and reading time. Notice also that there are no periods at the end of the options to avoid confusion with decimals.

Exhibit 5.20 Labeling values

Unlabeled Values

Which of these laboratory results should a nurse recognize as suggestive that a client who is diagnosed with schizophrenia has developed an adverse effect of prescribed clozapine (Clozaril)?

- A. Blood urea nitrogen (BUN), 16
- B. Platelets, 160,000
- C. Creatinine phosphokinase (CPK), 55
- D. White blood cells (WBC), 3,200 *

Labeled Values

Which of these laboratory results should a nurse recognize as suggestive that a client who is diagnosed with schizophrenia has developed an adverse effect of prescribed clozapine (Clozaril)?

- A. Blood urea nitrogen (BUN), 16 mg/dL
- B. Platelets, 160,000/mm³
- C. Creatinine phosphokinase (CPK), 55 U/L
- D. White blood cells (WBC), 3,200 μ/L *

Positive Statements As with stems, negativity should be avoided in the options (especially if a negative stem is used). Double negatives cause impossible confusion. Negative options are often used to increase item difficulty, but the problem is that they increase difficulty by tricking the students. Negative options are generally not acceptable distractors. **Exhibits 5.21** and **5.22** demonstrate the misleading quality of negative stems and negative options.

Negative questions are seldom encountered in real practice; therefore, they lack practical relevance. Situations do arise in healthcare settings, however, where the wrong action can have dire consequences. Use a negative stem only when knowing what not to do is important.

Distinct Each option should be distinct. Retaining as much information as possible in the stem rather than in the responses reduces redundancy and reading time. Words or phrases that have to be repeated in the options should be in the stem, not in the options, as shown in **Exhibit 5.23**. The operating principle here is to keep reading time to a minimum.

Another concern with maintaining the distinctness of the options is to avoid overlapping the options. Items should not be partially correct; that is, a correct response should not be part of a distractor. Structuring an item this way confuses students. Keep all of the options mutually exclusive; when options overlap, more than one option may be correct. **Exhibits 5.24** and **5.25** present different applications for keeping options distinct.

Exhibit 5.21 Negative options

Negative Options

When physically restraining a client, a nurse should consider all of these standards of care EXCEPT

- A. obtaining the client's consent for the restraint. *
- B. using the least restrictive device for the shortest time.
- C. not keeping restraints on continuously.
- D. applying restraints when nonrestrictive alternatives are not effective.

Negative options are particularly confusing when the stem is also negative. Options C and D both include negative terms, which make this question an exercise in logic rather than a true test of knowledge.

Revised

Which of these standards of care should a nurse include when caring for a client who is physically restrained?

- A. Obtaining a signed consent from the client.
- B. Using the most restrictive device available.
- C. Removing restraints at regular intervals. *
- D. Using a nonrestrictive alternative in addition to the restraint.

Exhibit 5.22 Negative stem with negative options

A nurse reviews self-care with a client who has chronic renal failure and an A-V fistula on the left arm. Which of these statements, if made by the client, should indicate to the nurse that the client needs FURTHER teaching?

- A. "I will wear my watch on my left wrist." *
- B. "I will not allow anyone to draw blood from my left arm."
- C. "I will not have my blood pressure taken on my left arm."
- D. "I will not carry heavy objects with my left arm."

The word "further" reverses the meaning of the stem so that the student must identify the incorrect option. The "nots" in the options reverse the meaning of the distractors. The correct answer is the only positive one. This is an extremely confusing item!

Exhibit 5.23 Distinct options versus redundant options**Redundant**

Which of these methods provides a quick estimation of the cardiac rate from the electrocardiogram of a client who has normal sinus rhythm?

- A. Count the number of T waves in a 5-second strip and multiply by 6.
- B. Count the number of large squares in an R-R interval and divide by 10.
- C. Count the number of small squares between two P waves and multiply by 5.
- D. Count the number of QRS complexes in 6 seconds and multiply by 10. *

Distinct

To obtain a quick estimation of the cardiac rate from the electrocardiogram of a client who has a normal sinus rhythm, a nurse should count the number of

- A. T waves in a 5-second strip and multiply by 6.
- B. large squares in an R-R interval and divide by 10.
- C. small squares between two P waves and multiply by 5.
- D. QRS complexes in 6 seconds and multiply by 10. *

The revised item eliminates redundancy and decreases the time needed for reading the question. Note also that the completion format works better here.

Homogeneous Appearance For options to be equally attractive to the students, they all must be parallel in length, grammatical structure, content, and complexity. The more homogeneous the options appear, the more challenging the item. Homogeneity refers to appearance only; each option must be mutually exclusive and provide a clear and distinct choice. The correct option must be the only correct option, and the incorrect options must be undeniably wrong. **Exhibit 5.26** shows that the more the incorrect options look like the correct answer, the more difficult it is for the uninformed students to guess the correct answer.

Exhibit 5.24 Partially correct versus distinct options**Partially Correct Options**

Which is the most effective approach for a nurse to take when approaching a suspicious client?

- A. Cautiously extend the hand.
- B. Introduce self and state reason for visit. *
- C. Extend hand and state reason for visit.
- D. Introduce self and extend the hand.

The actions in these options overlap. Including a correct component in a distractor confuses students. Each option should stand alone, with the correct option being the only completely correct answer.

Distinct Options

After introducing oneself, which of these approaches would be appropriate for a nurse to take when initially approaching a hospitalized client who is suspicious?

- A. Offer to shake the client's hand.
- B. Explain the reason for the visit. *
- C. Tell the client there is no need to be distrustful.
- D. Provide the client with a thorough orientation to the facility.

Each option is distinct, the distractors contain only incorrect components, and there is only one clearly correct answer. Note that the action of introducing oneself is included in the stem.

Opposite options pose a problem in multiple-choice items. If two options are opposites, the students will be drawn to decide between those two and ignore the other options. **Exhibit 5.27** shows how opposite distractors can provide a cue to test-wise students.

The Rule of Two Sets applies to opposite options. If similar structure or wording is included in two options, it must be used in all four options. If two options are opposites, you must use two sets of opposites. As the examples in **Exhibit 5.28** show, two similar options attract students and cause them to discount the two that are dissimilar, whereas two sets of opposite options decrease the guessing ability of the uninformed students.

Homogeneous options use medical terminology and technical language consistently. If terminology is used in one option, it should be used in all options. **Exhibit 5.29** provides an example of how students are drawn to choose the answer that appears to be most technical.

Avoid writing items that have very specific correct answers and very general distractors or very specific distractors with a very general correct answer, as **Exhibit 5.30** demonstrates. Students are attracted to select the option that is different. If one of the homogeneous options in these sets is the correct answer, the question is attempting to trick the students.

Exhibit 5.25 Overlapping options

Overlapping Options

A nurse should explain to a client who is taking lithium (Eskalith) that the dose must be individualized to maintain blood levels between

- A. 0.2 and 0.5 mEq/L.
- B. 0.5 and 1.5 mEq/L. *
- C. 1.5 and 2.0 mEq/L.
- D. 2.0 and 3.5 mEq/L.

Revised

A nurse should explain to a client who is taking lithium (Eskalith) that the dose must be individualized to maintain blood levels at how many milliequivalents per liter?

- A. 0.2–0.4
- B. 0.5–1.5*
- C. 1.6–2.5
- D. 2.6–3.5

Each option stands alone. One option does not include another. Also note that you can remove mEq/L from the options by including milliequivalents per liter in the stem.

Exhibit 5.26 Heterogeneous and homogeneous options

Heterogeneous Options

Which of these nursing diagnoses would be the priority for this client?

- A. Activity intolerance
- B. Constipation
- C. Hypertension
- D. Fluid volume deficit

Homogeneous Options

Which of these nursing diagnoses would be the priority for this client?

- A. Activity intolerance
- B. Constipation
- C. Hyperthermia
- D. Fluid volume deficit

Option C in the heterogeneous example is not a nursing diagnosis and is therefore inconsistent with the stem and the other options.

Exhibit 5.27 Opposite options**Opposite Options**

A client has a Sengstaken-Blakemore tube connected to low wall suction. When the client develops respiratory distress, which of these actions should a nurse take?

- A. Inflate the tube's esophageal balloon.
- B. Deflate the tube's esophageal balloon. *
- C. Decompress the tube's gastric balloon.
- D. Increase the amount of wall suction.

Distinct Options

A client has a Sengstaken-Blakemore tube connected to low wall suction. When the client develops respiratory distress, which of these actions should a nurse take?

- A. Lavage the tube with ice water.
- B. Deflate the tube's esophageal balloon. *
- C. Decompress the tube's gastric balloon.
- D. Increase the amount of wall suction.

In the first example options A and B are opposites, and this attracts students to choose between only options A and B and ignore options C and D. By removing the incorrect opposite option, uninformed students are more likely to consider all four options as equally attractive. In addition, in the original question option D is the only option that does not have a "balloon."

Exhibit 5.28 Rule of Two Sets**One Set of Opposites**

A nurse should monitor the client for side effects of the medication, which include

- A. hypertension.
- B. hypotension. *
- C. insomnia.
- D. palpitations.

Two Sets of Opposites

A nurse should monitor the client for side effects of the medication, which include

- A. tachycardia.
- B. bradycardia.
- C. hypertension.
- D. hypotension. *

In the first example test-wise students are apt to ignore options C and D. The second example uses the "Rule of Two Sets" in which two sets of opposites attract the uninformed student to all four options.

Exhibit 5.29 Health care terminology**Technical Language**

A nurse should carefully observe the client for which of these manifestations?

- A. Pruritus *
- B. Redness
- C. Bruises
- D. Ringing in the ears

Revised

A nurse should carefully observe the client for which of these manifestations?

- A. Pruritus *
- B. Erythema
- C. Ecchymosis
- D. Tinnitus

Choice A, which is the correct answer, contains the only technical term in the first example. Students are most likely to choose the technical term even if they are not familiar with the material being tested. If B, C, or D were the correct answer in the first example, the question would be a trick item. The revised example uses all technical terms, making the options homogeneous.

Exhibit 5.30 Repetitive versus succinct options**Repetitive Options**

Before administering digoxin (Lanoxin) to a client who has congestive heart failure, a nurse should check the client for

- A. bradycardia, hypokalemia, and gastric upset. *
- B. constipation, bradycardia, and hypokalemia.
- C. hypokalemia, dry mouth, and bradycardia.
- D. hypertension, bradycardia, and hypokalemia.

Succinct Options

Before administering digoxin (Lanoxin) to a client who has congestive heart failure, a nurse should monitor the client for bradycardia, hypokalemia, and

- A. gastric upset. *
- B. constipation.
- C. dry mouth.
- D. hypertension.

In the preceding question checking for bradycardia and hypokalemia are in every option, so they belong in the stem.

Exhibit 5.31 General versus specific options**General Options**

Which of these measures is most important to include when caring for a client during the first hour after surgery?

- A. Repositioning the client at regular intervals.
- B. Monitoring the client's cardiovascular status. *
- C. Orienting the client to the post anesthesia unit.
- D. Checking the client's ability to move the lower extremities.

Specific Options

Which of these measures is most important to include when caring for a client during the first hour after surgery?

- A. Repositioning the client at regular intervals.
- B. Monitoring the client's blood pressure. *
- C. Orienting the client to the post anesthesia unit.
- D. Checking the client's ability to move the lower extremities.

Test-wise students will recognize that the correct answer is the global option, which is the heterogeneous one in the original question. The revised item contains four specific options, which decreases the opportunity of the test-wise student to correctly answer the question without having mastered the content.

Succinct Succinctness of the options is just as important as succinctness of the stem, as **Exhibit 5.31** illustrates. Keeping key words in the stem eliminates repetition in the options. Repeating words in the options causes confusion and unnecessarily complicates the reading of the question. In addition, a distractor should not be partially correct.

Developing the Correct Answer

There should be one and only one correct answer for each question. Perhaps this statement seems too elementary to even mention, but frequently the key is a problem in classroom tests. Whether the correct answer is the only right answer or the best response, the faculty should agree that the designated answer is the only correct one. Writing a referenced rationale for each of your items is the most effective way to ensure the veracity of the key. In addition, referenced items can be shared with your students for a very effective test review.

It is critical that the stem specifies all the necessary conditions that make the intended response the only correct answer. At the same time, avoid some of the factors that interfere with the effectiveness of your items.

First, it is important to randomize the key. The correct answer should be equally assigned to each option choice. If you consciously alternate the position of the correct answer when you write your items, it makes it easier to randomize the

key when you assemble a test. It is counterproductive to alphabetize the options as some experts suggest. If you rewrite the options because of item analysis results, you will have to reorder the options, which will cause confusion when you try to associate data with the options in the future. Also, alphabetizing the options will be lost if you use a test development program that allows you to scramble options to create alternate forms of a test. You do not need another step to item writing. Just alternate between the available options when you write your items and randomization will not be a problem.

In addition to randomizing, you want to make sure that the key does not repeat the same letter more than three or four times. A string of six A's, for example, might make a student doubt that the seventh answer is also an A, even if it is. After you assemble your test, print out a key and check that the same letter is not repeated more than three times. If you identify a problem, move the questions around; do not change the order of the options. Changing the order of the options can cause great confusion with the key, especially if you have data associated with the items.

A helpful method for ensuring that your key does not become confused is to put an asterisk at the end of the correct option. If you use a test development software program to compose your items, this step is unnecessary because the program maintains the key once you enter it. If you write your items in a word processing program, however, the key could become confused if you rearrange the options for any reason. Having an asterisk at the end of the correct answer ensures that the key is correct no matter how often you cut and paste your options during test development. You will note that the item examples in this text follow this suggestion.

There are several cues that can give away your correct answer to test-wise students. These include having a longer and more precise correct answer as compared with the incorrect options, as in **Exhibits 5.18** and **5.32**, and phrasing the correct answer in textbook terminology, as in **Exhibit 5.32**.

Designing Effective Distractors

The art of writing effective multiple-choice items requires you to use your creativity and critical thinking skills. Crafting distractors presents the biggest challenge to most teachers. The goal of distractors is to discriminate between the students who are informed and those who are uninformed or have not mastered the course content and objectives. To effectively discriminate, all of the item's options must be equally attractive to those students who are uninformed.

Distractors should be as attractive as the correct answer to students who have not achieved the desired outcome. If a distractor does not attract students, if the distractors attract the high-achieving students, or if more low achievers choose the correct answer than high achievers, the item is not functioning properly. It takes practice to develop expertise in crafting workable distractors; using the suggestions that follow will help you get started.

One method for increasing the difficulty of a multiple-choice item is to require the student to select the best answer. When you are asking for the one correct answer, the distractors should all be wrong. A question that asks for the best answer implies that all of the options vary in degree of correctness, with only one option as the best answer. The difference between these two formats is illustrated

Exhibit 5.32 Textbook language

Which of these measures is most important to include when caring for a client during the first hour after surgery?

- A. Repositioning the client at regular intervals.
- B. Monitoring the client's cardiovascular status. *
- C. Orienting the client to the post anesthesia unit.
- D. Checking the client's ability to move the lower extremities.

A nurse should recognize that the manifestations of tuberculosis are related to

- A. the production of lymphokine, which is stimulated by the immune response to the tubercle bacilli. *
- B. a decrease in the white blood cells.
- C. an inflammatory response.
- D. the increased production of sputum.

Textbook language encourages students to select an option even though they do not understand the material. This option violates two additional guidelines: tubercle bacilli is mentioned only in the key, and the key is much longer than the distractors.

in **Exhibit 5.33**. Best answer items tend to be more difficult and discriminating than questions that have distinctly incorrect distractors. Items that are written in the best answer format are an effective strategy for developing critical thinking items. Chapter 6, "Writing Critical Thinking Multiple-Choice Items" elaborates on writing items using this format.

Plausibility It is not enough for a distractor to be wrong; it must be plausible without being tricky (**Exhibit 5.34**). If high-achieving students chose distractors because they are tricky, the item loses its usefulness. At the same time, highly implausible or absurd distractors contribute nothing to the effectiveness of a test. Ideally, all incorrect options should appeal only to the uninformed student. The uninformed student should not be able to eliminate the incorrect options with certainty. Learning to write plausible distractors takes practice.

Common Misconceptions You probably have lots of ideas for plausible distractors right at your fingertips. Keep a log of the common misconceptions that students express in clinical practice. Make a list of classroom questions that students frequently ask. Keep track of the incorrect responses that students supply on short answer items. Common errors and beliefs of students translate into very believable distractors. **Exhibit 5.35** shows how common misconceptions can be translated into effective distractors.

Sound Bites A statement that relates to a situation that is close to the question but does not satisfy the requirements of the question will attract the uninformed

Exhibit 5.33 Best answer versus correct answer format**Best Answer Format**

A nurse should give priority to which of these short-term outcomes for a client who is experiencing a panic attack?

- A. The client will have decreased symptoms of anxiety.
- B. The client will avoid frightening situations.
- C. The client will learn thought-stopping techniques.
- D. The client will remain safe during the episode. *

Each option is a possible outcome, whereas option D is clearly the priority outcome at this time.

Correct Answer Format

Which of these questions would be appropriate for a nurse to ask when assessing a client for bulimia?

- A. "How many times a day do you eat?"
- B. "For how long have you been at your current weight?"
- C. "Do you have particular food dislikes?"
- D. "Do you ever eat in secret?" *

In this example all the distractors are incorrect. Only D is an appropriate answer. Because there is only one correct answer, the stem cannot ask for a best answer, such as "Which of these questions should a nurse ask first?"

Exhibit 5.34 Implausible distractors

A nurse should recognize that which of these individuals is most likely to have a personality disorder?

- A. An 18-year-old man who is beginning a new relationship and is unsure as to whether he is ready for a long-term commitment.
- B. A 24-year-old woman who is unable to show emotion, has no friends, and is estranged from her family. *
- C. A dependable, loyal, 30-year-old man who expresses himself through art.
- D. A 43-year-old woman who describes herself as shy and reticent.

Options A, C, and D are implausible, whereas option B is so obviously correct.

students. Students who have not mastered the content will remember hearing or reading these facts but will be unable to correctly apply the information. The uninformed students will remember that you "said that in class," but they will not recognize that what you said does not apply to the question at hand. A sound bite that does not apply to the stem requires students to make a judgment related to the accuracy of the statement as well as its relevance, as **Exhibit 5.36** illustrates.

Exhibit 5.35 Common misconceptions

When a client has a seizure, which of these actions should a nurse take?

- A. Place an object in the client's mouth.
- B. Protect the client's head. *
- C. Restrain the client's extremities.
- D. Insert an airway into the client's trachea.

This item recognizes that students who are not familiar with the content will be drawn to the common misconceptions identified in the distractors.

Exhibit 5.36 Sound bite

A client who has congestive heart failure says to a nurse, "I really don't understand what is wrong with my heart." Which of these explanations would be appropriate for the nurse to give to the client?

- A. "There is a blockage in the arteries that supply your heart muscle."
- B. "Your heart is having difficulty pumping enough blood for your body." *
- C. "The impulses that direct the beating of your heart are acting randomly."
- D. "There is a bulging in the major vessel that leaves your heart."

While A, C, and D are responses that describe cardiac pathology, they do not apply to congestive heart failure. They look familiar to the uninformed student. Writing distractors that correctly explain another situation is much more effective than creating pathophysiology, such as "The blood is moving too rapidly through the left side of your heart."

Seeks Help Appropriately Items that call for the nurse to seek assistance require the student to recognize when a situation requires the expertise of another healthcare professional. Because students hesitate to select the option, "call the primary healthcare provider (PCP)," it makes a very poor distractor. When that option is the correct one, however, it works well because it requires the student to carefully discriminate among the alternatives to recognize when a situation requires the attention of the PCP. You might prefer to have the nurse take an action in the stem first, but calling the PCP is an acceptable format, as the question in **Exhibit 5.37** demonstrates.

Quote the Nurse and/or the Client The item in **Exhibit 5.38** demonstrates how effectively quotes work in a question. Quotes represent real-life situations that a nurse would encounter in practice, and they also ensure that the material is not directly copied from a textbook.

Characteristics to Avoid

Cues are irrelevant and unintended clues to the correct answer that enable students to make the correct response without having the required ability. Cues negatively

Exhibit 5.37 Seeks help appropriately

A client who has esophageal varices develops hematemesis. In addition to checking the client's pulse and blood pressure, which of these actions should a nurse take?

- A. Obtain a specimen for blood gas analysis.
- B. Increase the client's oral fluid intake.
- C. Administer the client's prescribed lactulose (Cephulac).
- D. Notify the client's physician. *

Exhibit 5.38 Quotes

A client who has insulin-dependent diabetes mellitus (IDDM) is taking both insulin injection (Regular, Humulin R) and isophane insulin (NPH). The client asks a nurse, "Is it okay for me to be taking both insulins in one injection?"

- A. "Regular insulin is unstable so you should inject it separately from the NPH."
- B. "Yes, mixing the insulins in one injection decreases the use of injection sites." *
- C. "It is not a good idea because NPH is altered if it is mixed with regular insulin."
- D. "If you take the two insulins together you'll need to take the injection more frequently."

impact the reliability of a test. An effective multiple-choice item eliminates these cues so that students are only able to answer the question correctly if they have mastered the concepts that the question requires. Grammatical inconsistency and homogeneity are two cues that were previously discussed. It is obvious that violating many of the guidelines presented in this chapter provides cues to the uninformed student. Several additional cues are identified in the section that follows. Your goal as an item developer is to avoid these cues to ensure that your items are providing the information you need to make decisions.

Verbal Associations Repeating key words from the stem only in the correct option provides a cue to test-wise students. Verbal associations connect the correct answer to the stem, as is seen in **Exhibit 5.39**.

Qualifying Words Qualifying words provide cues to students because they neutralize the option, making it a safe choice. Words such as often, seldom, sometimes, usually, and generally are most often found in the correct answer, as shown in **Exhibit 5.40**. These words qualify the key by indicating that the option does not have to be true all the time. Test-wise students recognize that if one option is not definitive, it is the safe choice. If you use qualifying words, keep the options homogeneous by including qualifiers in all options.

Specific Determiners Words such as never, none, all, and always are specific determiners. These words are the antitheses of qualifiers: They indicate that a situation is absolute. Because very few things in nursing are absolute, using specific

Exhibit 5.39 Verbal association**Verbal Association**

A nurse should recognize that the first step in resolving an ethical dilemma related to a client's advanced directives is to

- A. recognize that an ethical dilemma exists. *
- B. identify the moral point of view of the client.
- C. assess the viewpoints of all involved parties.
- D. determine the client's health status.

Revised

A nurse should recognize that the first step in resolving an ethical dilemma related to a client's advanced directives is to

- A. recognize that a conflict exists. *
- B. identify the moral point of view of the client.
- C. assess the viewpoints of all involved parties.
- D. determine the client's health status.

The word "ethical" provides a cue because it is repeated only in the correct answer in the original question. The revised item changes the words ethical dilemma to conflict, which removes the cue.

Exhibit 5.40 Qualifying words

When screening a group of senior citizens for hypertension, a nurse should understand that elderly clients who have hypertension

- A. often have no symptoms. *
- B. will refuse to accept treatment.
- C. have an underlying cause for the problem.
- D. respond more positively to medication than younger clients.

The qualifying word in the correct answer provides a clue because the option is more general. The key allows that some clients have symptoms, whereas the distractors are absolute.

determiners only in the incorrect answers provides a cue to test-wise students, as **Exhibit 5.41** shows. Specific determiners are seldom used in the correct answer, and test-wise students are aware of this fact. These words are appropriate to use in the stem; however, they should be used sparingly in the options and then only when they can be appropriately used in the correct answer. Items should be written to test more than a student's ability to recognize that unequivocal statements are seldom true.

Exhibit 5.41 Specific determiners

When planning care for an elderly client who is bedridden, a nurse should recognize that pressure ulcers

- A. always result from the client's inability to ambulate.
- B. develop when tissue is subjected to sustained pressure. *
- C. can always be prevented by vigorous massage.
- D. never develop if the client is well nourished.

Specific determiners rule out the possibility of an exception to the rule. The rule never say never applies here. Pressure is also a cue in the stem.

All-of-the-above All-of-the-above and none-of-the-above are used most often when a teacher cannot think of a fourth option. All-of-the-above is particularly helpful to test-wise students who are able to select the correct answer based on incomplete information (**Exhibit 5.42**). These students recognize that if they can identify two correct answers, then all-of-the-above is correct; conversely, if they can identify that one answer is incorrect, then all-of-the-above is incorrect. The use of all-of-the-above should be avoided; it is much more effective to rephrase the question so that four plausible alternatives are provided.

None-of-the-above None-of-the-above should be used sparingly, if at all. After all, if there is no correct answer to the question, why ask it in the first place? **Exhibit 5.43** clarifies how the use of none-of-the-above as a distractor produces an ineffective item.

Some experts advocate the use of none-of-the-above to decrease the chance of correctly guessing when the student must perform an operation to obtain the correct answer. Several authorities acknowledge the benefit of using this option when testing calculations in a multiple-choice format (Miller et al., 2009; Nitko and Brookhart, 2011; Popham, 2003).

Exhibit 5.42 All of the above

When assessing a client who reports having sleep deprivation, a nurse should assess the client for manifestations, which include

- A. confusion.
- B. slowed response time.
- C. diminished reasoning skills.
- D. all of the above. *

The test-wise student need only recognize that two of the options are correct to identify that the correct answer is all of the above. Therefore a student who has incomplete understanding can guess the correct answer.

Exhibit 5.43 None of the above

Which of these components of the nursing process determines the extent to which the planned client outcomes have been achieved?

- A. Assessment
- B. Planning
- C. Evaluation *
- D. None of the above

Test-wise students know they should avoid the none of the above option, which reduces the plausible options to three.

The use of none-of-the-above is recommended only when students are more likely to answer the question and then look at the options, such as with a math calculation, as shown in **Exhibit 5.44**. Students might be able to estimate the correct calculation answer on a multiple-choice exam. When you want to be confident that students can perform the calculations, use none-of-the-above so that students cannot assume that the correct answer is included in the options. This alternative avoids giving clues to students when their incorrect solution is not among the options. When none-of-the-above is an option, the students have to be certain that their solution is correct. Without none-of-the-above as a choice, it is easier to guess without really knowing how to calculate. There is one caution to remember if you use none-of-the-above as an option: The correct answer must be absolute. The answers for math calculation questions, for example, cannot be rounded up or down. Unless you specify in the stem that the answer is approximate, a rounded number is not absolutely correct and none-of-the-above is the technically correct answer, even when you intend another option to be the correct answer. If you choose to use the none-of-the-above format for math calculation items, reserve it for answers that are absolute, such as the example in **Exhibit 5.44**.

Exhibit 5.44 None of the above for math

A nurse is preparing to administer 2 mg of a medication to a client. The medication is available in a vial that is labeled 1 mg/0.5 mL. How many milliliters should the nurse administer to the client?

- A. 0.5
- B. 1.5
- C. 2.0
- D. None of the above *

In this example the student must be sure of the answer to recognize that none of the above is correct.

A problem with the none-of-the-above option is that students might not believe that this option is ever correct. If students do not believe that it is a viable choice, it will not work as an option. It is important to explain to students who are not used to the inclusion of the none-of-the-above option on a test that this choice is sometimes the correct option.

Multiple Multiples The goal of item development is to make the question as clear as possible and to eliminate any extraneous factors that would confuse students. Multiple-multiple or complex multiple-choice items directly contradict this goal. The example in **Exhibit 5.45** shows just how confusing a multiple-multiple item can be. This item format is unnecessarily complex and is more a test of a student's logic ability than a direct and meaningful indicator of a student's achievement.

Trick Items Trick items are designed by item writers who are under the false impression that any means of increasing item difficulty is acceptable (**Exhibits 5.46** and **5.47**). The problem is that these items trick both low and high achievers, and therefore the item will not be an effective indicator of student achievement.

Exhibit 5.45 A multiple-multiple item

Multiple-Multiple

A screening test for a disease is found to have a sensitivity of 90 percent and a specificity of 95 percent, which means that of the people who had the test

- A. 5 percent of those who have the disease were identified as positive.
- B. 95 percent of those who do not have the disease were identified as negative.
- C. 10 percent of those who were identified as negative have the disease.
- D. 90 percent of those who were identified as positive do not have the disease.
- A. A and B are true and C and D are false.
- B. C and D are true and A and B are false.
- C. A and C are true and B and D are false.
- D. B and C are true and A and D are false. *

This question is impossibly confusing. Even if the student can interpret the stem, an inordinate amount of time is needed to decipher what is being asked.

Revised

A screening test for a disease is found to have a sensitivity of 90 percent and a specificity of 95 percent. A nurse should interpret this as meaning that of the people who had the test

- A. 5 percent of those who were identified as negative do not have the disease.
- B. 10 percent of those who have the disease were identified as positive.
- C. 90 percent of those who were positive do not have the disease.
- D. 95 percent of those who do not have the disease were identified as negative. *

Exhibit 5.46 Trick item

A client who is receiving an intravenous infusion develops dyspnea and increased blood pressure. A nurse should recognize that which of these problems may be developing?

- A. Infection
- B. Air embolism
- C. Fluid overload *
- D. Hypovolemia

This question will confuse students. It is a trick item because although an embolism is not associated with elevated blood pressure, it is definitely associated with dyspnea. The inclusion of dyspnea in the stem will mislead students. The question would be more effective if it included several clear manifestations of fluid overload and/or if air embolism was left out of the distractors. Even the most experienced professional would not make a definitive diagnosis based on two manifestations. In addition, it is far more important to ask what a nurse should do when a client experiences an untoward reaction to an intravenous infusion.

Exhibit 5.47 Another trick item

Which of these client manifestations would support a nursing diagnosis of fluid volume deficit?

- A. Tachycardia *
- B. Decreased respiratory rate with prolonged expiratory phase
- C. Dysuria
- D. Diaphoresis

Students may be drawn to select B because it is the longest answer. Figure 6.13 illustrates a disproportionately long correct answer that provides a cue to students. This example violates the same rule, but it is particularly unfair because it purposely tempts the student with a cue to the wrong answer.

These items lure students to second-guess themselves and to select an incorrect answer because of an extraneous cue. Students become understandably distrustful of faculty members who use tricks in their tests.

Putting the Action in the Stem Identifying what action a nurse should take in the stem and then asking the students to refine the action is an approach that results in a very easy item. It is difficult to break an action down into four believable options, and therefore the students only have to eliminate the obviously incorrect to identify the correct answer. A better approach is to simply ask the students to identify which action is appropriate in the stem and keep the options

Exhibit 5.48 Action in the stem**Action in the Stem**

In which of these positions should a nurse place a client who had a liver biopsy 1 hour ago?

- A. Right side lying *
- B. Left Sims
- C. Prone
- D. Supine

Revised

Which of these measures should a nurse include in the care plan for a client who had a liver biopsy 1 hour ago?

- A. Monitor the neurovascular status of the client's affected extremity.
- B. Advise the client to maintain a right side-lying position. *
- C. Check the client's urine for occult blood.
- D. Instruct the client to move slowly when arising from a sitting position.

The original question tells the student that the answer involves positioning. The student can then guess between plausible options. The revised question requires a higher level of discrimination from the student. The action is not indicated in the stem, so the student must choose from among a list of unrelated options.

distinct from each other. **Exhibits 5.48** and **5.49** present examples that illustrate this type of question.

Stating the action in the stem is such a common problem with teacher-developed items that I have included two additional examples to illustrate how dramatically these items can be improved if the actions are kept in the options. **Exhibits 5.50** and **5.51** demonstrate the advantage of keeping the actions in the options, not in the stem. In addition, these exhibits introduce the concept of developing parallel items for use in future tests.

Missing Information Item stems that do not provide adequate information to solve the problem present a serious issue in an exam. Obviously no one plans for an item to be incomplete, but sometimes the author can overlook important details. Although an incomplete item can be removed after the test is administered, the damage is done. When students encounter an item that they cannot answer, their first impulse is to assume they have inadequate knowledge, which increases anxiety and can affect their performance on the rest of the test. **Exhibits 5.52** and **5.53** provide additional illustrations for why careful proofreading by a colleague is so important when you develop a test.

Humor Humor is an indispensable tool in the classroom; however, it is out of place on an exam. Although humor can decrease tension in the classroom, it can

Exhibit 5.49 Action in the stem

Action in the Stem

When administering medication to a client via an intravenous heparin lock, a nurse should

- A. flush the lock with 5 mL of bacteriostatic water.
- B. flush the lock with 10 mL of 5% dextrose solution.
- C. flush the lock with 2.5 mL of normal saline. *
- D. flush the lock with 1 mL of atropine sulfate.

Revised

Which of these actions should a nurse take immediately before administering a medication to a client who has an intravenous heparin lock in the right arm?

- E. Apply iodine to the lock insertion site.
- F. Aspirate the lock to check for blood return.
- G. Flush the lock with 2.5 mL of normal saline. *
- H. Elevate the client's right arm above the level of the heart.

The original question tells the student that the answer involves flushing the lock. The uninformed student only has to guess the reasonable amount of solution to use. The revised question requires a higher level of discrimination from the student. The action is not indicated in the stem, so the student has to choose from among a list of unrelated options.

have the opposite effect in a testing situation, particularly with highly anxious test takers (Haladyna, 2004). Students who do not get the joke on a test can become embarrassed and distracted by laughter during a test. ELL students in particular will have difficulty understanding the humorous intention of an item and can lose their focus when trying to interpret the meaning of such an item (Klisch, 1994). Consider how distracting it would be to have students around you laughing during an exam while you are struggling to decipher what a question is asking. In addition, using a humorous option decreases the number of plausible distractors and makes the test artificially easier. Haladyna (2004) points out that humorous questions might encourage students to be less serious about taking the test. The best approach is to save your humor for classroom instruction.

Alternate National Council Licensure Examination (NCLEX) Items

In April 2003, the National Council of State Boards of Nursing (NCSBN) introduced alternate item types in both the NCLEX-PN and the NCLEX-RN exams. NCSBN describes alternate items as questions that use technology to present items other than the standard four-option multiple-choice item. Just as with the standard

Exhibit 5.50 Action in the stem vs. actions in the options**Action in the Stem**

A nurse should place a client who had a total right hip replacement 4-hours-ago in which of these positions?

- A. Supine, with the legs abducted *
- B. Low-Fowler's, with the legs elevated
- C. Left side-lying, with the knees flexed
- D. Right side-lying, with the legs extended

Actions in the options

A nurse is planning care for a client who had a hip replacement 4-hours ago. The nurse should include which of these measures in the client's care plan?

- A. Checking the client's patellar reflexes
- B. Observing the client's incision site for redness
- C. Positioning the client with the legs abducted *
- D. Assisting the client to use a bedside commode

This example demonstrates the advantage of keeping the actions in the options. In the first example the stem tells the student that the action is positioning. The student has only to remember which position.

In the revised example, the student has to identify that positioning is the correct answer from a group of alternate activities. You could easily create a parallel item for use in a future test.. Change the correct answer to an incorrect position and write a different correct answer.

Parallel Item

A nurse is planning care for a client who had a hip replacement 4-hours ago. The nurse should include which of these measures in the client's care plan?

- A. Checking the client's patellar reflexes
- B. Monitoring the drainage from the client's wound *
- C. Positioning the client with the legs adducted
- D. Assisting the client to use a bedside commode

multiple-choice items, alternate items are scored as either correct or incorrect; there is no partial credit on NCLEX (Wendt, 2003). The current alternate item types include:

- Fill in the blank
- Point and click
- Multiple response
- Chart/exhibit
- Drag and drop

Exhibit 5.51 Action in the stem vs. actions in the options

Action in the Stem

A client has been prescribed bed rest for a prolonged time. To specifically promote the use of resistive isometric exercise for the client, the nurse will initiate:

- A. Quadriceps setting
- B. Gluteal muscle contraction
- C. Moving the arms and legs in circle
- D. Pushing against a footboard

Actions in the Options

Which of these instructions should a nurse give to a client who is scheduled to be in traction on bedrest for six weeks?

- A. "You should flex your feet against the footboard at least ten times each hour."
- B. "Make sure you lie flat. You could develop a headache if you elevate the head of the bed."
- C. "We will be checking your blood glucose level twice each day."
- D. "It is very important that you restrict your fluid intake. Have only two liters per day."

In the original example the student is told that the action is to implement resistive isometric exercises. The student does not even have figure out why this is important. In addition, the only resistive exercise is the correct answer.

In the revision, the student has to identify that deep vein thrombosis is a potential complication and that resistive isometric exercises are required. This item also offers an opportunity to write a parallel item.

Parallel Item

Which of these instructions should a nurse give to a client who is scheduled to be on bedrest in traction for six weeks for treatment of a back injury?

- A. "You should pull up frequently on the over head trapeze to maintain your upper body strength."
- B. "Make sure you lie flat. You could develop a headache if you elevate the head of the bed."
- C. "We will be checking your blood glucose level twice each day."
- D. "It is very important that you have a fluid intake of at least two liters each day." *

The NCSBN maintains that these item formats do not affect the pass rate on the exams. The alternate items are additions to the current NCLEX test pools; they are not replacing the items that are in the current NCLEX exams. The difficulty level of these items is calibrated, just as the standard multiple-choice items are; they undergo the same rigorous quality control as do the standard four-option multiple-choice items; and they are all pretested and must meet the stringent criteria of the NCSBN before being used as a scored item on NCLEX (NCSBN, 2012).

Exhibit 5.52 Missing Information**ORIGINAL**

Nursing interventions in the pre-operative management of a child with Wilm's tumor include:

- A. Restrict fluid intake
- B. Assess urine for blood
- C. Palpate the abdominal mass for changes
- D. Teach child and family about nephrectomy

A. 1, 2, 3

A. 2, 3

A. 1, 2

A. 2, 4 *

REVISION

Nursing interventions in the pre-operative management of a 4-year-old child who has Wilm's tumor and is scheduled for surgery in two days should include which of these actions? Select all that apply.

- A. Restrict the child's fluid intake
- B. Assess the child's urine for blood
- C. Palpate the child's abdomen for changes
- D. Teach child and family about nephrectomy
- E. Monitor the child's intake and output
- F. Maintain the child in low-Fowler's position

The original version of this item is missing essential information. What is the child's age and when is the surgery scheduled? Note that original form of the item is written in the multiple-multiple format. The revision uses the multiple response format, a format used in the NCLEX exams which is discussed later in this chapter.

Nursing faculty across the country are expressing concern about preparing their students for these item types so they are not penalized when taking the NCLEX. This concern reminds us of the ultimate goal of any educational program: to facilitate the students' ability to think. If the students can think, they can reason out any question that is proposed to them.

That being said, it is important to acknowledge that an exam situation is stressful enough without being surprised by the type of items presented. Just as nursing students should be familiar with basic computer technology before they take the NCLEX, it is important that they be familiar with the alternate item types before they take the exam. However, faculty do not need to be overly concerned if they do not have access to the technology needed to present these items to their students. The next section examines the different types of alternate items and discusses how you can adapt these formats, both to familiarize the students with them and to provide you with another tool for assessing student attainment of the objectives of

Exhibit 5.53 Extraneous and Missing Information

ORIGINAL

Your client has developed a deep vein thrombosis as a result of immobility from his spinal cord injury. He is receiving 950 units of heparin in 500 ml D5W. The client's lab data indicated that he needed more anticoagulation and the doctor ordered an increase of 3 units per kilogram per hour. The client weighs 165 lbs. you will set the pump at:

- A. 19.0 ml per hour
- A. 22.0 ml per hour
- A. 23.5 ml per hour *
- A. 24.5 ml per hour

REVISION

At client who weighs 165 pounds is receiving an intravenous infusion of 1000 units of a medication in 500 ml D5W via an infusion pump. The client's prescription is for 2 units of medication per kilogram per hour. The nurse should set the infusion pump to run at how many milliliters per hour?

- A. 16.5
- A. 33
- A. 75 *
- A. 130

This item contains two characteristics to avoid. The original version has information that is not necessary for the problem solution and it omits information that is essential. The original neglects to tell us what the client weighs! The revision consolidates the information and provides the client's weight. Even if this question is removed from the test, the damage was done. Consider the anxiety of the students who attempted to answer the question before the error was noted. This example clearly demonstrates the necessity of proofreading.

your nursing program. Another use for these alternate item formats is to use them in class to promote group discussion at the beginning or end of a lecture. This type of activity supplements your lecture and encourages active learning while introducing students to the alternative item formats.

These items are designed to test higher cognitive levels or critical thinking. Examples of each of the item types are presented here. Chapter 6, "Writing Critical Thinking Multiple-Choice Items," further examines these item types and presents techniques for developing items that require the students to use critical thinking in order to solve the problem presented in the stem.

Fill in the Blank

Fill-in-the-blank is a constructed-response type item (discussed at length in Chapter 9, "Constructed Response Format: Developing Short-Answer and Essay Items"). The fill-in-the-blank items used on the NCLEX present a problem and require the student

Exhibit 5.54 Fill in the blank

A nurse assesses a newborn at 1 minute after vaginal delivery. The nurse identifies that the infant has a lusty cry in response to stimulation, regular respirations, a pink body with bluish colored extremities, a heart rate of 120/min, and good muscle tone with spontaneous flexion of the extremities. What Apgar score should the nurse assign to the infant? 9 _____

to type in the answer rather than selecting from among four answers. **Exhibit 5.54** provides an example of this type of item.

The software that you currently use to scan your exams probably does not allow for scoring this type of item electronically. The simple solution is to include this type of question at the end of the test and hand score the answers to add the results to the students' raw score. These items can also be used effectively as separate tests or quizzes, which are hand scored. Although you may want students to show their work on the page, most experts advise against giving partial credit for a calculation problem because of the implications of calculating incorrectly in a healthcare situation.

Point and Click

This item type is also referred to as a hot-spot item. It involves presenting a problem with an illustration and asking the student to use the mouse to click on the area of the illustration that answers the problem. Refer to **Exhibit 5.55** for an example of a hot-spot item.

Since it is most likely that you cannot duplicate this technology with the current software available for test development, **Exhibit 5.56** illustrates how to adapt the format to fit the capabilities of today's popular software. A, B, C, and D represent different waves on the electrocardiogram. Although the student is able to select a response, this adaptation of the format introduces the student to the point-and-click format. This type of item represents another format that promotes classroom discussion and encourages critical thinking.

Multiple Response

Multiple-response items present a problem in the stem, as with a standard four-option multiple-choice question, and then direct the student to select all that apply.

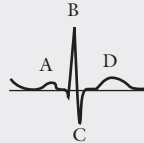
Exhibit 5.55 Point and click

A nurse is reviewing a client's electrocardiogram as depicted below. Click on the area of the tracing that represents the T wave.



Exhibit 5.56 Point-and-click multiple-choice alternative

A nurse is reviewing a client’s electrocardiogram as depicted below. Which of these areas, as indicated by A, B, C, and D, represents the T wave on the client’s electrocardiogram tracing?



So, instead of choosing the one correct answer, the student must identify all correct responses. There is no partial credit for these questions; the student must select all of the correct options and none of the incorrect options to receive credit. An example of this type of item is in **Exhibit 5.57**.

Some software test development programs can score this type of item. If your program does not, hand scoring is the best alternative. Phrasing this type of item as a multiple-multiple (as in **Exhibit 5.45**) may cause confusion for the students. These items also provide excellent prompts for classroom discussion. Use one or two of this item format as a pre- or post-lecture quiz and have the students correct each other and discuss the results. This kind of exercise promotes critical thinking while familiarizing the students with an alternative item format.

Chart/Exhibit

This item type presents the student with a problem related to information in a chart. The student must analyze the information to answer the question. The NCLEX presents several tabs that each contain different pieces of information that mimic the current setup of a client’s medical record. You can use this format model to determine whether your students can interpret information to solve a problem, as in **Exhibit 5.58**.

Exhibit 5.57 Multiple responses

A nurse is planning care for a patient who had a right hip replacement 3 days ago. Which of these actions should the nurse include? Select all that apply.

- A. Instructing the patient to avoid crossing the legs.
- B. Keeping the patient on strictly enforced bed rest.
- C. Advising the patient to install a raised seat on the toilet.
- D. Teaching the patient to bend at the waist when picking up items from the floor.
- E. Explaining that the patient will need to use an abduction pillow for life.

Answers: A and C

Exhibit 5.58 Chart or exhibit

A visiting nurse identifies all these findings when reviewing the medical record of a client who has been taking levothyroxine sodium (Synthroid) for 3 weeks:

History: Three weeks ago the client reported a history of generalized weakness, anorexia, muscle weakness, and sleeping 14 to 16 hours per day for 3 months. The vital signs were: pulse, 64/min; blood pressure, 110/66 mm Hg; respiration, 18/min; temperature, 97.8°F (36.6°C). Height was 5' 6", and weight was 180 lbs.

	Admission Laboratory Results	
	Patient	Normal
Serum T3	90 ng/dL	110–230 ng/dL
Serum T4	4 µg/dL	4.6–11 µg/dL

	Current Laboratory Results	
	Patient	Normal
Serum T3	130 ng/dL	110–230 ng/dL
Serum T4	7 µg/dL	4.6–11 µg/dL

The nurse assesses the client and identifies the following findings. Vital signs are now pulse, 78/min; blood pressure, 116/74 mm Hg; respiration, 20/min; temperature 98.4°F (36.9°C). Weight is 172 lbs. The client reports feeling more energetic and requires fewer hours of sleep. Which of these instructions should the nurse give the client?

- A. "Continue to take your medication as prescribed." *
- B. "Let's call your doctor to see whether you need to decrease the medication dose."
- C. "Hold the medication until I visit tomorrow to recheck your pulse."
- D. "You can discontinue the medication if your symptoms continue to decrease."

Drag and Drop

Drag-and-drop items require students to prioritize. The students must drag the options from one column to a second column in order of priority, as shown in **Exhibit 5.59**.

As with the other alternate item formats, partial credit is not granted for drag-and-drop items. The student must place the options in the correct sequence to receive credit for this item type. If your scanning program does not support scoring this type of item, you could set it up as a matching column. This is also a format that lends itself to class discussion. While it is always important to ask a colleague to review your items, it is particularly important with the drag-and-drop and multiple-response items. You should be sure that the answers are irrefutably correct before you include them on an exam.

Item Rationale

An effective method for increasing the validity of your multiple-choice items is to write a rationale for each question. A quality rationale includes a textbook reference

Exhibit 5.59 Drag and drop

A nurse prepares to instill ointment into a client's eye. After explaining the procedure to the client and checking the five rights, the nurse takes all these actions. Drag the actions from the first column and place them in order from first to seventh in the second column. All the actions must be used.

A. Put on gloves	1.
B. Tilt the client's head back	2.
C. Wash the hands	3.
D. Ask the client to look up	4.
E. Apply a thin line of ointment on the inside edge of the lower lid	5.
F. Document the instillation	6.
G. Instruct the client to gently close the eyes and rub the lid lightly	7.

You must be very careful when you ask students to order actions in priority, particularly because there is no partial credit for items. The actions of explaining to the client and checking the five rights is included in the stem because there could be a difference of opinion as to where these actions fit in the sequence.

and explains why the correct answer is correct and also why each of the distractors is incorrect. This explanation should be kept with the item in an electronic file, either in an item banking program or in a word processing file. Writing rationales for your items not only increases the quality of the items and ensures the veracity of the key—it also provides a valuable resource for student test review. Rationales are particularly useful for alternative format items. These items are challenging, both for the teacher to compose and the student to answer. Writing a rationale helps to reduce ambiguity and ensure the correctness of the key.

Question Difficulty

While it is important not to trick or confuse students, it is just as important to present them with questions that challenge them and that are trustworthy measures of their abilities. Chapter 3, “Developing Instructional Objectives,” reviews the cognitive levels and notes that the levels of knowledge, comprehension, analysis, and application are particularly suited to the development of multiple-choice items. Item writers should strive to develop items at the higher levels of application and analysis. In fact, nursing exams should not include any items at the knowledge level. Comprehension-level items should be the lowest cognitive level item included on a nursing exam. Appendix C, “Targeting Cognitive Levels for Multiple-Choice Item Writing,” provides lists of verbs and examples of items at the different levels of cognitive ability.

An item writer can manipulate the difficulty of items. The important principle is that the difficulty of the item should relate directly to the content and instructional objectives being measured. Keeping distractors homogeneous increases the difficulty level of the question because students have to make fine distinctions.

Using the best answer approach also increases the difficulty of the item. Refer to Chapter 5, “Implementing Systematic Test Development,” for a discussion related to planning test difficulty.

Framing Questions in Terms of the Nursing Process

Using the nursing process as a framework for item development poses several advantages for crafting quality multiple-choice items. In addition to increasing the face validity of the test, it increases the pertinence of the questions that you ask. If you have to put a nurse and/or a client in every stem, you have to think about the relevance of the question for nursing practice. This approach helps to eliminate trivia from your tests.

Another advantage of the nursing process approach is that it promotes the development of unique situations in which to frame nursing problems. While nursing process questions can be written at all cognitive levels, the format encourages item development at higher levels. Novel situations can be designed that require students to analyze and/or apply information in real-life clinical settings rather than to simply recall facts.

It is clear that the nursing process format is viewed as a valuable framework for item writing. The items on NCLEX exams are written in terms of the nursing process. The current plan (NCSBN, 2012) integrates items written in the framework of the nursing process across the categories of client needs.

Following the example of the NCSBN in developing your items makes perfect sense because their item development standards are held to the highest level. The nursing process format is viewed by the NCSBN, one of the most respected test developers in the country, as a valuable method for framing items that address nursing concerns. Following the lead of the experts when writing items to assess the content and objectives of your course is a logical approach to improving the quality of your multiple-choice exams. **Exhibit 5.60** provides definitions of the phases of the nursing process that can be used to guide the development of multiple-choice items.

Item Shells

An item shell is a successful item with its content removed, leaving only the stem. Appendix E, “Sample Item Stems for Phases of the Nursing Process,” provides suggested item stems that are framed in the context of the nursing process. These stems are successful items with their content removed, hence the term item shell. Substitute your content, and your stem is written. The challenge of writing the correct option and several plausible distractors still remains, but these stems set you in the right direction for writing items within the nursing process context that assess higher-order thinking. These shells can also help you to revise your original current items or those adapted from a textbook item bank. Using these shells also helps you to focus on writing items that test material of importance, rather than the recall of trivial facts.

Although stems are useful as prompts to get you started with developing your own items, do not mistake them for templates for all item writing. It is important

Exhibit 5.60 Phases of the nursing process

Assessing: Obtaining, confirming, and communicating data about a client.

Analyzing: Selecting relevant data and drawing inferences and conclusions to identify potential and/or actual problems that require nursing assistance. Includes identifying nursing diagnoses and communicating results of analysis.

Planning: Making plans with the client and family to set goals and establish outcomes to deal with the identified problems. Includes prioritizing and communicating plan.

Implementing: Includes actions, such as communicating, teaching, performing or assisting with activities of daily living, and informing client and/or family about health status to achieve the established outcomes.

Evaluating: Gauging the client's response to the planned actions, and the movement toward or away from identified goals. Determining the extent to which client outcomes have been achieved.

to have variety in the structure of items on a test; we do not want all the questions to be too similar. Use the suggested stems as a starting point for developing your own item writing strategy.

Peer Review

Item review by your colleagues is critical for developing effective test questions. Chapter 5, “Implementing Systematic Test Development,” addresses the need for blueprint review, and item review is equally important. A relevant blueprint designates what the items on the test should address. It is the teacher, however, who must ensure that the items actually meet the requirements of the blueprint. The relationship of each item to the content domain must be verified to ensure that the test actually represents the content.

In addition to verifying that the items meet the blueprint, item review involves editing and determining whether the items meet the guidelines presented in this chapter. Circulating items among colleagues for opinions and suggestions is a helpful method for addressing blueprint issues and improving item quality. Omit the answer key from the items. If an expert in the content area is unable to answer the question, it most certainly needs to be revised. The objective is not to find fault or criticize but only to critique the items based on agreed-on criteria to increase the quality of the items. The questions in **Exhibit 5.61** summarize the guidelines presented in this chapter. Use these questions as a checklist for critiquing multiple-choice items.

Allowing an adequate time frame for blueprinting and item development increases the likelihood that the items address the test plan. It is unrealistic to expect members of a teaching team to devote adequate time to editing and carefully examining the relevancy of test items on short notice. In fact, you will not

Exhibit 5.61 Criteria for item review

Item Review

Does the item reflect the principles of item development?

Overall:

- Does the item specifically fit the blueprint?
- Does the item reflect a learning outcome established for the course?
- Does the item deal with an important aspect of the course content?
- Is the item testing information that is important for a nurse to know?
- Is the item succinctly worded?
- Does the item stand on its own?
- Does the item contain any cues?
- Is the meaning of the item clear?
- Does the item contain any spelling or grammatical errors?
- Is the item original (not a direct textbook quote)?
- Is the item written at an appropriate reading level?
- Does the item address higher level cognitive ability?
- Does the item follow the style guide agreed on by the faculty?
- If the guidelines are not followed, is the item effective?

The Stem:

- Does the stem address a learning outcome of the course?
- Does the stem present a single clearly formulated problem?
- Is there a nurse and/or a client in the stem?
- Is the problem clearly stated in the stem without reading the options?
- Does the stem provide all the necessary information to solve the problem?
- Is the stem clear without extraneous information?
- Does the stem use the nursing process format?
- Is the stem stated so that there is one, and only one, correct answer?
- Is the stem phrased to avoid repetitive words in the options?
- If the stem contains a negative word, is it unavoidable and HIGHLIGHTED?
- Is the stem longer than any of the options?

The Options:

- Do the options overlap?
- Are the options homogeneous?
- Is there only one correct answer?
- Are options placed in logical order?
- Are distractors incorrect, yet plausible?
- Are there degrees of correctness for best answer questions?
- Are all distractors completely incorrect for one correct answer?
- Has the position of the correct answer been randomly placed?
- Are all options grammatically correct and consistent with the stem?

be able to do a careful job of analyzing items yourself if you do not allow enough time.

Exhibit 5.62 provides a reference list of the exhibits included in this chapter. Refer to it when you are looking for a specific item example.

Exhibit 5.62 Exhibit reference list

Exhibit 5.1 Multiple-choice format	Exhibit 5.30 General vs. specific options
Exhibit 5.2 Question format	Exhibit 5.31 Succinct options
Exhibit 5.3 Completion format	Exhibit 5.32 Textbook language
Exhibit 5.4 Confusing homonym	Exhibit 5.33 Best answer vs. correct answer
Exhibit 5.5 Confusing homonym & colloquialism	Exhibit 5.34 Implausible distractors
Exhibit 5.6 Connected items	Exhibit 5.35 Common misconceptions
Exhibit 5.7 Grammatical inconsistency	Exhibit 5.36 Sound bite
Exhibit 5.8 Misplaced modifiers	Exhibit 5.37 Seeks help appropriately
Exhibit 5.9 Internal blank	Exhibit 5.38 Quotes
Exhibit 5.10 Incomplete vs. complete stem	Exhibit 5.39 Verbal associations
Exhibit 5.11 Incomplete vs. complete stem	Exhibit 5.40 Qualifying words
Exhibit 5.12 Diffuse vs. succinct stem	Exhibit 5.41 Specific determiners
Exhibit 5.13 Diffuse vs. succinct stem	Exhibit 5.42 All-of-the-above
Exhibit 5.14 Unfocused vs. focused stem	Exhibit 5.43 None-of-the-above
Exhibit 5.15 Negative stem	Exhibit 5.44 None-of-the-above
Exhibit 5.16 Negative stem	Exhibit 5.45 Multiple-multiple
Exhibit 5.17 Passive voice vs. present tense	Exhibit 5.46 Trick item
Exhibit 5.18 Disproportionate option length	Exhibit 5.47 Trick item
Exhibit 5.19 Disordered vs. ordered options	Exhibit 5.48 Action in the stem
Exhibit 5.20 Unlabeled vs. labeled options	Exhibit 5.49 Action in the stem
Exhibit 5.21 Negative options	Exhibit 5.50 Action in the stem
Exhibit 5.22 Negative stem with negative options	Exhibit 5.51 Action in the stem
Exhibit 5.23 Repetitive options	Exhibit 5.52 Missing information
Exhibit 5.24 Partially correct vs. distinct options	Exhibit 5.53 Extraneous and missing information
Exhibit 5.25 Including one option in another	Exhibit 5.54 Fill-in-the-blank
Exhibit 5.26 Heterogeneous options	Exhibit 5.55 Point and click
Exhibit 5.27 Opposite options	Exhibit 5.56 Point and click; multiple-choice alternative
Exhibit 5.28 Rule of two sets	Exhibit 5.57 Multiple response
Exhibit 5.29 Technical language	Exhibit 5.58 Chart/exhibit
	Exhibit 5.59 Drag and drop
	Exhibit 5.60 Phases of the nursing process
	Exhibit 5.61 Item review

Summary

Expertise in multiple-choice item writing is an ability that develops with practice over time. Because quality test items are essential for the validity and reliability of the results of your classroom exams, you need to develop this expertise. This chapter is designed to provide you with direction for becoming a proficient item writer. These guidelines are related only to the mechanical aspects of the item-writing process that can be discussed and practiced, however. While they provide important direction, your creativity and clinical expertise are just as important to successful item writing. To write multiple-choice exams that provide valid and reliable results, you need to cultivate your expertise in both aspects of the process.

Chapter 7, “Writing Critical Thinking Multiple-Choice Items,” specifically addresses how to call on your creative abilities when writing critical thinking items, and the chapters that follow provide additional guidance to assist you with objectively analyzing and improving your item-writing ability in both the selected-response and constructed-response item formats.

Learning Activities

1. Describe the advantages and disadvantages of the multiple-choice item format. Explain the difference between the question and completion formats.
2. Write the following completion format stem in the question format:

A nurse is assessing a patient who had repair of a fractured femur 12 hours ago. The nurse should recognize that the client may be developing a fat embolism when the client develops a

- A. total cholesterol of 260 mg/dL.
 - B. pulse rate of 92/min.
 - C. respiratory rate of 28/min. *
 - D. blood pressure of 100/68 mmHg.
3. Identify six qualities of an effective multiple-choice item. Write two multiple-choice items that incorporate one or more of those qualities.
 4. Revise this stem and write an item that keeps the actions in the options: How should a nurse ambulate a client who is blind?
 5. Revise this item with a positive stem: The nurse recognizes that all of the following can precipitate hypoglycemia in an individual who is taking insulin *except*
 - A. increased exercise.
 - B. a stomach virus.
 - C. skipping a meal.
 - D. skipping an insulin dose. *
 6. Develop five multiple-choice items following the guidelines in this chapter. Ask a colleague to review and discuss them with you.

Web Links

Bloom's Taxonomy

http://ww2.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

http://http://projects.coe.uga.edu/epltt/index.php?title=Bloom%27s_Taxonomy

<http://www.krummefamily.org/guides/bloom.html>

Educational Resources Information Center
<http://www.eric.ed.gov>
 National Council of State Boards of Nursing
<http://www.ncsbn.org>
 Nurse Educator Assessment Continuing Education
<http://www.nurseeducatorace.com>

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