

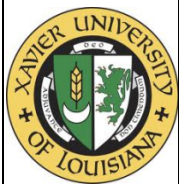
10 (plus 1) Tips for Writing Effective Multiple Choice Test Questions

Elizabeth Yost Hammer, Ph.D.

Tiera S. Coston, J.D., Ph.D.

From Timothy W. Bothell, Ph.D., Faculty Development Coordinator,
Assessment of Student Learning, Brigham Young University

Center for the Advancement of Teaching
'To Advance the Art and Science of Teaching'
cat@xula.edu • <http://cat.xula.edu>



Anatomy of a Multiple Choice Question

Multiple choice questions consist of:

- a problem (stem)
- a list of suggested solutions (alternatives)
 - one correct or best alternative (answer)
 - incorrect or inferior alternatives (distractors)

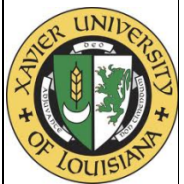
alternatives

Susie Science has discovered a mutant form of insulin that lacks a signal peptide. What will be the final cellular destination of the mutant insulin?

stem

- A) cytosol } **answer**
- B) mitochondria } **distractor**
- C) plasma membrane } **distractor**
- D) golgi apparatus } **distractor**
- E) nucleus } **distractor**

From the Vanderbilt University Center for Teaching. *Writing Good Multiple Choice Questions* at <http://cft.vanderbilt.edu/teaching-guides/assessment/writing-good-multiple-choice-test-questions/>



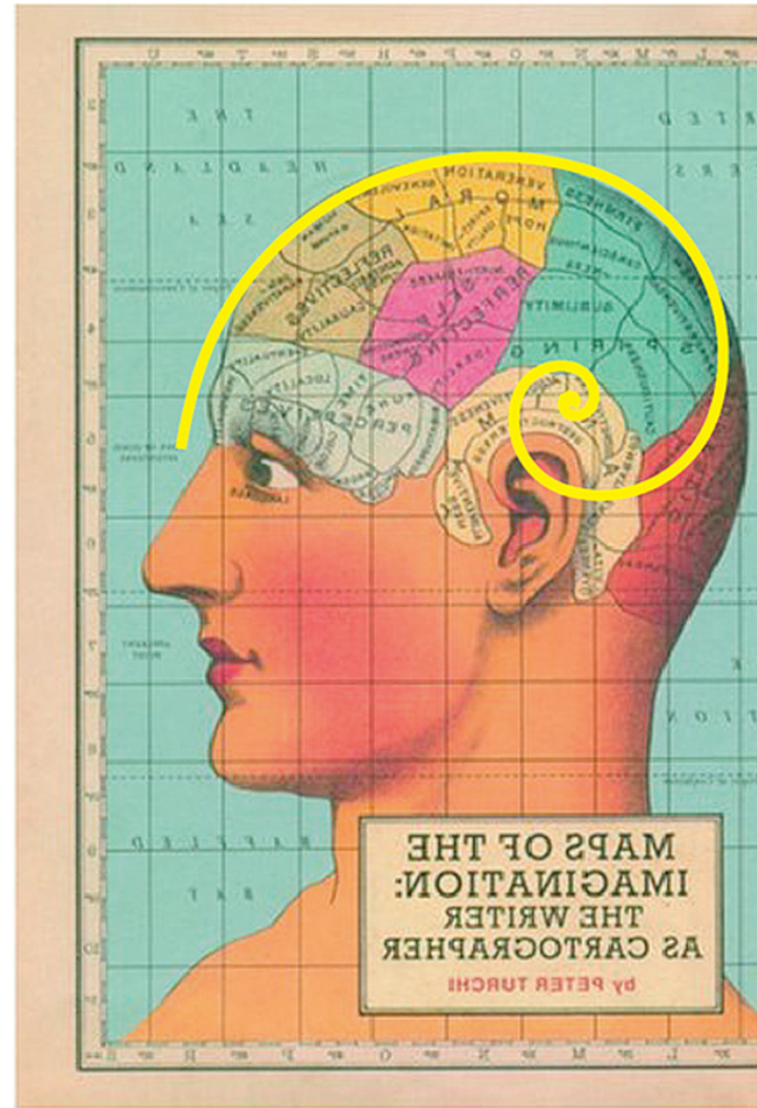
1. Let Your Objectives Guide You

- Base each item on an learning or instructional objective of the course, not trivial information.



2. Emphasize Higher-Level Thinking

- Use memory-plus application questions.
 - require students to recall principles, rules or facts in a real life context.
- Question should prompt the student to *first* recall the facts and *then* apply those facts.



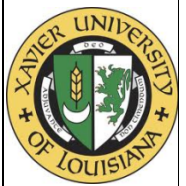
Memory-Only Example (less effective)

- Which description best characterizes a whole food?
- A. Food that has been processed or refined as little as possible
 - B. Food that has additives or other artificial substances
 - C. Food that is made of all organic, locally grown ingredients
 - D. Food that has been genetically modified



Memory-Plus Application Example (more effective)

- Sally's breakfast this morning included one glass of orange juice (from concentrate), one slice of toast, a small bowl of bran cereal and a grapefruit. What "whole food" did Sally eat for breakfast?
- A) orange juice
 - B) toast
 - C) bran cereal
 - D) grapefruit



3. Use Plausible Distractors

- Only list plausible distractors, even if the number of options per question changes
- Use answers given in previous exams to provide realistic distractors
- Avoid nonsense words and unreasonable statements



4. Make the Stem Meaningful

- The stem should be a complete sentence or idea.
- Poor: The central dogma of molecular biology
 - a. is challenged by the existence of retroviruses.
 - b. is the flow of genetic information from protein to RNA to DNA.
- Better: The central dogma of molecular biology had to be revised because of what group of organisms?
 - a. primates
 - b. retroviruses

5. Use a Question Format

- Experts encourage multiple-choice items to be prepared as questions (rather than incomplete statements)
- Incomplete Statement Format (less effective):
 - The capital of California is in _____.
- Direct Question Format (more effective):
 - In which of the following cities is the capital of California?

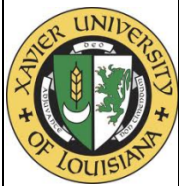


6. Keep Option Lengths Similar and Number of Choices the Same

- Avoid making the correct answer the long or short answer.
 - Dr. Jordon is writing a research article. Which of the following statements is most likely to appear in her *Methods* section?
 - A) The hypothesis was supported.
 - B) Before completing the survey, the participants read an account of a car crash in which a female, college-aged victim received mild or severe injuries.
 - C) There were no gender differences.
 - D) Alcohol is often involved in vehicle accidents.
- The number of answer choices should remain consistent.

7. Balance the Placement of Correct Answers

- Correct answers are usually the second and third option; keep correct answers in random positions
- When the test is written, look for patterns and reorder correct answers, if necessary.

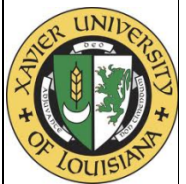


8. Be Grammatically Correct

- Use simple, precise and unambiguous wording.
- Students are likely to select the correct answer by finding the grammatically correct option (or discount the options with mistakes).
- Dr. Jordon is writing a research article. Which of the following statements is most likely to appear in her *Methods* section?
 - A) The hypothesis was supported.
 - B) The participants read an account of a car crash.
 - C) There were no gender difference.
 - D) Alcohol is often involve in vehicle accidents.

9. Avoid Clues to the Correct Answer

- Avoid extremes – never, always, only.
- Avoid answering one question in the test by giving the answer somewhere else in the test.
- Have the test reviewed by someone who can find mistakes, clues, grammar and punctuation problems before you administer the exam to students



10. Use “All” and “None” “of the Above” Options *Sparingly*

- Students merely need to recognize two correct options to get the answer correct.
- You will never know if students know the correct answer.



11. Avoid Negative Questions and Double Negatives

- Experts recommend avoiding negative questions.
 - Double Negatively Worded Question (less effective)
 - “Which of the following is NOT true about DNA replication?”
 - A) Helicases are NOT involved in the unwinding of the DNA.
 - Positively Worded Question (more effective)
 - “DNA replication involves which of the following enzymes?”
 - Negatively Worded Question (but more effective)
 - “DNA replication involves all of the following enzymes except”

Helpful Checklist

From: *How to Prepare
Better Multiple-Choice
Test Items: Guidelines for
University Faculty* at
[http://testing.byu.edu/info/
handbooks/betteritems.pdf](http://testing.byu.edu/info/handbooks/betteritems.pdf)

Checklist for Reviewing Multiple-Choice Items

- ☐ Has the item been constructed to assess a single written objective?
- ☐ Is the item based on a specific problem stated clearly in the stem?
- ☐ Does the stem include as much of the item as possible, without including irrelevant material?
- ☐ Is the stem stated in positive form?
- ☐ Are the alternatives worded clearly and concisely?
- ☐ Are the alternatives mutually exclusive?
- ☐ Are the alternatives homogeneous in content?
- ☐ Are the alternatives free from clues as to which response is correct?
- ☐ Have the alternatives “all of the above” and “none of the above” been avoided?
- ☐ Does the item include as many functional distractors as are feasible?
- ☐ Does the item include one and only one correct or clearly best answer?
- ☐ Has the answer been randomly assigned to one of the alternative positions?
- ☐ Is the item laid out in a clear and consistent manner?
- ☐ Are the grammar, punctuation, and spelling correct?
- ☐ Has unnecessarily difficult vocabulary been avoided?
- ☐ If the item has been administered before, has its effectiveness been analyzed?

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Exercise

Draft and effective multiple choice question on the topic of your choice.

Exchange questions with your neighbor and review his/her question.

Discuss your findings and share.



Take Home Point: Planning Test Construction

Example Table of Specifications

Content Area	BLOOM'S TAXONOMY			TOTALS
	<ul style="list-style-type: none"> • Remembering • Understanding 	<ul style="list-style-type: none"> • Applying 	<ul style="list-style-type: none"> • Analyzing • Evaluating • Creating 	
Topic A	10%	20%	10%	40%
Topic B	15%	15%	30%	60%
TOTALS	25%	35%	40%	100%

Table from Runte (2003)

Resources for Writing Effective Test Questions

- From Timothy W. Bothell, Ph.D. Faculty Development Coordinator: Assessment of Student Learning, Brigham Young University
- John Painter, Ph.D. *Writing and Reviewing Assessment Items: Guidelines and Tips*
- Dawn M. Zimmaro, Ph.D. *Writing Good Multiple-Choice Exams*

Resources for Writing Effective Test Questions

- Writing Multiple Choice Items which Require Comprehension at <http://www.psywww.com/selfquiz/aboutq.htm>
- 10 Rules for Writing Multiple Choice Questions at http://thelearningcoach.com/elearning_design/rules-for-multiple-choice-questions/
- How to Prepare Better Multiple-Choice Test Items: Guidelines for University Faculty at <http://testing.byu.edu/info/handbooks/betteritems.pdf>

