

# Writing Objective Test Items That Assess Thinking Skills

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# Learning Outcomes for You

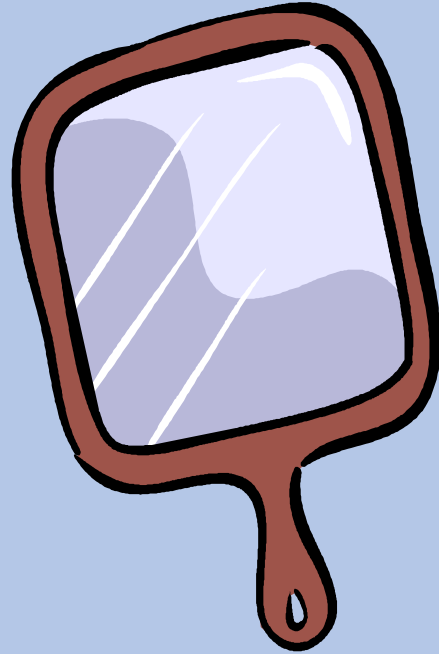
- Prepare students for a test in the most helpful way
- Identify the types of objective items that can assess lower- and higher-level thinking
- Distinguish between multiple choice and multiple true-false items

- Define and explain the advantages of multiple true-false items
- Compose cleanly designed matching, multiple choice, and multiple true-false items that can distinguish the knowledgeable from the poorly prepared students
- Compose matching items that can assess higher-level thinking

- Explain what stimulus-based items are
- Compose stimulus-based multiple choice and multiple true-false items that can efficiently assess higher-level thinking
- Select from a wide variety of stimuli to compose these items

Assessments should *mirror* outcomes.

**Outcome**



**Assessment**

If you want your students to be able to do X, Y, & Z, assess them doing X, Y, & Z.

To prepare students for a test, tell them what they will have to be able to *do/demonstrate* on the test (your “micro” learning outcomes).

- Use “active” verbs.
- Avoid internal states you cannot observe (“know,” “feel,” “understand,” “appreciate”).

# Types of Objective Items

- Fill-in-the-Blank/Completion
- True/False
- Matching
- Multiple Choice
- Multiple True/False

*Most* types of objective items can *require* and *assess* these higher-level thinking skills:

- Interpretation
- Generalization
- Inference
- Problem solving
- Conclusion drawing
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation



# Fill-in-the-Blank/Completion

- Focus on memorization (which you may want)
- Too many options possible for computer scoring
- Good for foreign languages and math (can't work backwards)

# True/False

- Focus on memorization, trivia
- Encourages guessing (50/50 chance)
- Good to have students correct F statements, but then grading corrections takes time
- Can assess higher-level thinking *IF* “stimulus-based” (defined later)

# Matching Items

Homogenous items within set—every option plausible for every item in list

- “Match each theory with its originator.”*
- Cause with effect*
- Definition with term*
- Achievement or work with person or author*
- Foreign word with translation*

- *Symbol with concept*
- *Organ/equipment/tool/apparatus with use or function*
- *Pictures of objects with names*
- *Labeled parts in a picture with function*
- *Processes, sequences (less known and used)*

## To assess higher-order thinking:

- *Causes with likely effects*
- *Concepts with new examples of them*
- *New, hypothetical problems with tools, concepts, or approaches needed to solve them*

# Guidelines for Writing Matching Items

- Imperfect match between columns:  
*“Some options may be used more than once, and others, not at all.”*
- Short options (1-3 words, phrase)
- Up to 15-17 items, all on one page
- List options logically (alphabetically, chronologically, or numerically).

What two sets of items can you have your students match to assess higher-level thinking in one of your courses?

# Guidelines for Writing Multiple Choice Items

- ◎ Avoid phraseology and distracters that would prevent a knowledgeable student from answering the item correctly.
- ◎ Avoid giving clues that would help a poorly prepared student answer the item correctly.



## ***More specifically:***

- List options logically (alphabetically, chronologically, or numerically).
- Make all distracters plausible, grammatically parallel, and just as long as correct response.
- Create distracters from elements of correct response.

- Use carefully:
  - *no*, *not*, *never*, *none*, *except*
- Use generously (not just when correct):
  - all of the above
  - none of the above

# Multiple True/False

- Each option below stem is a T/F item.
- Superior flexible, efficiency, reliability
- Easier and quicker to develop
- More challenge, no process-of-elimination
- Stem must be clear.

# To assess higher-order thinking

Compose *stimulus-based* multiple choice or multiple true/false items

= a *series* of items around a new\*, realistic *stimulus* that students must interpret or analyze accurately to answer the items correctly.

\* *New to the students*

# Possible Stimuli

- *Text*: claim, statement, passage, mini-case, quote, report, text-based data set, description of an experiment
- *Graphic*: chart, graph, table, map, picture, model, diagram, drawing, schematic, spreadsheet

**These items *require* and *assess*  
one or more of these higher-  
level thinking skills:**

- Interpretation
- Generalization
- Inference
- Problem solving
- Conclusion drawing
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

# Guidelines for Writing Stimulus-Based Items

- New stimulus, but students must have **prior practice** in the thinking skills
- Few interlocking items
- Length/complexity of stimulus  $\approx$  # MC or MT/F items possible

- Be creative with stimulus!  
chart, graph, map, picture, diagram,  
drawing...
- To approach the writing task:
  - Start with your learning outcomes.
  - Choose a (type of) stimulus.
  - Write stem and options.



What kinds of stimuli would work well in your courses?

# Strengths and Limitations of Stimulus-Based Items

- + Assess more skills more efficiently than student-generated work
- *Cannot* assess abilities to communicate, create, organize, define problems, or conduct research
  - For these outcomes, assess with student-generated work.

# Simple Item Analysis

- Best test items are **highly discriminating** and **moderately difficult**.
  - Programs calculate Discrimination Index and Difficulty Index for each item.
- An item is *poor* if:
  - it fails to differentiate among the stronger (more able, better prepared) and weaker students, **and**
  - almost all students get it either right or wrong, especially if the stronger students get it wrong.