# Science
## Multiple Choice
## Question Evaluation

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**Assessment Goals**
- Yields reliable and valid results
- is a meaningful measure of learning
- is well-constructed

**Writing Guidelines**
When writing multiple-choice questions:
- Use familiar vocabulary
- Keep the level of the questions appropiate for the level of the class and students
- Keep the reading comprehension level slightly below the level of the students

| | Stem | Choices | Correct Answer | Distractors |
|---|---|---|---|---|
| | GOAL:<br>• Relate the stem directly to specified learning outcome.<br>• Include both a subject and verb in every stem.<br>• Keep the stem longer than any of the options. | GOAL:<br>• Choices should challenge student but not trick them into choosing an incorrect answer.<br>• All choices should appeal equally. | GOAL:<br>There should be one and only one correct answer to each question. | GOAL:<br>• Distractors discriminate between the students who are informed and those who are uninformed.<br>• Distractors should be as attractive as the correct answer to students who have not achieved the desired outcome. |
| Level 1 | Eliminate **NEGATIVE** stems. Ex. does NOT/is NOT…<br><br>Eliminate **DOUBLE JEOPARDY** questions | Include **LABELS**<br>• A unit of measure should follow all measurable quantities<br><br>**ORDER**[3] choices<br>• Place choices in numerical, chronological or sequential order<br><br>Eliminate **NEGATIVE CHOICES**<br>• Stems with EXCEPT<br>• Choices with NOT | **RANDOMIZE** the key<br>• The correct answer should be equally assigned to each of the answer choices | All distractors are **PLAUSIBLE**<br><br>**AVOID**[10] using the words: never, none, all, always, all of the above and none of the above<br><br>Eliminate **TRICK** items |
| Level 2 | Write **FOCUSED**[1] stems<br>• Stem focuses on a single problem<br>• Thoughtful use of irrelevant information<br><br>Write **COMPLETE**[2] stems<br>• No fill-in-the-blanks<br>• Minimize completion stems<br>• Complete stems are highly preferred | Eliminate **REDUNDANT**[4] options<br>• Each choice should NOT begin with the same wording<br><br>Eliminate disproportionate **CHOICE LENGTH**<br>• All choices should be roughly the same length<br><br>Eliminate **GRAMMITICAL INCONSISTENCIES**[5]<br>• Stem is only consistent with the correct answer choice | | Incorporate **COMMON MISCONCEPTIONS** as distractors<br><br>Use **NONE OF THE ABOVE**[11] for math calculations only |
| Level 3 | Write **SUCCINCTLY**<br>• Avoid complex sentences<br>• Break long sentences up into 2 or more sentences | Eliminate **PARTIALLY**[6] correct choices<br><br>Eliminate **OVERLAPPING**[7] choices<br><br>Eliminate **INCONSISTENT**[8] options<br>• All choices should be plausible<br>• All choices should use consistent vocational language<br><br>Correct **OPPOSITE**[9] options<br>• Eliminate one set of opposites<br>• Include two sets of opposites | | Avoid **CUES**[12]<br>• Repeating key words from the stem in only the correct answer<br>• Avoid using the words often, seldom, sometimes, usually and generally |

The information presented above is a compilation of the materials found in McDonald, Mary E. "Developing Multiple-Choice Items." *Systematics Assessment of Learning Outcomes: Developing Multilpe-Choice Exams*. Boston: Jones and Bartlett, 2002. 83-120. Print.

[1]FOCUSED – Each mulitple-choice question should focus on a single problem. Questions may require multiple-stepped solutions, but there should only be one problem to solve. Incorrectly answered questions with more than one problem don't identify which problem the student couldn't solve. Irrelevent information does not support the correct solution; instead, it increases reading comprehension of the question.

[2]COMPLETE – The chart below shows the pros and cons of complete stems versus completion stems.

| | Pros | Cons |
|---|---|---|
| Complete Stem (Question) | • In real-life, we ask complete questions<br>• Most direct way to pose a problem<br>• Minimum demand on reading skills<br>• Stem completely frames the problem | • May require longer responses |
| Completion Stem | • Used properly, it may do a better job of clarifying the problem | • Increases the cognitive complexity<br>• Students have to rephrase it as a question<br>• Students have to keep rereading the stem<br>• Requires more time to answer<br>• More difficult for ESL students<br>• More difficult for students with learning disabilities |

[3]ORDER – Putting the choices in order eliminates the need for the student to hunt for the correct answer.

[4]REDUNDANT – Words or phrases repeated in the choices should be moved to the stem to reduce redunancies and reading time.

[5]GRAMMITICAL INCONSISTENCIES – Grammar should not give the answer away. Completion stems are more sensitive to grammatical inconsistencies.

[6]PARTIALLY – Choices should not be partially correct. Don't mix a correct response with a distractor.

[7]OVERLAPPING – Keep all choices mutually exclusive. Choices that overlap may have more than one correct answer or partially correct answer.

[8]INCONSISTENT – Choices that are not equally attractive lower the difficult of the question by reducing the number of distractors.

[9]OPPOSITE – One Set of Opposites – Students focus on just the two opposite choices and ignore the other choices.
Two Sets of Opposites – Eliminates students from ignoring non-opposite choices.

[10]AVOID – The words: never, none, all and always indicate a situation that is absolute. Test-wise students are aware that very few things are absolute.

[11]NONE OF THE ABOVE – None of the above should be limited to mathematical calculations. Clear directions on rounding eliminates students estimating the correct answer and increases the teacher's confidence that the student solved the problem.

[12]CUES – The words: often, seldom, sometimes, usually and generally indicate that the choice doesn't have to be correct all of the time. Repeating key words from the stem in only the correct answer is a verbal association that connects the stem and choice. Test-wise students are aware of these facts.