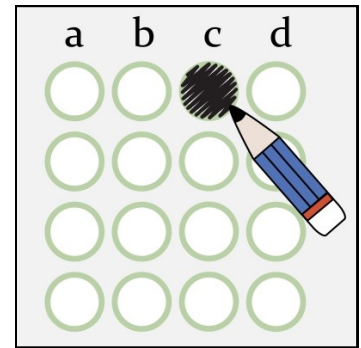


How to Write Better Multiple-Choice Questions

Flip the sheet over to see examples of weak multiple-choice questions turned into better questions



Fixing the Five Most Common Mistakes

1. All incorrect options (known as distractors) should be homogenous and logically compatible.
 - ⇒ All options should be of the same category as the correct option. Rewrite double options (e.g. X and Y) to focus on a single point.
2. All options should be of the same length as the correct answer.
 - ⇒ The correct option is often longer because of the need to qualify it.
3. Don't use questions of the form "Which of the following statements is correct?"
 - ⇒ Questions of this type are not focused and will have heterogeneous distractors.
4. The question portion (known as the stem) should pose a clear question that can be answered without looking at the options.
 - ⇒ If the question can't be answered without seeing the options, then it should be rewritten.
5. A better question will require application of knowledge rather than recalling an isolated fact.
 - ⇒ The stem can be relatively long while options should be short. The questions can provide details on an experimental result (e.g. show a graph), and then ask the students to interpret the data.

Using Shell Questions to Write Better Questions

- If X occurs, which is most the most likely outcome? (Applying knowledge)
- Which is most commonly the cause of X? (Applying knowledge)
- What distinguishes X from Y? (Analyzing knowledge)
- Present a problem. Which approach should be used to solve this problem? (Evaluating knowledge)
- Present a problem. Which is a possible solution? (Applying knowledge)
- Present a problem. Why is X the best solution? (Evaluating knowledge)

Example-Altered Multiple-Choice Questions



WEAK QUESTION and ANSWERS

1) Which of the following statements is false with respect to caspases:

- (A) They do not regulate blood clotting
- (B) They are synthesized in an inactive form
- (C) They are cysteine proteases
- (D) They cleave proteins after aspartate residues
- (E) They contain Asp-His-Ser in their catalytic site

2) Which of the following statements regarding membrane dynamics is false?

- (A) The acyl chains in the paracrystalline state are highly-ordered
- (B) Sideways movement is possible in the liquid-ordered state
- (C) Increased synthesis of unsaturated fatty acids can occur at lower temperatures
- (D) Cholesterol reduces fluidity of membranes
- (E) Adding heat increases the motion of the acyl chains

3) Hyperparathyroidism is a condition where the parathyroid gland secretes excess parathyroid hormone (PTH). How does a sudden excess of PTH alter calcium (Ca^{2+}) in the body?

- (A) Increases $[\text{Ca}^{2+}]$ in blood (at bone, gut and kidney)
- (B) Activates 1- α -hydroxylase \rightarrow increases 1,25-OH₂-D \rightarrow suppresses calcium absorption at gut
- (C) Increases Ca^{2+} excretion at gut
- (D) Increases Ca^{2+} excretion at kidney

4) Which of the following is a true statement?

- (A) Mitochondrial genomes are relatively constant in content (i.e. types of genes present)
- (B) Mitochondrial genomes are relatively constant in organization
- (C) Mitochondrial genomes are relatively constant in size
- (D) None of the above

5) Which of the following is an example of sexual dimorphism?

- (A) Only female mussels have modified mantle tissue that resembles the prey of their fish hosts
- (B) Mussels reared in the lab may be less bumpy than ones raised in a flowing river
- (C) Male and female mussels both use their siphons for feeding and reproduction
- (D) Some species of mussels may reproduce twice per season
- (E) More female offspring are produced each year than male offspring

BETTER QUESTION and ANSWERS

1) What distinguishes caspase 9 from factor Xa?

- (A) Caspase 9 regulates blood clotting; Factor Xa regulates apoptosis
- (B) Caspase 9 is a cysteine protease; Factor Xa is a serine protease
- (C) Caspase 9 is synthesized in the active form; Factor Xa is synthesized in an inactive form
- (D) Caspase 9 cleaves after a serine; Factor Xa cleaves after an aspartate
- (E) Caspase 9 is an initiator protease; Factor Xa is an effector protease

2) Lower temperatures cause membrane lipids to move less. Explain why the addition of cholesterol in the membrane restores membrane fluidity.

- (A) Cholesterol causes increased motion in unsaturated lipids
- (B) Cholesterol causes decreased motion in unsaturated lipids
- (C) Cholesterol causes increased motion in saturated lipids
- (D) Cholesterol causes decreased motion in saturated lipids

3) Hyperparathyroidism is a condition where the parathyroid gland secretes excess parathyroid hormone (PTH). How does a sudden excess of PTH alter calcium (Ca^{2+}) at the level of the bone?

- (A) Increases osteoblast activity
- (B) Decreases Ca^{2+} released from bone
- (C) Decreases reabsorption
- (D) Increases osteoclast activity

4) What characteristic is relatively constant in mitochondrial genomes across species?

- (A) Content (i.e. types of genes)
- (B) Organization
- (C) Size
- (D) Number of genes

5) A biologist is making observations about the body morphology of different individuals of freshwater mussels. She observes the following: only female mussels have modified mantle tissue that resembles the prey of their fish hosts. Which of the following concepts is consistent with this observation?

- (A) Gene flow
- (B) Sexual dimorphism
- (C) Phenotypic plasticity
- (D) Dioecy

References

OVG MCQ Workshop 2017
Vanderbilt Center for Teaching



Coming to a mail slot near you - MCQs, The Sequel!

- Multiple-choice questions harder than your long answer questions - Damn right!
- Item analysis reports – What the hell do those numbers mean anyway?
- Test specification – Stop students whining about tests being unfair.