

**Using Multiple Choice Items Formatively**



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**Water on a glass**

Jenna put a glass of cold water outside on a warm day. After a while...

- A. The air molecules around the glass condensed to form droplets of liquid
- B. The water vapor in the air near the cold glass condensed to form droplets of liquid water
- C. Water soaked through invisible holes in the glass to form droplets of water on the outside of the glass
- D. The cold glass causes oxygen in the air to become water

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**What is the Cognitive Complexity Level?**  
**Save the Ozone Layer**

What can we do to preserve the ozone layer?

- A. Reduce the amount of carbon dioxide produced by cars and factories
- B. Reduce the greenhouse effect
- C. Stop cutting down the rainforests
- D. Limit the numbers of cars that can be used when the level of ozone is high
- E. Properly dispose of air-conditioners and fridges

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## Possible DOK Level 2 Item

What is the median for the following data set?

38 74 22 44 96 22 19 53

- A. 38 and 44
- B. 41
- C. 46
- D. 77
- E. This data set has no median

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## Distractors Should Reflect Common Misconceptions

When creating your question, use known, prevalent student misconceptions as answer choices.

Examples of this:

- "It is not necessary to order the list of numbers."
- "An even-numbered list does not have a median."

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## What are Misconceptions?

Much of what we call "**student misconceptions**" is based on intuitive knowledge—knowledge not based on any logic or empirical evidence, but on feelings of reasonableness or on various experiences with the world and with teachers, peers and family.

Some misconceptions are correct ... until they are not!  
E.g., "adding/multiplying makes bigger," "the world is flat," etc.

Other misconceptions are based on our logical guesses or inferences about the world.

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## Probing Concepts Often Lead to Higher DOK Questions

Set 1: 10 12 13 15  
Set 2: 10 12 13 15 0

What can you say about the means of the two data sets?

- A. The two sets have the same mean.
- B. The two sets have different means.
- C. It depends on whether you choose to count the zero.

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## Using Student Language to Uncover Misconceptions

You look outside and notice a very gentle rain. Suddenly, it starts raining harder. What happened?

- a) A cloud bumped into the cloud that was only making a little rain.
- b) A bigger hole opened in the cloud, releasing more rain.
- c) A different cloud, with more rain, moved into the area.
- d) The wind started to push more water out of the clouds.

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## When Can MC Items be Used?

A well written multiple choice question that includes common misconceptions often leads to a great classroom discussion.

They lend themselves well to both "Bell Ringers" and "Exit Slips".

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## Guidelines for Using MC Items in the Classroom

- Questions should address core content AND misconceptions.
- The number of answer choices does not need to be fixed.
- A question can have more than one correct answer if instructionally useful.
- Answer choices do not necessarily have to look parallel.
- Wording can be presented in an informal student voice.
- Avoid using only DOK Level 1 questions- they give you the least amount of information about your students and they already exist out there!

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