

Item Writing Principles

Session B13.

OEAA Fall Conference
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Outline

- Welcome
- Writing Multiple Choice Items
 - Parts of an Item
 - Guidelines for Writing
 - Things to Consider
- Writing Constructed Response Items

Parts of an Item

Example of Complete Question Stem

Stem → What is the perimeter of a rectangular vegetable garden that is 6 feet wide by 8 feet long?

Correct option → B* 28 ft

Distractors (Incorrect Options) → A 48 ft
C 24 ft
D 14 ft

Note: The correct option or correct answer is often abbreviated CA.

Parts of an Item

Example of Open-Ended Question Stem

Stem → In this passage, the word infuriated means

Distractors → A confused.
B alarmed.
C worried.

Correct Answer → D* angry.

Parts of an Item

Example of Open-ended Stem

Stem → One of the factors of $x^2 - 5x - 36$ is —

- A ~~x~~ ~~5~~ x + 3
- B ~~x~~ ~~4~~ x - 4
- C x + 6
- D* x - 9

There should be no "throw-away" options.

Guidelines for Writing Multiple Choice Items

1. Write questions that measure understanding, insight, and higher level skills. Don't be trivial.
2. Use concise, straightforward language.
3. Present the problem or question as clearly as possible in the stem. Don't include unnecessary information.
4. Don't be tricky or cute.
5. Strive to be interesting to students at the target grade level.
6. Avoid bias toward or against any group of individuals.

Guidelines for Writing Multiple Choice Items

7. When calling for a judgment or conclusion, the student must be able to infer the correct answer from the text. The stems of items that call for a judgment or a conclusion should be worded accordingly (According to the author, or according to the selection.)
8. Don't pose questions such as "What do you think/What would you do?" because any option would be defensible.
9. Avoid using negative stems that ask the students to choose the one wrong answer, such as those that use the terms "except" and "not".

Guidelines for Writing Multiple Choice Items

10. Use options that fit grammatically with the stem.
11. Write options that are parallel in grammatical structure, logic and length.
12. Use distractors that are incorrect but plausible to students at the target grade level.
13. Provide one and only one correct answer, or one answer that is clearly the best.
14. Don't use "all of these" or "none of the above" as an option. This is inconsistent with there being only one correct answer.

Guidelines for Writing Multiple Choice Items

15. Numerical options should be presented in ascending or descending order.
16. Unnecessary or redundant information should generally not be included in the stem and never in the options.
17. Items should include multicultural contexts and names (unfamiliar names should be used in short, easy items and familiar names in hard items).
18. Be alert for names that have multiple meanings in contextual items (e.g., Pat, Bill, Sue, Mark, June)

Guidelines for Writing Multiple Choice Items

- Complete Question stems are preferred.
- Open-ended stems are acceptable if it is clear from the stem what the item is asking.
- For example, "The boy in the story lived —" is an unclear stem. Where did the boy live? With whom did he live? When did he live? How did he live? Students cannot determine what the item is asking until they read all the answer choices.
- On the other hand, "The boy liked to watch ships because he —" is acceptable. The stem clearly asks why.

Things to Consider

- ★ **Instructional Match**
- ★ **Appropriateness**
 - ★ **Clarity**
 - ★ **Format**
 - ★ **Options**
- ★ **Bias**

Instructional Match

- ★ **Does the item assess the content it is supposed to assess?**
- ★ **Does the item pose a clearly defined problem or task appropriate to the content?**

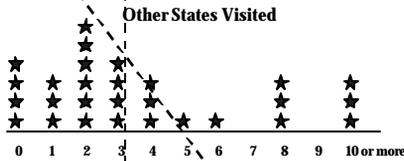
Appropriateness and Clarity

- * Is the item well-written, clear, and concise? Short sentences are almost always better than long ones in mathematics assessment.
- * Does the item use confusing wording or synonyms? Keep it simple. When in doubt, use the simpler word, phrase, or clause.
- * Is the artwork clear, correct, and appropriate? Are geometric figures, graphs, charts, and diagrams precisely labeled?
- * Are euphemisms used? If so, at the lower grade levels or when their use is necessary to ensure that an item is fair to all students, they should occur in parentheses following the correct term.

Clearly stated items enhance student performance.

Use of Synonyms

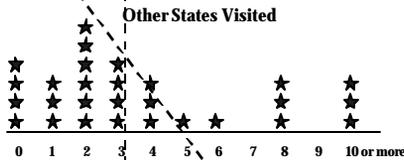
Miguel polled his classmates to learn the number of different states each one had visited outside of Michigan. His results are shown in the line plot below.



What percent of the classmates Miguel polled had visited more than 5 states outside of Michigan?

Use of Synonyms

Miguel polled his classmates to learn the number of different states each one had visited outside of Michigan. His results are shown in the line plot below.



What percent of the students Miguel surveyed had visited more than 5 states outside of Michigan?

Clarity

- Is the item well written and clear?
- Is the item free of unnecessary verbiage?
- Is the answer contained in the text or can it be concluded from information in the text?
- Is the item asking for information that is necessary or important to the understanding of the text?
- Is the artwork clear, correct, and appropriate?
- Does any item provide clues to the correct answer?

Clarity

The stem must be clear and precise to avoid the possibility of multiple correct answers.

Ambiguous Stem, Three Correct Answers

Zack placed \$1000 in an account that paid 5% annual interest. After how many years will Zack have at least \$1300 in the account?

- A 5 years
- B 6 years
- C 7 years
- D 8 years

The same options can be used with "tightened up" stem.

Zack placed \$1000 in an account that paid 5% annual interest. If he makes no further deposits or withdrawals, after how many years will Zack *first* have \$1300 or more in the account?

Clarity

~~What is the value of x in the equation below?~~

What is the solution to the equation shown below?

$$2x - 6 = x$$

- A 2
- B 3
- C 6
- D 12

Note: x is a variable; its value can be *any* real number. In the original, there are four defensible answers.

Format

- ★ Is the format appropriate for the grade level being tested?
- ★ Is the format sufficiently simple and interesting for students at this level?
- ★ Is the item formatted so that it is not unnecessarily wordy or difficult?

An appropriate item format can improve student performance.

Word Economy and Formatting

Instead of this formatting,

Jorge needs to evaluate the expression $\frac{-2(4-3)+8-4}{5}$ in order to finish his math homework. What should his answer be?

What about this?

Jorge needs to evaluate the expression below in order to finish his math homework.

$$\frac{-2(4-3)+8-4}{5}$$

What should his answer be?

Something to consider: To provide access to more students, take formulas, expressions, lists, etc. buried in text out of the text and center on a single line.

Word Economy and Formatting

Carol asked her 4 best friends, Alice, Clark, Ruth, and Matt, if she could measure their heights in inches. She found that Alice was 58 inches tall; Clark was 62 inches tall; Ruth was 60 inches tall; and Matt was 61 inches tall. To the nearest inch, what was the mean height of Carol's 4 friends?

What about this instead?

Carol measured the heights of each of 4 friends. Her results are shown below.

Alice: 58 inches Ruth: 60 inches

Clark: 62 inches Matt: 61 inches

To the nearest inch, what is the mean height of Carol's 4 friends?

Use a chart, a bulleted list, a graphic, etc. to break up reading.

A Closer Look at Options

An item's difficulty level is often a function of its incorrect options (distractors). An item with distractors that represent errors will give a good indication of which students have mastered the skill being measured.

- ★ Are the options reasonably parallel in structure and length?
- ★ Are the options worded clearly and concisely?
- ★ Does any option eliminate another?
- ★ Is there a unique correct answer?

Options

Options should be closely parallel in length, grammar, and style.

The regular hexagon below has a side of 4 centimeters. Which statement about the hexagon is *not* true?



Poor Options

- A It can be divided into one rectangle and two isosceles triangles.
- B It has 6 lines of symmetry.
- C It can be tessellated.
- D Its area is 36 square centimeters.

Better Options

- A Its perimeter is 24 centimeters.
- B It has 6 lines of symmetry
- C It can be tessellated.
- D Its area is 36 square centimeters.

Options

Distractors should be plausible and should not provide clues.

Laurie plans to save 40% of her take home pay each month during her summer job. If she works 3 months and takes home \$380 per month, what total amount will she save?

Poor Options: Note cheuing in C and D with D also an outlier.

- A \$152
- B \$423
- C \$456
- D \$45,600

Improved Options

- A \$15.20
- B \$45.60
- C \$152.00
- D \$456.00

Options

There must be one only one correct answer. One option must not subsume another.

Terrible Stem, Worse Options: A, B, and C describes the solutions since all solutions are greater than 10.

Which describes the solutions to $3x + 10 > x - 10$?

- A $x > 0$
- B $x > 5$
- C $x > 10$
- D $5 < x < 10$

"Tightened-up" Stem, Improved Options

What is the solution to the inequality below?

$$3x + 10 > x - 10$$

- A $x > 0$
- B $x > 10$
- C $0 < x < 10$
- D $5 < x < 10$

Bias

Cultural, ethnic, gender, and economic imbalance (and stereotyping) can appear subtly in items and may unfairly inhibit the performance of groups of students.

- ★ Does the item assume racial, class, or gender values or suggest stereotypes?
- ★ Might the item offend any group?
- ★ Are minority interests well represented?

Some Common Problems

Distractors should be closely parallel in length, grammar, and style.

Poor

Candy should be eaten sparingly between meals because it

- A causes diabetes.
- B supplies energy.
- C causes headaches.
- D dulls the appetite for foods rich in other necessary elements.

Improved

Candy should be eaten sparingly between meals because it

- A causes diabetes.
- B supplies energy.
- C causes headaches.
- D dulls the appetite.

Some Common Problems

Items should not present stereotypes.

Poor

Martha was not a typical teenage girl because she

- A always wore jeans and tennis shoes.
- B didn't want to learn how to drive a car.
- C played football on the varsity team.
- D liked to help with chores at home.

Improved

Martha's most unique accomplishment during high school was

- A adopting her own style of dress.
- B learning to drive a car.
- C playing football on the varsity team.
- D joining the yearbook club.

Some Common Problems

Distractors should be plausible.

Poor

Six-year-old Jed was late for school because he

- A stopped to play in the park.
- B went to the dentist.
- C couldn't find his reading book.
- D drove his dog to the vet.

Improved

Six-year-old Jed was late for school because he

- A broke a shoelace.
- B went to the dentist.
- C lost his reading book.
- D thought it was a holiday.

Some Common Problems

There should be only one correct or best answer. One distractor should not subsume another.

Poor

According to the passage, what percentage of the city's resident's own pets?

- A Less than 20%
- B Less than 30%
- C More than 50%
- D More than 75%

Improved

According to the passage, what percentage of the city's resident's own pets?

- A Less than 20%
- B Between 20% and 40%
- C Between 40% and 60%
- D More than 60%

Parallel Options

Poor -

Which of the following is an effective way to remove an air bubble from a wet mount microscope slide?

- A Tapping the cover slip gently with an eraser tip. *
- B You take the microscope fine focus and adjust it.
- C Use cleaning solution to clean the microscope lenses.
- D Increase the amount of light by adjusting the diaphragm.

Better Options-

- A Tapping gently on the cover slip *
- B Adjusting the focus on the microscope
- C Cleaning the microscope lens
- D Increasing the amount of light

Poor

What is a characteristic of simple machines?

- A. Reduce force
- B. Are inexpensive
- C. Lift heavy objects
- D. Make work easier

Better?

A student wants to lift a heavy object to the second floor of a building. Which simple machine would be best for lifting the object?

- Lever
- Pulley *
- Screw
- Wedge

[Ugly]

Mushrooms are *not* considered plants because they do *not* have –

- A a lack of cell walls
- B undifferentiated chlorophyll*
- C noncreative stems
- D roots, stems, or leaves

[Poor]

In science you observe bacteria growing on agar gel. Each dish of agar you see has bacteria growing in it. What is the name given to this step of the scientific method?

- A Fact
- B Hypothesis
- C Observation *
- D Theory

[Better]

A student believes that bacteria will grow on a mixture of beef soup and gelatin. What is the name given to this step of the scientific method?

- A Fact
- B Hypothesis *
- C Observation
- D Theory

Multiple Correct Answers

Terrible Options

According to the graph, what percent of the city's residents own pets?

- A Less than 20%
- B Less than 30%
- C More than 50%
- D More than 75%

(B subsumes A, and D subsumes C.)

Improved Options

According to the graph, what percent of the city's residents own pets?

- A Less than 20%
- B Between 20% and 40%
- C Between 40% and 60%
- D More than 60%

Cueing

Poor

Lisa is writing a report on different types of ecosystems. In which book would she *most likely* find this information?

- A. *Cooking with Plants*
- B. *Big Book of Dog Breeding*
- C. *A Guide to Rock Collecting*
- D. *Ecosystems of North America*

Better

Lisa is writing a report on the relationship between organisms and their natural environments. In which book would she *most likely* find this information?

- A. *Cooking with Plants*
- B. *Big Book of Dog Breeding*
- C. *A Guide to Rock Collecting*
- D. *Ecosystems of North America* *

**[Open-Ended/Constructed
Response Items]**

OE/CR items should allow students to demonstrate the depth of their understanding.

There should be more than one way to answer the question (or at least part of it), and there should be opportunities for students to obtain partial credit.

**[Keep Each CR Item within a
Reasonable Scope]**

Science Example:

Poor: Explain kinetic energy and gravitational potential energy.

Better: A pencil rolls across a tabletop and then falls to the floor. Describe the changes in the kinetic energy and gravitational potential energy of the pencil as it rolls, falls, and lands on the floor.

[Break Complex Tasks into Parts]

Poor Science Example:

Students are designing an experiment to test whether a pesticide affects tomato plant growth.

Better Science Example:

Identify **four** possible variables in this experiment.

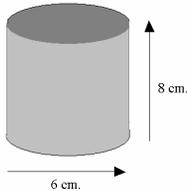
Choose one of these and explain how it can be controlled and how the results might change if it were not controlled.

How About this One?

Stephanie enjoyed the gustatory pleasure of consuming a bucket of popcorn, which had been lovingly kissed by a patina of butter and salt. Curious as to the properties of the container which ensconced this gastronomical delight, she attempted to ascertain its capacity.

Better

A popcorn tub is shown below



What is the volume of this popcorn tub?

Writing Constructed Response Items

Social Studies: Choose a topic

Michigan Examples:

Manufacturing	Zebra Mussels
Tourism	Urban Sprawl
Agriculture	Light Pollution
Lumbering	Automobiles
Mining	Sand Dunes
Water	Kirtland's Warbler
Great Lakes	Recycling Glass and Plastic
Increasing Bottle Deposit	

**Writing Constructed Response
Items**

Write first draft of “Should”
question.

“Should [authority] [carry out] [policy]?”

**Should the Park Commission allow
team sports in Wilson Park?**

**Writing Constructed Response
Items**

You will now take a stand on the following
public policy issue: “*Should [authority] [carry
out] [policy]?*”

You may either support or oppose [the
policy].

Write a letter to the [authority].

**Writing Constructed Response
Items**

**Choose data sets —
Supporting/neutral/opposing the policy**

You Need:

- 2 for Grade 6
- 2 for Grade 9
- 3 for High School

**Writing Constructed Response
Items**

Review/revise "Should" question
as needed

(Does it match the data you
found?)

**Writing Constructed Response
Items**

Write exemplary responses
(supporting and opposing)

How would the best student answer?

**Writing Constructed Response
Items**

V. Inquiry

Content Standard 1:

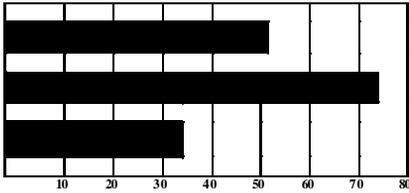
All students will acquire information from books, maps, newspapers, data sets and other sources, organize and present the information in maps, graphs, charts and timelines, interpret the meaning and significance of information, and use a variety of electronic technologies to assist in accessing and managing information.
(Information Processing)

Part B

The Park Commission asked people living near Wilson Park if they wanted to allow team sports in the park.

This graph shows the percent who said YES.

Percent of People Who Want Team Sports in Wilson Park



Study the information in Part B of the Data Section.

Which statement describes a *relationship* shown by the information in the graph?

- A Parents of children age 11 and above are most likely to watch team sports in Wilson Park.
- B Parents of children age 10 and below are least likely to support team sports in Wilson Park. *
- C Adults with no children are least likely to support team sports in Wilson Park.
- D Adults with no children are most likely to watch team sports in Wilson Park.

You will now take a stand on the following issue:

Should the Park Commission allow team sports in Wilson Park?

You may either support or oppose team sports in the park. Write a letter to the Park Commission explaining your position.

Exemplary Response

I believe that playing team sports in Wilson Park should not be allowed. It should not be allowed because the data in Part A shows that the parks that do allow team sports have reported more children getting hurt.

The Core Democratic Value that supports my position is Life, because if someone gets hit in the head with a ball or a bat they can get brain damage. The hospital can be very expensive, and some families don't have money to pay for it.

So that is why I believe team sports should not be allowed in Wilson Park.

Contact Information

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