

Grade 6 Mathematics Performance Task and Scoring Guide

CEREAL BOXES

A cereal company uses cereal boxes that are rectangular prisms. The boxes have the dimensions shown.

- 12 inches high
- 8 inches wide
- 2 inches deep

The managers of the company want a new size for their cereal boxes. The new boxes have to be rectangular prisms. You will evaluate one box design the company proposed. Then you will create and propose your own design for the company.

Requirements for the new boxes:

- The new boxes have to use less cardboard than the original boxes.
- The new boxes have to hold the same or a greater volume of cereal as the original boxes.

1.

Determine the volume of the current cereal box with the dimensions 12 inches high, 8 inches wide, and 2 inches deep.

Find the volume, V , in cubic inches, of each box.

Volume of Original Box: $V = \underline{\quad} \text{ in}^3$



Scoring

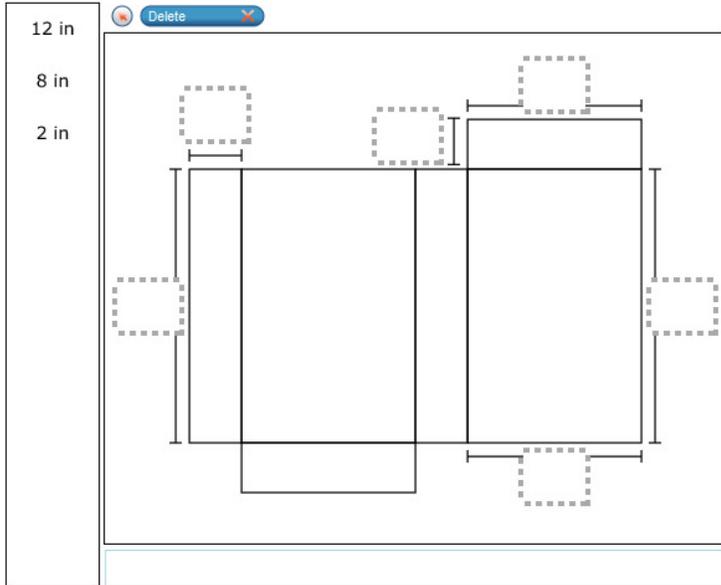
For this item, a full-credit response (1 point) includes

- 192.

For this item, a no-credit response (0 points) includes none of the features of a full-credit response.

2.

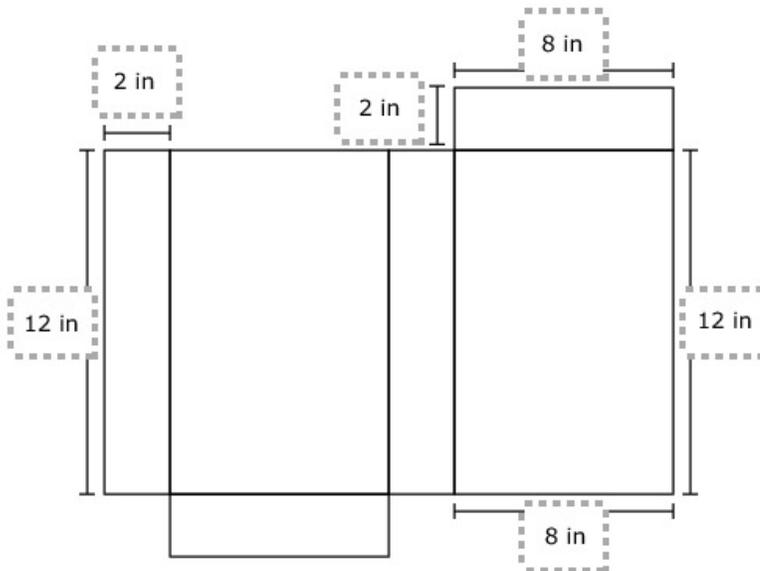
Label the dimensions of the net for the current cereal box with dimensions 12 inches high, 8 inches wide, and 2 inches deep.



Scoring

For this item, a full-credit response (1 point) includes:

-

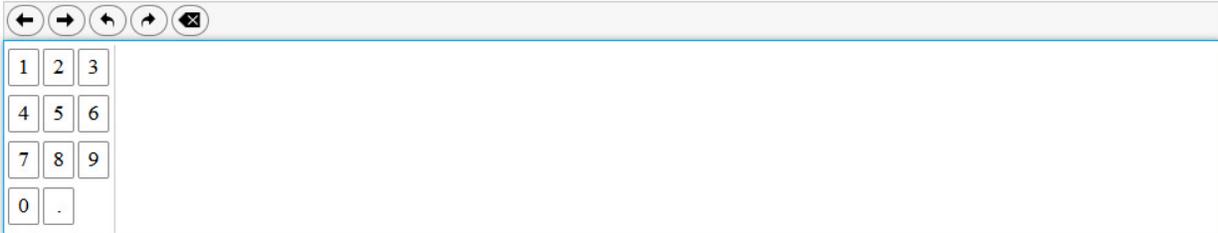


For this item, a no-credit response (0 points) includes none of the features of a full-credit response.

3.

Determine the surface area, S , in square inches, of the current cereal box with dimensions 12 inches high, 8 inches wide, and 2 inches deep.

$S = \underline{\hspace{1cm}} \text{ in}^2$



Scoring

For this item, a full-credit response (2 points) includes

- 272.

For this item, a partial-credit response (1 point) includes all of the following common mistakes:

- 136
- 176
- 248
- 256
- 80
- 224
- 240 or square inches consistent with an error in Item 2.

For this item, a no-credit response (0 points) includes none of the features of a full- or partial-credit response.

4.

The company proposes a new cereal box with dimensions 10.5 inches high, 7.5 inches wide, and 4 inches deep. The new cereal box is a rectangular prism. Determine if this new box meets each of the requirements. Explain why or why not.

Scoring

For this item, a full-credit response (2 points) includes

- comparing the proposed volume to the requirements
AND
- comparing the proposed surface area to the requirements
AND
- judging the proposed dimensions to be inappropriate.

For example,

- $V = 315$ cubic inches and $315 > 192$. $S = 301.5$ square inches and $272 < 301.5$. The box should not be used because the surface area is too large.

For this item, a partial-credit response (1 point) includes either:

- comparing the proposed volume to the requirements
AND
- comparing the proposed surface area to the requirements
- (1 point for making the valid comparisons but no judgment call)
OR
- judging the proposed dimensions to be inappropriate.

(1 point for making the correct judgment but not showing evidence to support it)

For example,

- $V = 315$ cubic inches and $315 > 192$. $S = 301.5$ square inches and $272 < 301.5$.
OR
- The box should not be used because the surface area is too large.

Continued on next page

For this item, a no-credit response (0 points) includes none of the features of a full- or partial-credit response.

For example,

- The box can be used because it meets the requirements.

This item is not graded on spelling or grammar.

5.

Design a new cereal box for this company. All cereal boxes are rectangular prisms. Then explain why your design is better for the company, based on the requirements.

In your response,

- give the dimensions of your box;
- explain how your box meets each of the requirements for new boxes.

Scoring

For this item, a full-credit response (3 points) includes:

- giving the dimensions for the cereal box design
AND
- explaining how the design meets the volume requirement
AND
- explaining how the design meets the surface area requirement.

For example,

- "The new box should have a length of 10 inches, a width of 8 inches, and a depth of 3 inches. These dimensions will give a greater volume of 240 cubic inches, and a lesser surface area of 268 inches."

For this item, an incorrect response (2 points) includes two of the following:

- Student gives the dimensions for the cereal box design.
- Student explains how the design meets the volume requirement.
- Student explains how the design meets the surface area requirement.

For example,

- "The new box should have a length of 10 inches, a width of 8 inches, and a depth of 3 inches. These dimensions will give a greater volume of 240 cubic inches."

Continued on next page

For this item, a no-credit response (0 points) includes none of the features of a full- or partial-credit response.

For example,

- “The new box should have a length of 10 inches. This will result in a greater volume.”

This item is not graded on spelling or grammar.