

Model Makers

Use a simple model to test an insulation design.

5.1.e.i “developing and using models develop models using an analogy, example, or abstract representation to describe a scientific principle or design solution”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each phrase that tells what a part of the cup model represents, and circle the sentence that names a limit of the model, so you can see how a model helps explain a design.

Testing a Tiny Cooler

- ① Engineers often build models before they build a full design. A model can be an object, a drawing, or an analogy that shows an important idea. When Maya’s class planned a device to keep an ice cube from melting, they used a small lidded cup to represent an insulated lunch container. The cup was not a real lunch container, but it could help them test heat transfer.
- ② They placed equal ice cubes in two small cups. One cup had a layer of cotton around it, representing insulation, and the other had no cotton. Both cups sat in the same sunny place for twenty minutes. The class compared the melted water. Less melted water in the cotton cup would support the idea that insulation slows the movement of heat into a container.
- ③ The cups gave the class a simple model of the design problem. They could change one part, such as the cotton layer, and observe a result. Still, the model had limits. A lunch container is larger, may have several materials, and is opened during the day. After testing, Maya’s class would use the results to choose materials for a better lunch-container design.

2 ANSWER WITH EVIDENCE Use the passage

1 What real object did the small lidded cup represent?

2 What did the cotton layer represent in the model?

3 How did comparing the melted water help the class test its design idea?

4 Name one limit of the cup model.

3 YOUR TURN Your own words

Develop a two-panel model for a package that protects a fragile object during shipping. In Panel 1, draw and label an object that represents the fragile item and a material that represents padding. In Panel 2, show a test that compares packages with and without padding, then write one sentence telling what result would support the design.

A rectangular box for drawing. A horizontal dashed line is positioned approximately one-fifth of the way from the bottom edge.A rectangular box for drawing. A horizontal dashed line is positioned approximately one-fifth of the way from the bottom edge.

PART 1 • READ AND MARK

Underline each phrase that tells what a part of the cup model represents, and circle the sentence that names a limit of the model, so you can see how a model helps explain a design. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What real object did the small lidded cup represent?	An insulated lunch container.
2	What did the cotton layer represent in the model?	Insulation.
3	How did comparing the melted water help the class test its design idea?	It showed whether the cotton insulation kept more heat from reaching the ice. Less melted water in the cotton cup would support the idea.
4	Name one limit of the cup model.	A real lunch container is larger, may have several materials, or is opened during the day.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: A marble represents a fragile item, and crumpled paper represents padding inside a small box.

Panel 2: Drop two boxes from the same height, one with paper and one without. If the marble in the padded box is not damaged while the other marble is damaged, the result supports using padding.

Accept any clearly labeled analogy or simple-object model that connects each model part to a real package part. The test should compare padded and unpadded packages under the same conditions and state an observation that would support the padding design.