

Model the Runoff

Use a small-scale model to test a flooding solution.

7.1.G “develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each material used in the model and circle the courtyard feature it represents. This will help you see how a model connects parts of a system to real-world parts.

A Courtyard Flood Model

- ① When hard rain fell on Maple Middle School, water rushed across the paved courtyard and pooled near a doorway. A student engineering team built a small model to investigate the problem. Their shallow tray represented the courtyard. Packed soil represented the garden edge, a smooth plastic sheet represented pavement, and a low block represented the doorway. They placed the materials in the same relative positions as the real area, but at a much smaller scale. The model could not copy every crack or storm, yet it could show where moving water might collect.
- ② To test the model, the team poured the same cup of water at the tray's upper end for each trial. First, they watched water travel quickly across the plastic and stop against the doorway block. Next, they changed one feature: they set a thin strip of sponge along the pavement's lower edge to represent a planted rain garden. In the revised model, the sponge slowed and absorbed some water before it reached the block. Because the water amount and tray slope stayed the same, the team could connect the changed result to the rain-garden strip.
- ③ The team used the model results to propose a solution: add a rain garden beside the pavement, not directly in front of the door. Before construction, they would compare the model with measurements and observations from the actual courtyard during several rains. They also would test deeper soil and a wider garden strip, since a small sponge cannot represent roots, soil layers, or very heavy storms exactly. A useful model is not a perfect copy. It helps people explain a system, test ideas safely, and revise a solution using evidence.

2 ANSWER WITH EVIDENCE Use the passage

1 Name two materials in the tray model and the real courtyard features they represented.

2 What relationship between the tray model and the real courtyard did the team keep the same?

3 What did the team change in the model, and what did they keep the same so they could connect the result to that change?

4 How did the revised model support the team's rain-garden solution? Include one limitation of the sponge model.

3 YOUR TURN Your own words

Choose a classroom movement problem, such as a crowded supply table. In Panel 1, draw a labeled model of the current setup using symbols for people and objects. In Panel 2, revise one feature to solve the problem, then write one prediction about how the revision will change the system.

PART 1 • READ AND MARK

Underline each material used in the model and circle the courtyard feature it represents. This will help you see how a model connects parts of a system to real-world parts. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Name two materials in the tray model and the real courtyard features they represented.	Packed soil represented the garden edge, smooth plastic represented pavement, and a low block represented the doorway. Accept any two correct pairs.
2	What relationship between the tray model and the real courtyard did the team keep the same?	They kept the materials in the same relative positions, although the model was much smaller.
3	What did the team change in the model, and what did they keep the same so they could connect the result to that change?	They added a strip of sponge to represent a rain garden. They kept the amount of water and the tray slope the same.
4	How did the revised model support the team's rain-garden solution? Include one limitation of the sponge model.	The sponge slowed and absorbed some water before it reached the doorway block, supporting a rain garden beside the pavement. The sponge could not represent roots, soil layers, or very heavy storms exactly.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: One supply table is labeled in the center, with six student-circle symbols waiting in one line. Panel 2: Two supply tables are labeled on opposite sides, with three student-circle symbols at each table. Prediction: Two tables will shorten the waiting line because students can get materials at the same time.

Accept correct model-to-courtyard matches and explanations that use the passage's evidence. For the open task, accept any labeled two-panel model that represents a real system, changes one feature, and gives a logical prediction.