

Model Detective

Read how a team uses a small watershed model to study a large system.

6.2.A "identify advantages and limitations of models such as their size, scale, properties, and materials;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline statements that tell what the model helps the team investigate. Circle phrases that tell what the model cannot show accurately.

A Town in a Tray

- ① At Riverbend Middle School, a team built a model to study what happens when heavy rain falls near a town. Their model sat in a shallow tray, so it could fit on a lab table and be moved easily. A real watershed is much larger, with hills, streets, soil, and streams spread across many kilometers. The students chose a scale of 1 centimeter for every 20 meters. At that scale, they could compare the positions of a hill, a road, and a creek without building a full-size town.
- ② To make the land, the team used packed sand, clay, and small stones. Sand has larger spaces between grains, so water can soak through it quickly. Clay particles are much smaller and hold water longer, so a clay area can produce more surface runoff in the tray. The students used a sponge for a wetland because it absorbed and released water. Blue yarn marked the creek. Yarn showed the creek's path clearly, but it could not carry flowing water, so it could not show erosion along the streambank.
- ③ The model gave the team a safe, low-cost way to test where water might collect after a storm. They could pour the same amount of water several times and change one feature, such as moving the road. Still, the model could not predict an exact flood in the real town. Its short tray, simplified land shapes, and small materials left out changing weather, underground pipes, plants, and people. The team used the model to ask questions and compare possible patterns. They would need field measurements and computer data before making a real flood plan.

2

ANSWER WITH EVIDENCE

Use the passage

1

How did the model's size and scale make it useful to the team?

2

How did the properties of sand and clay make water behave differently in the model?

3

What was one advantage and one limitation of using blue yarn for the creek?

4

Why could the model not predict an exact flood in the real town? Name two things the model left out.

3

YOUR TURN

Your own words

Create a three-row plan for a neighborhood runoff model. For each feature, choose a material or scale choice, then state one advantage and one limitation of that choice.

MODEL FEATURE	MATERIAL OR SCALE CHOICE	ADVANTAGE	LIMITATION

PART 1 • READ AND MARK

Underline statements that tell what the model helps the team investigate. Circle phrases that tell what the model cannot show accurately. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How did the model's size and scale make it useful to the team?	It fit on a lab table and could be moved easily. Its scale let students compare the locations of a hill, road, and creek without building a full-size town.
2	How did the properties of sand and clay make water behave differently in the model?	Water soaked quickly through sand because it has larger spaces between grains. Clay held water longer and could produce more surface runoff.
3	What was one advantage and one limitation of using blue yarn for the creek?	The yarn showed the creek's path clearly. It could not carry flowing water or show erosion along the streambank.
4	Why could the model not predict an exact flood in the real town? Name two things the model left out.	Its tray, land shapes, and materials were simplified. It left out factors such as changing weather, underground pipes, plants, and people.

PART 3 • YOUR TURN (SAMPLE ANSWER)

MODEL FEATURE	MATERIAL OR SCALE CHOICE	ADVANTAGE	LIMITATION
Road and curb	1 cm = 10 m, cardboard strip	Makes the neighborhood layout fit on a table	Does not show the exact shape of every curb
Soil area	Packed sand	Shows water soaking into spaces between grains	May not match the layers in real neighborhood soil
Wetland	Sponge	Shows water being stored and released	Cannot include real wetland plants and organisms

Accept equivalent advantages and limitations when they match the passage. For the model plan, accept varied reasonable materials or scale choices if each row gives a relevant benefit and a realistic limit.