Runoff Detective

Trace causes and effects in a school garden investigation.

5.5.B "identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems;"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each cause, circle each effect, and number the links in one cause-and-effect chain. Marking the links will help you explain how one change leads to another.

Why Did the Drain Water Turn Muddy?

1. After a hard rain, Ms. Lee's class saw muddy water flowing from the school garden into a storm drain. Bare soil lay between the young bean plants. Rain hit the uncovered soil and loosened tiny particles. Flowing water carried those particles downhill. The garden lost soil, and the drain water became cloudy. Plant roots had not yet grown enough to hold the loose soil in place.

2. To investigate the problem, the class filled two equal trays with the same soil. They tilted both trays and poured the same amount of water at the top. One tray had bare soil. The other had a layer of straw mulch. The bare tray lost much more soil in its runoff. Mulch slowed the water and shielded the soil from direct raindrops.

3. The class used their results to explain why mulch could help the real garden. Straw covers the ground, so less rain strikes soil directly. Water moves more slowly, so it carries away fewer particles. With less soil entering the drain, the water stays clearer and the garden keeps more fertile topsoil. The class planned to add mulch before the next heavy rain. They would then observe the runoff and compare it with a bare area.

2 ANSWER WITH EVIDENCE

Use the passage

1. What caused the storm-drain water to become cloudy after the rain?

2. What did the class keep the same in both tray tests? Explain how this helped them investigate mulch as a cause.

3. Describe the cause-and-effect chain that can lead from straw mulch to clearer drain water.

4. What problem did the class investigate, and what result supports their plan to add mulch?

3 YOUR TURN

Your own words

Plan a fair test about a different water-and-soil problem, such as why water runs off packed ground. Use both rows for two setups. Change one possible cause, name the effect you will measure, and list conditions that will stay the same.

SETUP	POSSIBLE CAUSE CHANGED	EFFECT TO MEASURE	CONDITIONS KEPT THE SAME

ANSWER KEY # Runoff Detective

GRADE 5 · TEKS 5.5.B

PART 1 · READ AND MARK

Underline each cause, circle each effect, and number the links in one cause-and-effect chain. Marking the links will help you explain how one change leads to another. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What caused the storm-drain water to become cloudy after the rain?	**Rain loosened particles from bare soil, and flowing water carried the particles downhill into the drain.**
2	What did the class keep the same in both tray tests? Explain how this helped them investigate mulch as a cause.	**They used equal trays, the same soil, and the same amount of water. Keeping these conditions the same made mulch the important difference between the tests.**
3	Describe the cause-and-effect chain that can lead from straw mulch to clearer drain water.	**Mulch covers the soil and slows water. Less soil is loosened and carried away, so less soil enters the drain and the water stays clearer.**
4	What problem did the class investigate, and what result supports their plan to add mulch?	**They investigated soil washing from the garden into the drain. The tray with bare soil lost much more soil in runoff than the tray with straw mulch.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

SETUP	POSSIBLE CAUSE CHANGED	EFFECT TO MEASURE	CONDITIONS KEPT THE SAME
Setup A	Loose soil	Amount of runoff after 100 mL of water is poured	Tray size, soil amount, water amount, and pour rate
Setup B	Packed soil	Amount of runoff after 100 mL of water is poured	Tray size, soil amount, water amount, and pour rate

Accept equivalent cause-and-effect explanations that accurately connect bare soil, moving water, soil particles, and cloudy runoff. For the open task, accept any fair comparison with one changed cause, a measurable effect, and relevant controlled conditions.