When Water Vanishes

Track how measurement steps shape a soil test's conclusions.

11-12.RST.3 "Analyze a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle steps that make the two sites comparable, number the timed measurement steps in order, and underline explanations of what the water-level drops do or do not show.

Testing How Water Enters Soil

1. At a school garden, a science club tested whether packed footpath soil lets water enter more slowly than loose soil beside it. They used a double-ring infiltrometer: two metal cylinders, one inside the other. At each site, they pressed both rings five centimeters into the ground without digging out the soil. They then poured water into both rings until each held a shallow layer two centimeters deep. Water in the outer ring helps limit sideways movement of water from the inner ring, so a drop in the inner water level better reflects water moving downward.

2. Before recording a rate, the club kept both rings filled for ten minutes. This prewetting step reduced the influence of unusually dry surface soil on the timed comparison. Next, they topped up both rings to the same two-centimeter depth and started a timer. After exactly ten minutes, they read how far the water level in the inner ring had fallen, then topped up the rings again. They repeated the timed interval twice at each site, measuring from the starting level each time. They took care to pour gently because a strong stream could scour a channel through the soil.

3. On the footpath, the inner water level fell 4, 3, and 4 millimeters across the three intervals; in the garden bed, it fell 12, 11, and 12 millimeters. The similar readings within each site support a consistent difference: water entered the garden bed faster during these trials. The club's notes, however, say that a ring rocked slightly on a stone during a separate trial, allowing water to escape along its edge. They excluded that trial because an edge leak could make a large drop look like rapid infiltration. These measurements suggest an association with packed soil, not proof that packing alone caused the difference.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why did the club keep both rings filled for ten minutes before starting the timed measurements?

2. How did resetting the water depth and using ten-minute intervals help the club compare readings?

3. What do the six recorded drops show about the two sites, and what do they not prove?

4. Why did the club exclude the trial in which a ring rocked on a stone, even if its water level fell a great deal?

3 YOUR TURN

Your own words

Imagine a new garden-bed trial produces drops of 18, 11, and 12 millimeters, and a note says the first pour cut a small channel into the soil. Write a four-sentence field note explaining how the channel may have affected the result, whether to include the first reading, and how you would repeat the test fairly.

When Water Vanishes

PART 1 · READ AND MARK

Circle steps that make the two sites comparable, number the timed measurement steps in order, and underline explanations of what the water-level drops do or do not show. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why did the club keep both rings filled for ten minutes before starting the timed measurements?	**Prewetting reduced the influence of unusually dry surface soil, making the timed readings more comparable.**
2	How did resetting the water depth and using ten-minute intervals help the club compare readings?	**Each interval began at the same water depth and lasted the same amount of time, so the drops were measured under comparable conditions.**
3	What do the six recorded drops show about the two sites, and what do they not prove?	**Drops of 12, 11, and 12 millimeters in the garden bed exceed the footpath's 4, 3, and 4 millimeters, supporting faster water entry in the bed during these trials. They do not prove that soil packing alone caused the difference.**
4	Why did the club exclude the trial in which a ring rocked on a stone, even if its water level fell a great deal?	**Water could escape along the ring's edge. That loss could produce a large drop without indicating rapid entry into the soil beneath the inner ring.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The 18-millimeter drop may reflect water moving through the channel cut by the first pour rather than through undisturbed soil. I would flag that interval instead of combining it with the 11- and 12-millimeter readings. I would place both rings in undisturbed nearby soil, press them to the same depth, and prewet for ten minutes. Then I would pour gently, reset both water levels to two centimeters, and measure three ten-minute intervals again.

Accept responses that connect a procedural step to its effect on a reading. For the field note, look for a reasoned decision about the first interval and a repeat procedure that avoids another channel while preserving comparable measurement conditions.