A Drop's Detour

Trace how changing conditions move water through the air.

ESS.7.a "Obtain and communicate information to explain how water cycles through the atmosphere, including condensation, evaporation, clouds, types of precipitation, relative humidity, and dew point."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle each mention of evaporation or condensation, and underline the temperature or moisture condition that causes it. Use your marks to trace how water moves between the reservoir, the air, and the ground.

From Reservoir to Rain

1. At a city reservoir after sunrise, sunlight warms the surface. Some liquid water gains enough energy to enter the air as invisible water vapor, a process called evaporation. Wind carries that vapor above streets and trees. Warm air can hold more water vapor than cooler air before it becomes saturated. Relative humidity compares the water vapor actually in the air with the most it could hold at that temperature. At 50 percent relative humidity, the air contains half the vapor needed for saturation at its current temperature. As evaporation adds vapor, relative humidity can rise if temperature stays the same.

2. By evening, air carrying vapor rises along a nearby hill and cools. Its dew point is the temperature at which that air becomes saturated if its vapor content stays the same. When the rising air cools to its dew point, water vapor condenses into tiny liquid droplets on airborne particles. These droplets form a cloud; in colder parts of a cloud, vapor may instead form ice crystals. At ground level, cooling air can also reach its dew point, allowing condensation on grass as dew. Clouds are not made of invisible vapor; they are collections of visible droplets or ice crystals.

3. Inside the cloud, droplets collide and grow. When they become too heavy to remain aloft, they fall as rain if the air below the cloud stays above freezing. Snow reaches the ground when ice crystals grow into flakes and remain frozen on the way down. If snow melts into rain in a warm layer and then refreezes into pellets before landing, it falls as sleet. If the melted drops pass through a shallow freezing layer without refreezing in flight, they may freeze on contact as freezing rain. Runoff returns water to the reservoir, where sunlight can start evaporation again.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do sunlight and wind move water from the reservoir toward the hill without carrying liquid droplets?

2. Why does a cloud form as the air rises along the hill, and what part of the cloud can you see?

3. If the amount of vapor in the rising air stays the same, how does cooling toward the dew point affect its relative humidity? Explain why.

4. After snow melts in a warm layer, what determines whether it reaches the ground as sleet or freezing rain?

3 YOUR TURN

Your own words

Write a five- or six-sentence weather report for a different place, such as a garden or soccer field. Trace water from a liquid surface into a cloud and back to the ground, explain how cooling affects relative humidity and reaches the dew point, and choose a type of precipitation with the conditions that produce it.

A Drop's Detour

PART 1 · READ AND MARK

Circle each mention of evaporation or condensation, and underline the temperature or moisture condition that causes it. Use your marks to trace how water moves between the reservoir, the air, and the ground. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do sunlight and wind move water from the reservoir toward the hill without carrying liquid droplets?	**Sunlight supplies energy for liquid water to evaporate into invisible vapor, which the wind carries toward the hill.**
2	Why does a cloud form as the air rises along the hill, and what part of the cloud can you see?	**Rising air cools to its dew point, so vapor condenses into tiny droplets on airborne particles. The droplets, or ice crystals in colder parts, are visible.**
3	If the amount of vapor in the rising air stays the same, how does cooling toward the dew point affect its relative humidity? Explain why.	**Relative humidity rises toward 100 percent because cooler air reaches saturation with less water vapor.**
4	After snow melts in a warm layer, what determines whether it reaches the ground as sleet or freezing rain?	**Drops that refreeze into pellets before landing are sleet. Drops that remain liquid through a shallow freezing layer and freeze on contact are freezing rain.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

At noon, sunlight warms a puddle beside a soccer field, and some liquid water evaporates into invisible vapor. A breeze carries the vapor upward as the air rises over nearby buildings. As the air cools without losing vapor, its relative humidity increases until it reaches 100 percent at the dew point. Vapor then condenses into tiny droplets on airborne particles, forming a cloud. Droplets collide and grow, and because the air below the cloud stays above freezing, they fall as rain. Some rainwater collects in the puddle, ready to evaporate again.

Accept other locations and precipitation types if the response accurately links evaporation, cooling, rising relative humidity, condensation at the dew point, cloud formation, and the conditions for the chosen precipitation.