Follow the Flow

Trace how sunlight moves water through air and land.

6.8 "Construct an evidence-based explanation of how the sun's energy drives the motion and cycling of water through the hydrosphere. a. Plan and carry out an investigation to determine the differences in rates of energy transfer from the sun to..."

NAME _____ DATE _____

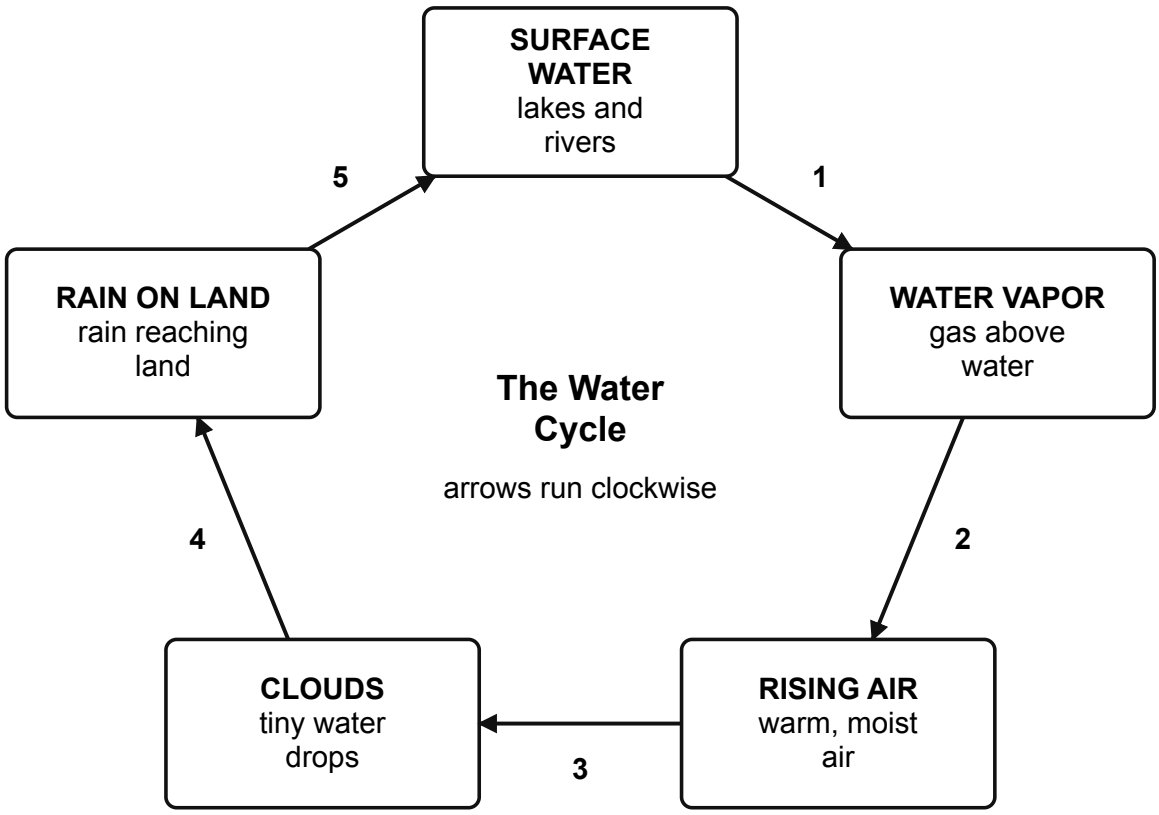
1 LABEL THE MODEL

Word bank below

Fill the arrows. Then analyze this simulated comparison: two identical open cups each start with 200 mL. After four hours, the sunlit cup has 192 mL and the shaded cup 198 mL. Other conditions are matched. Use the data and model to explain sunlight's role.

WORD BANK

- Convection lifts moist air
- Cooling and condensation
- Precipitation
- Runoff to rivers
- Sun-driven evaporation



Arrow numbers match the response boxes on the next student section.

Label the arrows

Use the word bank to write the process for each numbered arrow.

Arrow 1	Arrow 2	Arrow 3

Arrow 4	Arrow 5

2 RUN THE MODEL

Use your finished diagram

1. Calculate each cup's water loss. Explain how the comparison supports a role for solar energy in moving water into the air.

2. Warm moist air can rise when it is less dense than surrounding air. Use the model to explain how rising air can lead to cloud droplets.

3. Trace water from a cloud back to a river. What drives the downward movement, and why does the model not show water being used up?

3 CHECK IT

Before you turn it in

- [ ] I calculated losses from the supplied data.
- [ ] I linked energy to a process, not to destruction of water.
- [ ] I used the model to explain a complete route.

TEST THE MODEL

What happens to some water that this model does not show?

Follow the Flow

PART 1 · COMPLETED MODEL

ARROW	FROM	TO	PROCESS
1	SURFACE WATER lakes and rivers	WATER VAPOR gas above water	Sun-driven evaporation
2	WATER VAPOR gas above water	RISING AIR warm, moist air	Convection lifts moist air
3	RISING AIR warm, moist air	CLOUDS tiny water drops	Cooling and condensation
4	CLOUDS tiny water drops	RAIN ON LAND rain reaching land	Precipitation
5	RAIN ON LAND rain reaching land	SURFACE WATER lakes and rivers	Runoff to rivers

PART 2 · RUN THE MODEL

1. **The sunlit cup loses 8 mL; the shaded cup loses 2 mL. In the simulated matched comparison, greater loss under sunlight supports faster evaporation when solar energy is added. Evaporation still occurs in shade.** (Calculate each cup's water loss. Explain how the comparison supports a role for solar energy in moving water into the air.)
2. **As air rises it expands and cools; if it cools enough, water vapor condenses into droplets. Convection transports air containing water vapor; it does not turn vapor directly into rain.** (Warm moist air can rise when it is less dense than surrounding air. Use the model to explain how rising air can lead to cloud droplets.)
3. **Precipitation falls and runoff carries water toward rivers. Gravity drives downward flow. The model transfers water among stores rather than destroying it.** (Trace water from a cloud back to a river. What drives the downward movement, and why does the model not show water being used up?)

TEST THE MODEL (SAMPLE ANSWERS)

- Some water soaks into the ground.
- Plants release some water vapor into the air.

The cup values are explicitly simulated practice data, not measured experimental results. Keep an evidence-based explanation separate from claiming an actual investigation was performed. Solar energy supplies evaporation; gravity also drives cycling. This focuses on the parent explanation, not every investigation or density-model child. Source: USGS Water Science School, Evaporation and the Water Cycle.