

Water Cycle Check-Up: Twelve Items and a Snow-to-Streets Synthesis

Learning target: I can recall and apply the processes, drivers and changes of state of the water cycle, and explain a seasonal phenomenon using the sun's energy and gravity.

Retrieval and mastery check

About 35 min

Individual

MS-ESS2-4 · assesses

independent practice

writing

Name _____

Date _____

Period _____

Directions

Work alone without notes. Answer every item; for multiple choice, circle one letter. Numeric items must show the calculation. The synthesis at the end is worth as much as the first six items together, so leave at least ten minutes for it.

You will need: This worksheet, Pencil

Part A: Retrieval (items 1 to 12)

1. Which process is **not** driven by gravity? 1 pt
☐ A. Runoff flowing into a river
☐ B. Infiltration into soil
☐ C. Evaporation from a lake
☐ D. Precipitation from a cloud

2. True or false: the clouds you see in the sky are made of water vapor. 1 pt
☐ True ☐ False Explain your thinking:

3. A puddle dries up completely on a cool 12 °C day. This shows that evaporation 1 pt
☐ A. requires water to boil
☐ B. happens at the surface at any temperature
☐ C. is caused by gravity pulling water into the air
☐ D. only happens in summer

4. What must happen to water vapor for condensation to occur? Give two everyday examples of condensation. 2 pts

5. A reservoir loses 6 mm of depth per day to evaporation for 25 rainless days. How much depth is lost in millimeters and in centimeters? Show the calculation. 2 pts

6. Which statement best describes groundwater? 1 pt

- ☐ A. An underground river running through open caves
- ☐ B. Water filling the tiny pore spaces in soil and rock
- ☐ C. Water stored inside plant roots
- ☐ D. Water that has frozen underground

7. The sun's energy directly powers three of the lesson's processes: evaporation, transpiration and 1 pt

_____.

8. Diagrams often say every water cycle process is powered by the sun or by gravity. Which two processes are actually driven by water **losing** energy, and what causes that loss? 2 pts

9. About 1.69 percent of Earth's water is groundwater, and about 45 percent of that groundwater is fresh. What percent of all Earth's water is fresh groundwater? Show the multiplication and round to the nearest hundredth of a percent. 2 pts

10. Draw a large raindrop as it falls through the air. Show its real shape (not a teardrop), draw and label the two forces acting on it, and write one sentence on what happens if the drop grows very large. 2 pts

11. A fog-catching net produces water on foggy mornings because

1 pt

- ☐ A. the net warms the fog until it evaporates
- ☐ B. tiny fog droplets stick to the mesh and merge until gravity can pull them down
- ☐ C. the net freezes the fog into ice that later melts
- ☐ D. the net pulls water vapor out of the air by suction

12. True or false: the water cycle begins at the ocean and every water molecule follows the same route.

1 pt

☐ True ☐ False Explain your thinking:

Part B: Synthesis

Early in January a storm leaves a city in the northeastern United States under 1.2 meters of snow, and no one hauls it away. By late May the pavement is dry and no snow is left anywhere, yet the river through the city is running high and brown.

13. Explain where the snow went and what made it move. Your explanation must (a) name the energy source and the force involved and say what each one did, (b) name every change of state that happened, (c) describe at least two different destinations for the water, and (d) explain why the river is high even though the snow is gone. Use at least five of these terms: *melting, evaporation, sublimation, runoff, infiltration, groundwater, water vapor, condensation*.

8 pts

Checklist for the synthesis

Before you write q13, make four quick notes in the margin: (1) Energy source and force: the sun supplies energy; gravity pulls. (2) Changes of state: snow to liquid (melting), liquid to gas (evaporation), and snow straight to gas (sublimation). (3) Destinations: the air, the river, the ground, the sea. (4) The river: melt runs off; groundwater keeps feeding it. Then turn the notes into sentences.

Reverse the season

Write a second synthesis paragraph for the same city from October to January, explaining how the water that left in spring could come back as the January snow. Include where the vapor came from, what had to happen to it to form a cloud, why it fell as snow instead of rain, and why the cycle has no true beginning. Use at least four lesson terms you did not use in q13.