Groundwater and Surface Water Answer Key

1. Describe the outcome of Experiment 1: Stream A. How did the groundwater move?
   In Stream A, the groundwater moved into the stream and out of the surrounding ground.

2. Describe the outcome of Experiment 2: Stream B. How did the groundwater move?
   In Stream B, the groundwater moved out of the stream and into the surrounding ground.

3. What accounts for the difference between Stream A and Stream B?
   The water slopes differently between the different streams. In Stream A, there is more water in the surrounding ground than in the stream, and in Stream B, there is more water in the stream than there is in the surrounding ground.

4. How could putting wells near a stream affect the flow of water in the stream?
   If the stream is a gaining stream, putting wells near the stream will prevent the flow of water into the stream. Instead, the water will go to the wells. If the stream is a losing stream, putting wells near the stream will prevent the water from getting out as far away from the stream as it would otherwise flow because the water would instead be going to the wells.

5. What likely happened to the level of the water table between spring and summer?
   The water table fell between spring and summer.

6. Explain your answer.
   The area dried up, so it is likely that the water table fell. As the water table falls, the amount of water at the surface decreases. This would lead to the surface being drier when the water table is low and wetter when the water table is high.

7. How certain are you about your claim based on your explanation?
   Answers will vary.

8. Explain what influenced your certainty rating.
   Answers will vary. Scientific evidence includes: the area got drier from spring to summer and the water table is the top surface of the unconfined aquifer. Students may also state that the temperature is higher in the summer than in the spring, leading to increased evaporation of the surface.

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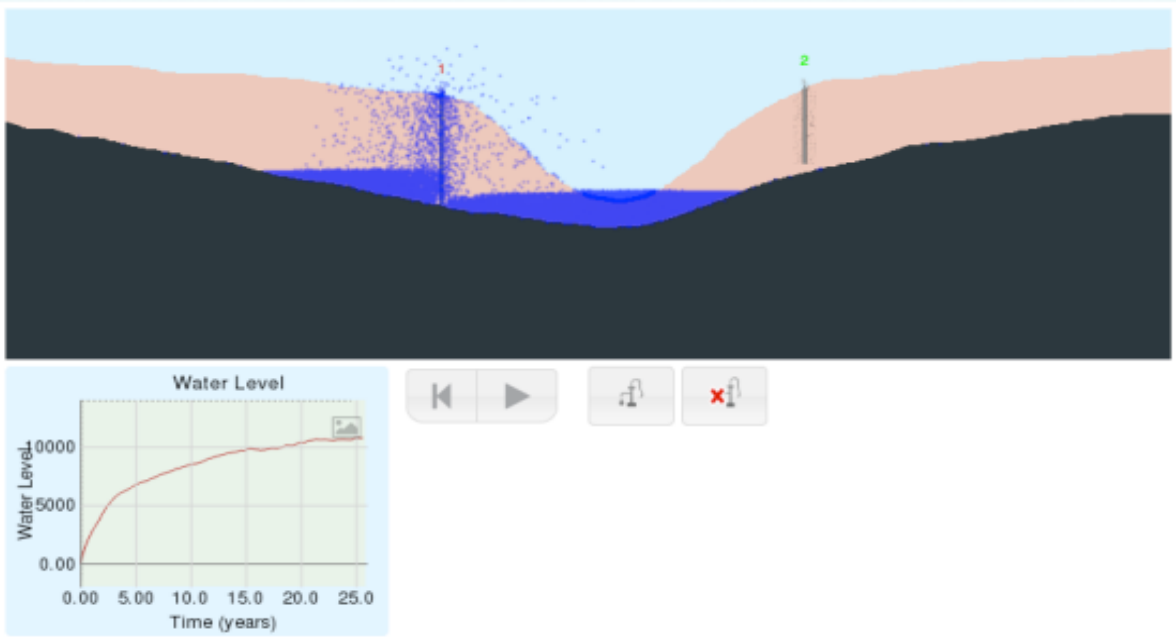
Groundwater and Surface Water Answer Key, continued

9. Draw arrows to show the flow of groundwater in each image. Explain why the water flows that way.
   In the winter, the ground is frozen, so the water table doesn't flow along the surface. The water still flows deep underground where it is not frozen. In the spring, the water flows up towards the surface as the ground thaws and precipitation increases the amount of water in the ground. In the summer, the water table has fallen, so the water flows down (away from the surface) to reach the top of the water table, which is no longer from the surface.

10. Insert a snapshot showing the results of Experiment 1: wells near the stream.



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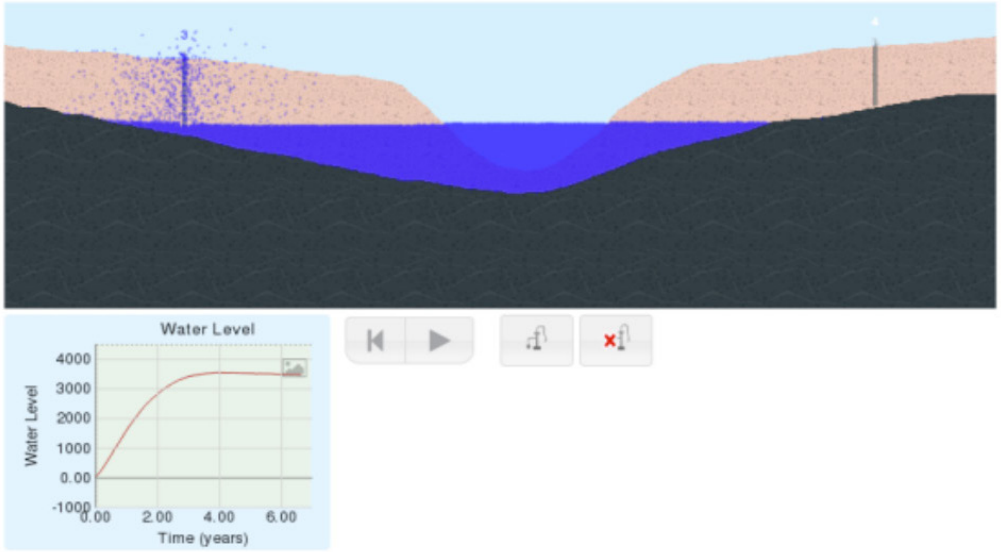
Groundwater and Surface Water Answer Key, continued

11. Insert a snapshot showing the results of Experiment 2: wells far from the stream.



12. Where should pumps be placed around a gaining stream (stream in an area with a high water table) to ensure a good flow of water from the wells maintain flow in the stream?
far from the stream

13. Explain your answer.
The experiment shows that the water level in the stream was maintained better when the wells were far from the stream. If the wells are placed correctly, the wells can also maintain a good flow of water over time.

14. How certain are you about your claim based on your explanation?
Answers will vary.

15. Explain what influenced your certainty rating.
Answers will vary. Students should refer to the evidence from their experiments.

16. Identify elements of this system that contributed to the drying up of the Santa Cruz River.
Elements that contributed to the Santa Cruz River's drying up are: low amounts of rainfall (because it flows through a desert), new pump technology to reach deeper water supplies, and an increased population in the area demanding more water.

17. What factors led to the increase in population? Is the population growth in Pima County sustainable?
The population increased because there were many jobs in the area. The area was hospitable to life because people were able to find a water supply to develop the area. Population growth at such a high rate is not sustainable, but it looks as if the population may be leveling off. People will learn how to live with the supplies available in the area, or they will be forced to import supplies to be able to support their lifestyles. Or they will move out of the area, leading to a decrease in the population.

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