Name _____ Date _____ Period _____

Direction – complete the following activities to learn how water cycles inside the Earth.

ACTIVITY 1 – POROSITY AND PERMEABILITY

Porosity and permeability are difficult to understand. Complete the following activity to learn the difference between the 2 processes that are part of the water cycle.

Definitions

Porosity – the open space between rocks
Permeability – measure of the rate at which water can move through rock

Materials - Water, dropper, cup of marbles (labeled A), cup of bb's (labeled B), graduated cylinder, stop watch, small cup with a hole in the bottom (labeled C), stop watch

Procedures -

1. Observe the marble cup and bb cup.
    a. Which one seems to have more open space? Explain your answer.

2. Slowly fill the graduated cylinder with 20mL of water
3. Slowly pour the water from the graduated cylinder into the cup of marbles until the water barely covers all of the marbles. Use the dropper to remove any extra water and put the water back into the graduated cylinder.
4. Record how much water you used from the graduated cylinder in the data table below. This is a measure of the **pore volume** of space between rock and soil particles.
5. Repeat steps 2 – 4 for the small cup of bb's

Material	Water Volume (mL)
Marble	
BB's	

ANALYSIS QUESTIONS

6. Which material was able to hold more water?

7. Which material had the largest particle size?

8. Explain why, in your own words, the cup with marbles and the cup with bb's did not hold the same amount of water.

9. Is this showing porosity or permeability? Explain why

Procedures -

1. Transfer the cup with marbles and water into cup labeled C, be careful, as cup C has a hole in the bottom you will need to place your finger over the hole to prevent the water from falling out.
2. Finish filling cup C with water.
3. Hold cup "C" over cup "A" (yes, the one you just emptied)
4. Move your finger away from the hole and let the water drain for 10 seconds.
5. After 10 seconds, quickly place your finger back over the hole in cup C.
6. Measure how much water transferred to cup A by pouring the water that was drained into an empty graduated cylinder.
7. Record how much water moved through the marbles in 10 seconds in the data table below.
8. Repeat steps 1-7 for cub B (it has the bb's).

Material	How much drained in 10 seconds (mL)
Marbles	
BB's	

ANALYSIS QUESTIONS

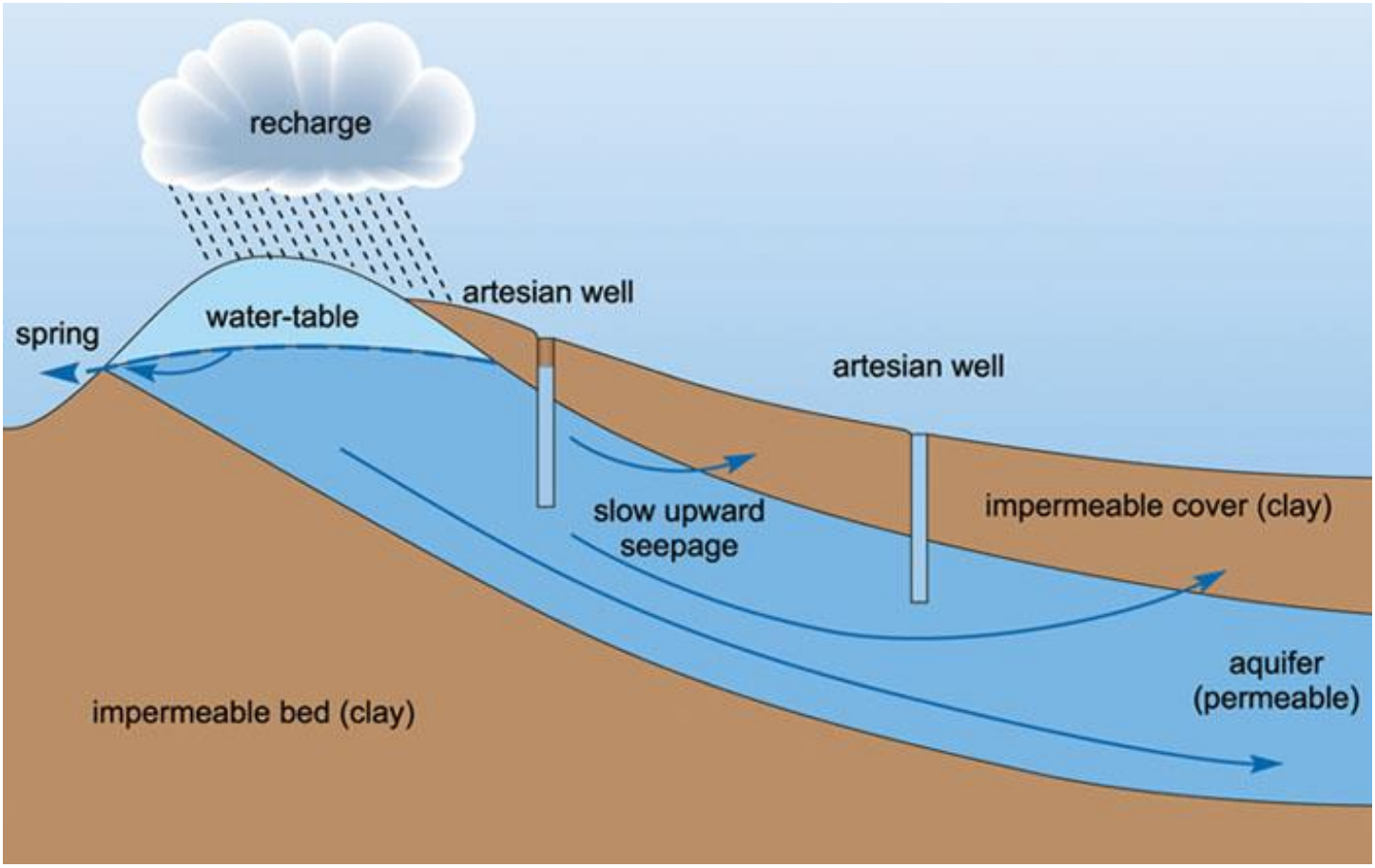
9. Which material drained the most water in 10 seconds?

10. Does the particle size influence how slow or fast water drained from the cup?

11. Is this showing porosity or permeability? Explain why

ACTIVITY 2 – WHAT IS RECHARGE?

Directions – Use the image of water in an aquifer to answer the following analysis questions.



ANALYSIS QUESTIONS

1. Where is the water in an aquifer located?

2. What is the difference between a spring and artesian spring?

3. How in an aquifer recharged?

4. What do you think the difference is between “impermeable” and “permeable” based on this image?