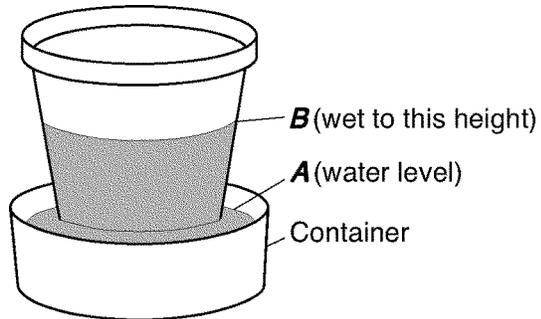


Name: \_\_\_\_\_

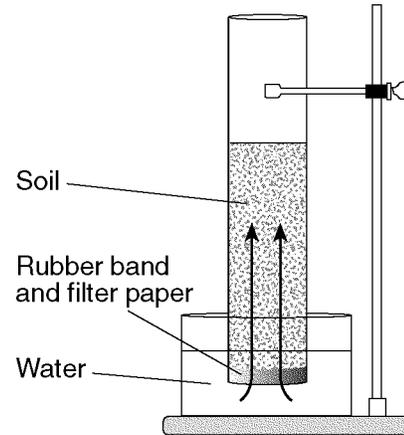
- 1) The diagram below shows the result of leaving an empty, dry clay flowerpot in a full container of water for a period of time. The water level in the container dropped to level *A*. The top of the wet area moved to level *B*.



Level *B* is higher than level *A* because water

- A) is more dense than the clay pot  
 B) traveled downward in the clay pot by capillary action  
 C) is less dense than the clay pot  
 D) traveled upward in the clay pot by capillary action

- 2) The diagram below shows a laboratory setup. The rubber band holds filter paper across the base of the open tube to hold the soil sample. The tube was placed in the water as shown. The upward movement of water is represented by arrows. The height of the water that moved upward within the soil was measured. Students repeated this procedure using soils with different particle sizes. Results of the experiment are shown in the data table.

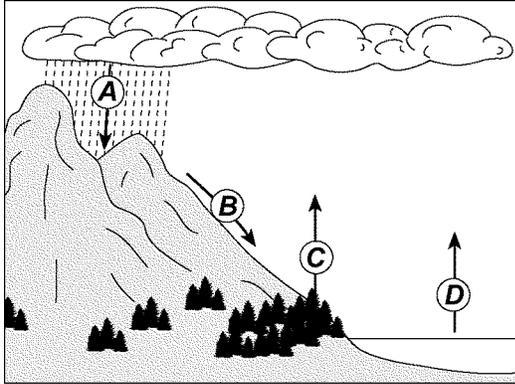


| Average Soil Particle Diameter (cm) | Height of Water in Column (cm) |
|-------------------------------------|--------------------------------|
| 0.006                               | 30.0                           |
| 0.2                                 | 8.0                            |
| 1.0                                 | 0.5                            |

Results of this experiment lead to the conclusion that

- A) permeability is greater in soils with larger particles  
 B) permeability is greater in soils with smaller particles  
 C) capillarity is greater in soils with smaller particles  
 D) capillarity is greater in soils with larger particles

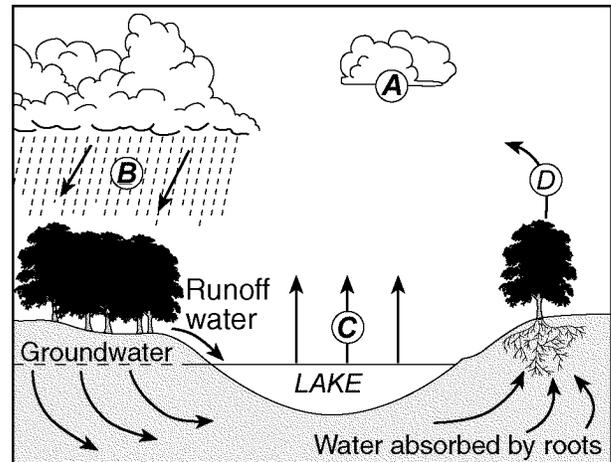
- 3) The arrows in the diagram below represent the movement of water in the water cycle.



Which arrow represents the process of transpiration?

- A) A      B) B      C) C      D) D

- 4) The letters A through D in the cross section below represent four of the processes that are part of the water cycle.



Which table correctly matches each letter with the process that it represents?

A) 

| Letter | Process       |
|--------|---------------|
| A      | evaporation   |
| B      | condensation  |
| C      | precipitation |
| D      | transpiration |

B) 

| Letter | Process       |
|--------|---------------|
| A      | condensation  |
| B      | precipitation |
| C      | evaporation   |
| D      | transpiration |

C) 

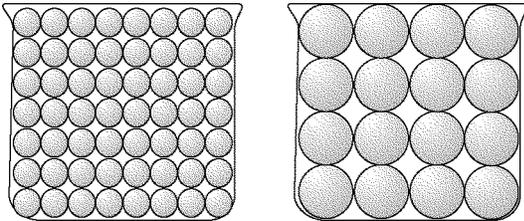
| Letter | Process       |
|--------|---------------|
| A      | condensation  |
| B      | precipitation |
| C      | transpiration |
| D      | evaporation   |

D) 

| Letter | Process       |
|--------|---------------|
| A      | transpiration |
| B      | precipitation |
| C      | evaporation   |
| D      | condensation  |

- 5) By what process do plants add water vapor to the atmosphere?  
 A) condensation                      C) transpiration  
 B) absorption                         D) precipitation
- 6) Which process in the water cycle is directly responsible for cloud formation?  
 A) infiltration                         C) precipitation  
 B) condensation                       D) evaporation

- 7) The water table usually rises when there is
- an increase in the amount of precipitation
  - an increase in the slope of the land
  - a decrease in the amount of infiltration
  - a decrease in the amount of surface area covered by vegetation
- 8) For infiltration to occur, the ground must be
- impermeable and not saturated
  - permeable and not saturated
  - impermeable and saturated
  - permeable and saturated
- 9) Which set of surface soil conditions on a hillside would result in the *most* infiltration of rainfall?
- steep slope, saturated soil, vegetation
  - gentle slope, unsaturated soil, vegetation
  - gentle slope, saturated soil, no vegetation
  - steep slope, unsaturated soil, no vegetation
- 10) Compared to an area of Earth's surface with gentle slopes, an area with steeper slopes most likely has
- less infiltration and less runoff
  - more infiltration and less runoff
  - more infiltration and more runoff
  - less infiltration and more runoff
- 11) The diagram below shows two identical containers filled with uniform particles that were sorted by size.

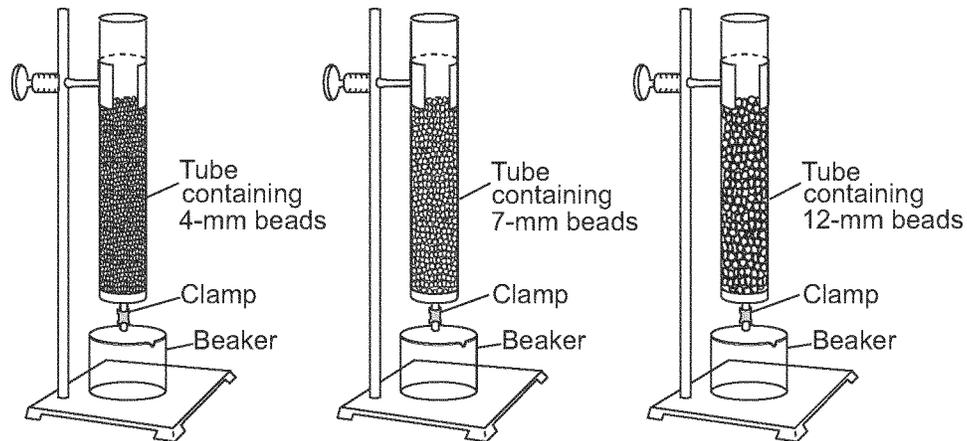


What characteristic is most likely the same for these particle-filled containers?

- water retention
- capillarity
- porosity
- infiltration rate

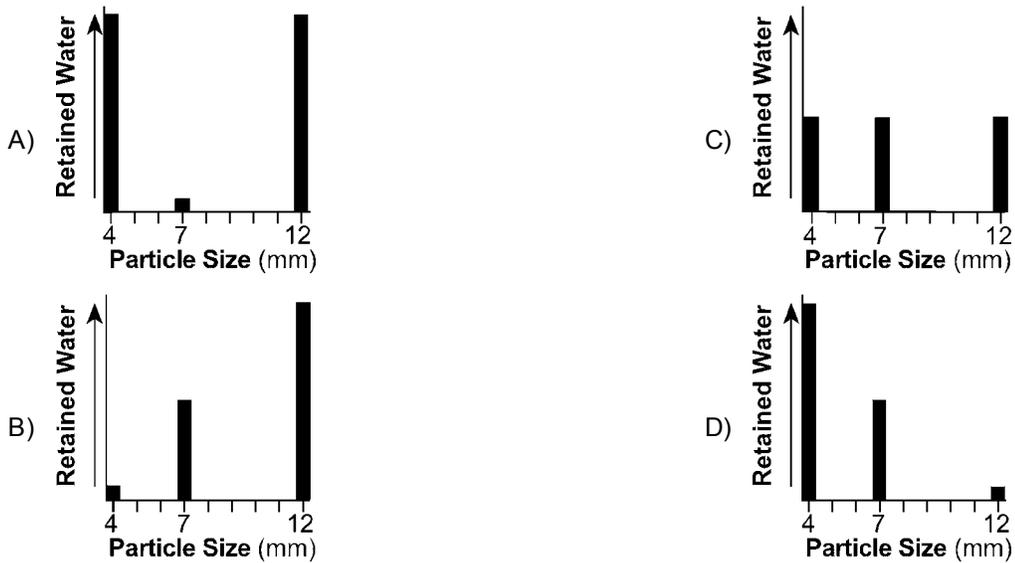
- 12) Which of the following soil conditions normally result in the *greatest* amount of runoff?
- low permeability and steep slope
  - high permeability and gentle slope
  - low permeability and gentle slope
  - high permeability and steep slope
- 13) During a heavy rainstorm, runoff is most likely to occur if the surface soil is
- unsaturated and has a gentle slope
  - covered by trees, shrubs, and grasses
  - firmly packed clay-sized particles
  - loosely packed sand-sized particles
- 14) Which of the following surface soil types has the *slowest* permeability rate and is most likely to produce flooding?
- pebbles
  - silt
  - sand
  - clay
- 15) Which sediment size would allow water to flow through at the *fastest* rate?
- silt
  - sand
  - clay
  - pebbles
- 16) A soil sample with a large amount of space between the particles will have a
- high capillarity
  - high porosity
  - low infiltration rate
  - low permeability rate

- 17) The diagram below shows three identical plastic tubes filled to the same level with spherical beads of different diameters. Each tube was filled with water to the top of the beads. The clamps were then opened to allow water to drain into the beakers.

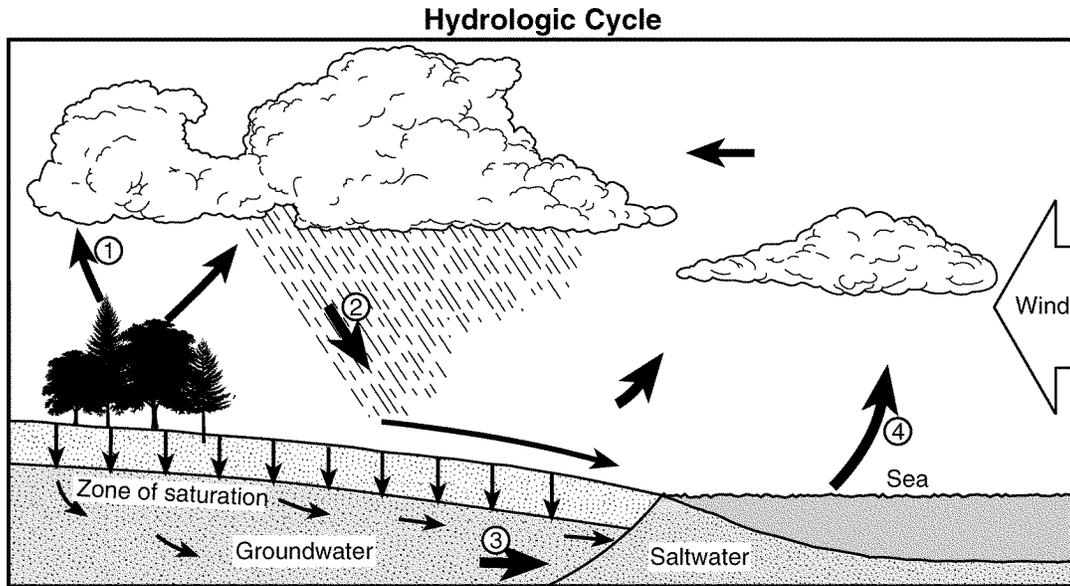


(not drawn to scale)

Which graph *best* represents the relative amount of water retained by the beads in each tube?



- 18) In the water cycle diagram below, the arrows numbered 1 through 4 represent various processes.

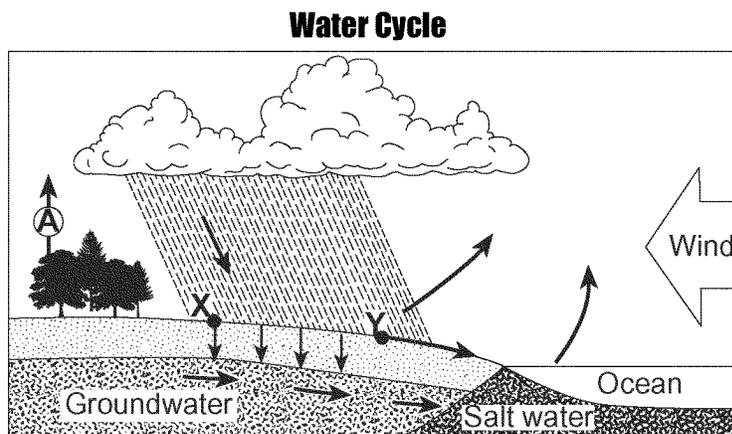


Which numbered arrow in the diagram *best* represents the process of transpiration?

- A) 1                                      B) 2                                      C) 3                                      D) 4

Questions 19 through 21 refer to the following:

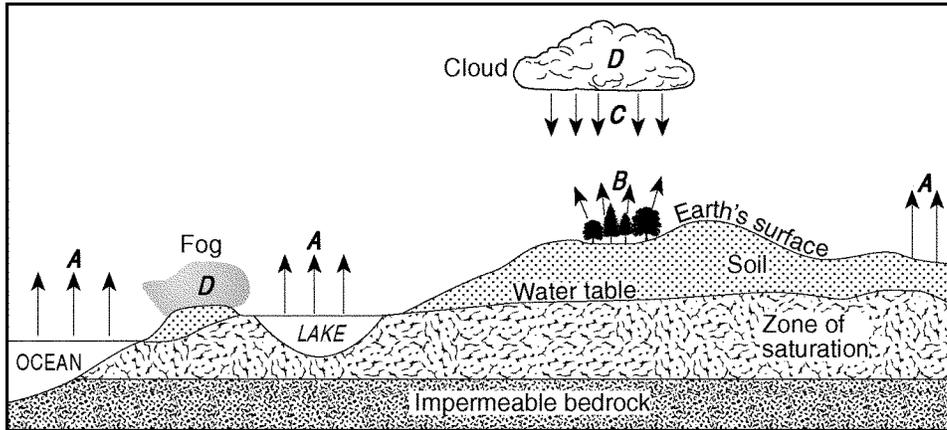
In the diagram of the water cycle below, letter A represents a process in the water cycle. Points X and Y represent locations on Earth's surface.



- 19) The amount of runoff at letter Y in the given diagram will increase as the
- A) precipitation rate exceeds the infiltration rate  
 B) porosity of the soil increases  
 C) slope of the land decreases  
 D) evaporation rate exceeds the infiltration rate
- 20) Rainwater will enter the ground at letter X in the given diagram if the ground is
- A) unsaturated and impermeable  
 B) unsaturated and permeable  
 C) saturated and permeable  
 D) saturated and impermeable
- 21) The process represented by letter A in the given diagram is
- A) precipitation                                      C) transpiration  
 B) condensation                                      D) saturation

Questions 22 and 23 refer to the following:

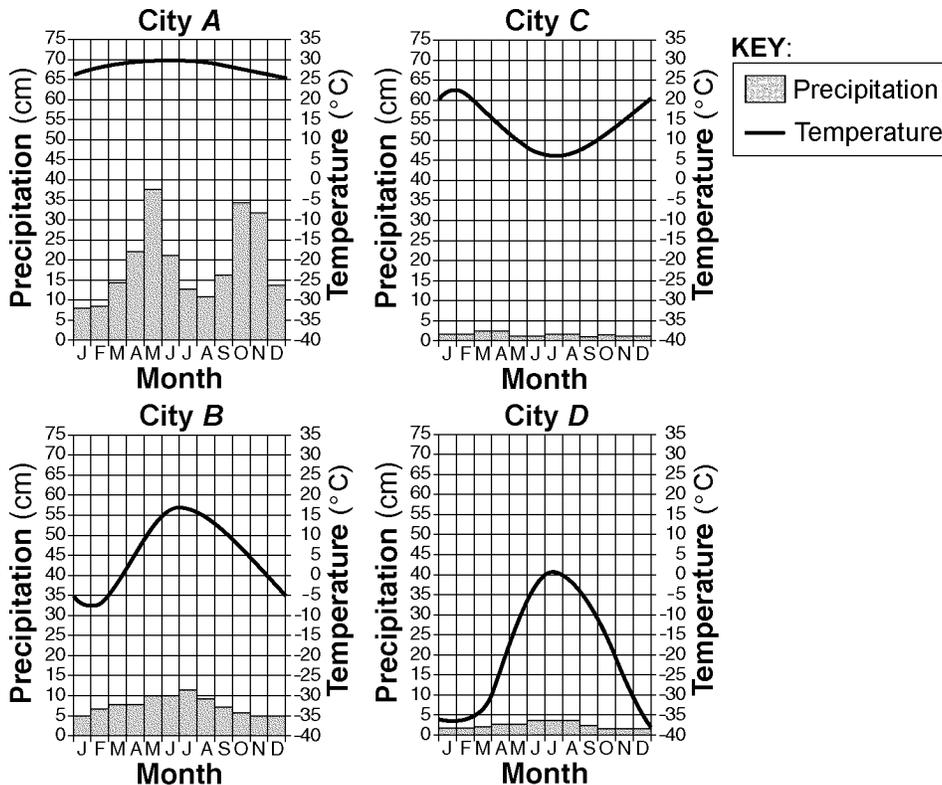
The cross section below represents part of Earth's water cycle. Letters A, B, C, and D represent processes that occur during the cycle. The level of the water table and the extent of the zone of saturation are shown.



- 22) Which two letters in the diagram shown represent processes in the water cycle that usually cause a lowering of the water table?
- A) A and C  
 B) B and D  
 C) C and D  
 D) A and B

- 23) What are two water cycle processes *not* represented by arrows in the cross section shown?
- A) evaporation and melting  
 B) transpiration and condensation  
 C) runoff and infiltration  
 D) precipitation and freezing

24) The climate graphs below show average monthly precipitation and temperatures at four cities, A, B, C, and D.

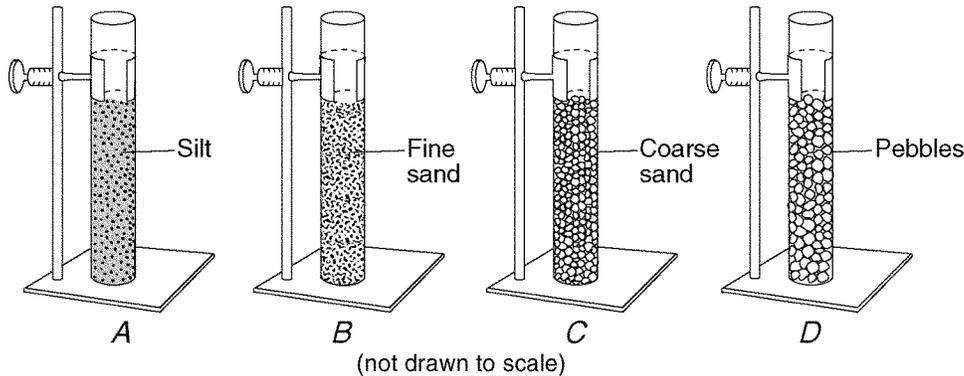


Based on the climate graphs shown, very little water will infiltrate the soil around city D because the region usually has

- A) a frozen surface  
 B) a small amount of runoff  
 C) nearly flat surfaces  
 D) permeable soil

Questions 25 through 27 refer to the following:

The diagram below shows four tubes containing 500 milliliters of sediment labeled *A*, *B*, *C*, and *D*. Each tube contains well-sorted, loosely packed particles of uniform shape and size and is open at the top. The classification of the sediment in each tube is labeled.



- 25) Water was poured into each of the given tubes of sediment and the time it took for the water to infiltrate to the bottom was recorded, in seconds. Which data table *best* represents the recorded results?

| Tubes    | Infiltration Time (s) |
|----------|-----------------------|
| <i>A</i> | 3.2                   |
| <i>B</i> | 3.3                   |
| <i>C</i> | 3.2                   |
| <i>D</i> | 3.3                   |

A)

| Tubes    | Infiltration Time (s) |
|----------|-----------------------|
| <i>A</i> | 2.4                   |
| <i>B</i> | 2.9                   |
| <i>C</i> | 3.6                   |
| <i>D</i> | 3.8                   |

B)

| Tubes    | Infiltration Time (s) |
|----------|-----------------------|
| <i>A</i> | 3.0                   |
| <i>B</i> | 5.8                   |
| <i>C</i> | 6.1                   |
| <i>D</i> | 2.8                   |

C)

| Tubes    | Infiltration Time (s) |
|----------|-----------------------|
| <i>A</i> | 5.2                   |
| <i>B</i> | 3.4                   |
| <i>C</i> | 2.8                   |
| <i>D</i> | 2.3                   |

D)

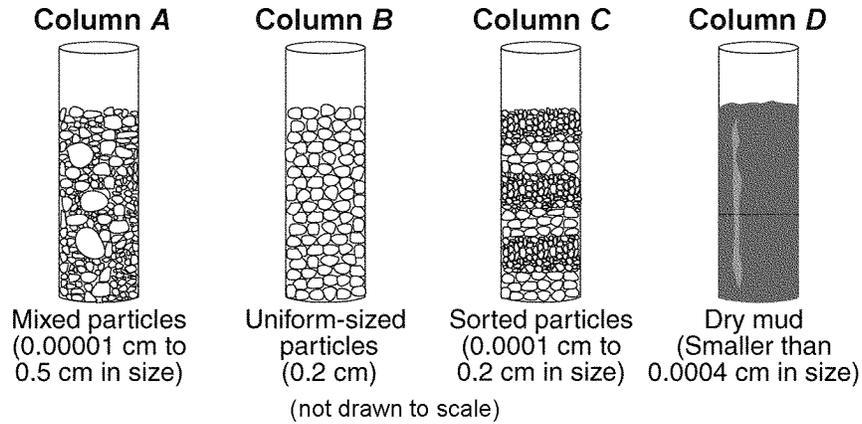
- 26) Water will be able to infiltrate each of the given sediment samples if the sediment is

- A) unsaturated and impermeable  
 B) saturated and permeable  
 C) unsaturated and permeable  
 D) saturated and impermeable

- 27) Each of the given tubes is filled with water to the top of the sediments and the tube is covered with a fine screen. The tubes are then tipped upside down so the water can drain. In which tube would the sediment retain the *most* water?

- A) *A*      B) *B*      C) *C*      D) *D*

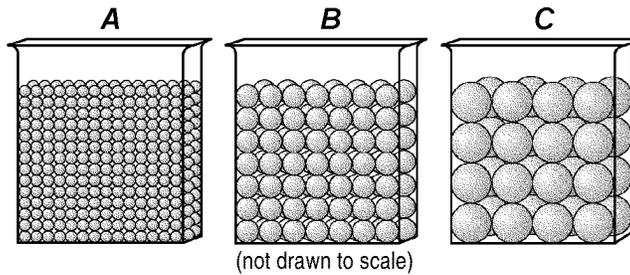
28) The columns *A*, *B*, *C*, and *D* shown below contain equal volumes of sediment.



When an equal volume of water is added to each column, the *greatest* rate of infiltration will occur in which column?

- A) *A*                                      B) *B*                                      C) *C*                                      D) *D*

29) The diagrams below represent three containers, *A*, *B*, and *C*, which were filled with equal volumes of uniformly sorted plastic beads. Water was poured into each container to determine porosity and infiltration time.



Which data table *best* represents the porosity and infiltration time of the beads in the three containers?

A)

| Beaker   | Porosity (%) | Infiltration Time (sec) |
|----------|--------------|-------------------------|
| <i>A</i> | 40           | 0.4                     |
| <i>B</i> | 40           | 2.8                     |
| <i>C</i> | 40           | 5.2                     |

C)

| Beaker   | Porosity (%) | Infiltration Time (sec) |
|----------|--------------|-------------------------|
| <i>A</i> | 20           | 0.4                     |
| <i>B</i> | 30           | 2.8                     |
| <i>C</i> | 40           | 5.2                     |

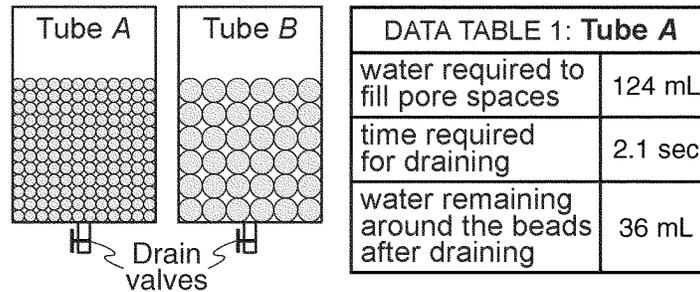
B)

| Beaker   | Porosity (%) | Infiltration Time (sec) |
|----------|--------------|-------------------------|
| <i>A</i> | 40           | 5.2                     |
| <i>B</i> | 40           | 2.8                     |
| <i>C</i> | 40           | 0.4                     |

D)

| Beaker   | Porosity (%) | Infiltration Time (sec) |
|----------|--------------|-------------------------|
| <i>A</i> | 20           | 5.2                     |
| <i>B</i> | 30           | 2.8                     |
| <i>C</i> | 40           | 0.4                     |

- 30) The diagram below shows tubes *A* and *B* partly filled with equal volumes of round plastic beads of uniform size. The beads in tube *A* are smaller than the beads in tube *B*. Water was placed in tube *A* until the pore spaces were filled. The drain valve was then opened, and the amount of time for the water to drain from the tube was recorded. The amount of water that remained around the beads was then calculated and recorded. Data table 1 shows the measurements recorded using tube *A*.



If the same procedure was followed with tube *B*, which data table shows the measurements most likely recorded?

A)

|   |         |
|---|---------|
| water required to fill pore spaces              | 124 mL  |
| time required for draining                      | 1.4 sec |
| water remaining around the beads after draining | 26 mL   |

C)

|   |         |
|---|---------|
| water required to fill pore spaces              | 168 mL  |
| time required for draining                      | 1.4 sec |
| water remaining around the beads after draining | 36 mL   |

B)

|   |         |
|---|---------|
| water required to fill pore spaces              | 124 mL  |
| time required for draining                      | 3.2 sec |
| water remaining around the beads after draining | 36 mL   |

D)

|   |         |
|---|---------|
| water required to fill pore spaces              | 168 mL  |
| time required for draining                      | 3.2 sec |
| water remaining around the beads after draining | 46 mL   |