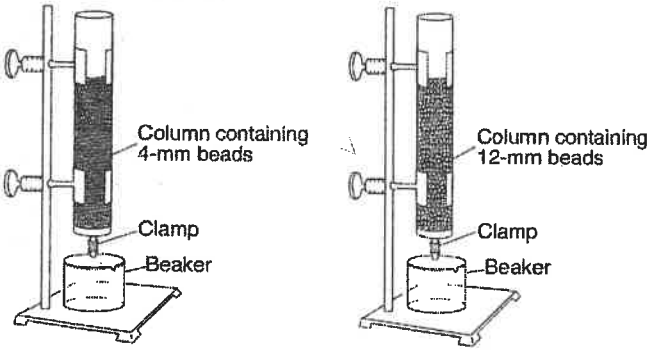
Name: _____ Surface Processes # 2 Practice Date: _____

1 The diagram below shows an experimental setup to compare water retention and permeability in two columns with equal volumes of spherical plastic beads of different diameters.

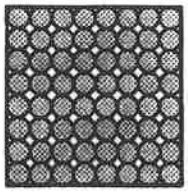
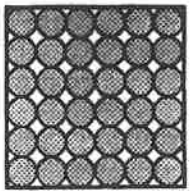


Which statement best describes the water retention and permeability in the two columns of beads?

A) The column with 4-mm beads has greater water retention and permeability.
B) The column with 12-mm beads has greater water retention and permeability.
C) The column with 4-mm beads has greater water retention and the column with 12-mm beads has greater permeability.
D) The column with 12-mm beads has greater water retention and the column with 4-mm beads has greater permeability.

2 Which diagram represents the soil with the greatest permeability?

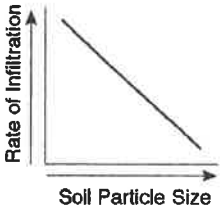
KEY
SOIL PARTICLES
PORE SPACE (AIR)

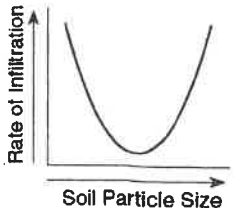
A) 
B) 
C) 
D) 

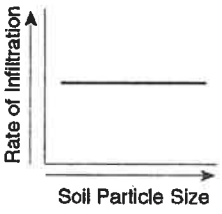
3 A soil sample with a large amount of space between the particles will have a

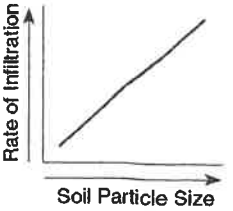
A) low permeability rate
B) low infiltration rate
C) high porosity
D) high capillarity

4 Which graph best represents the relationship between soil particle size and the rate at which water infiltrates permeable soil?

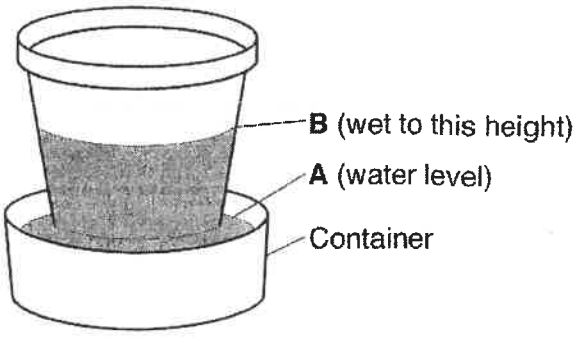
A) 

B) 

C) 

D) 

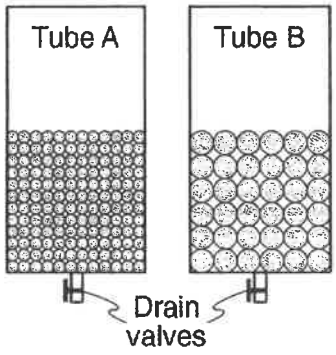
5 The diagram below shows the result of leaving an empty, dry clay flowerpot in a full container of water for a period of time. The water level in the container dropped to level A. The top of the wet area moved to level B.



Level B is higher than level A because water

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

6 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.



Data Table 1: Tube A	
water required to fill pore spaces	124 mL
time required for draining	2.1 sec
water that remained around the beads after draining	36 mL

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

A)

Data Table 2: Tube B	
water required to fill pore spaces	124 mL
time required for draining	1.4 sec
water that remained around the beads after draining	26 mL

B)

Data Table 2: Tube B	
water required to fill pore spaces	168 mL
time required for draining	3.2 sec
water that remained around the beads after draining	46 mL

C)

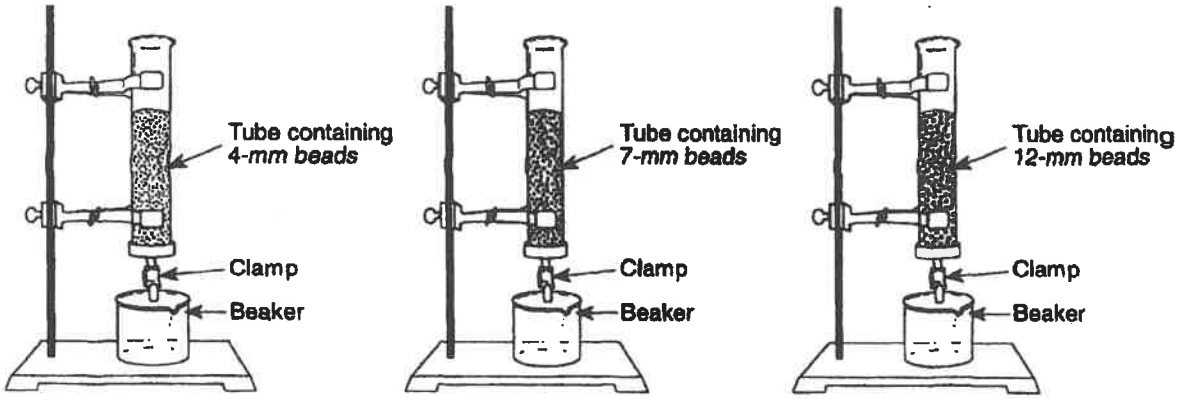
Data Table 2: Tube B	
water required to fill pore spaces	124 mL
time required for draining	3.2 sec
water that remained around the beads after draining	36 mL

D)

Data Table 2: Tube B	
water required to fill pore spaces	168 mL
time required for draining	1.4 sec
water that remained around the beads after draining	36 mL

Surface Processes # 2 Practice

Base your answers to questions 7 through 9 on the diagram, data and information below. The diagram below represents part of the laboratory setup for an activity to investigate the effects of particle size on permeability, porosity, and water retention. Three separate tubes were used, each containing 300 milliliters of beads of uniform size. Bead sizes were 4 millimeters, 7 millimeters, and 12 millimeters in diameter, respectively.



The amount of water added to each tube to cover the beads was determined. The clamp was then removed, the flow of the water was timed, and its volume was measured. Data are shown in the table below. (The amount of water retained on the 7-millimeter beads has been omitted.)

	Particle Size		
	4 mm	7 mm	12 mm
Infiltration Time (seconds)	3.7	3.0	2.4
Amount of Water Needed To Cover All Beads (mL)	147	145	147
Water Recovered from Tube After Clamp Was Removed (mL)	111	123	135
Water Retained on Beads (mL)	36		12

7 The data table shows that all three tubes of beads had approximately the same

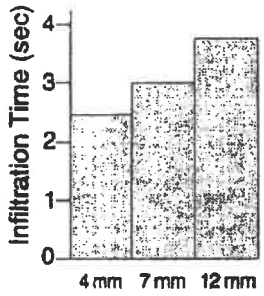
A) porosity
B) water retention
C) permeability time
D) capillarity

8 Water can infiltrate loose soil when the soil is

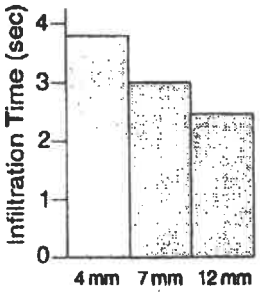
A) saturated and permeable
B) saturated and permeable
C) unsaturated and permeable
D) unsaturated and impermeable

9 Which graph best represents the infiltration times for these three particle sizes?

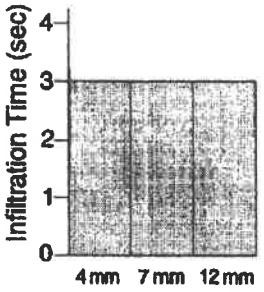
A)



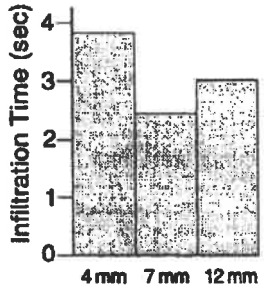
B)



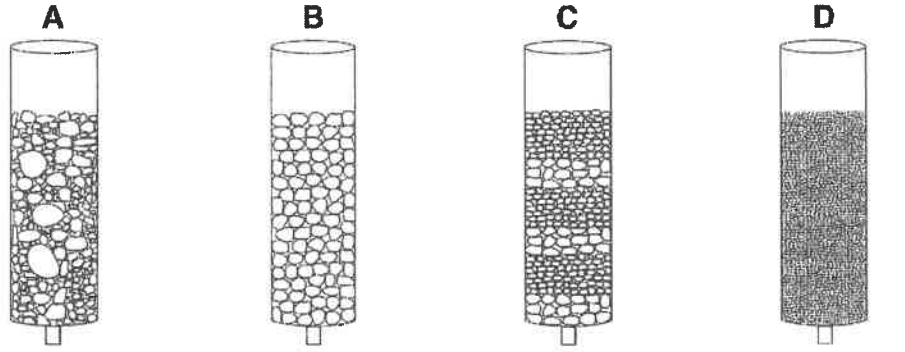
C)



D)



10 The diagram below shows columns A, B, C, and D that contain different sediments.



(Not drawn to scale)

Equal volumes of water were poured through each column. Which column of sediment retained the most water?

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

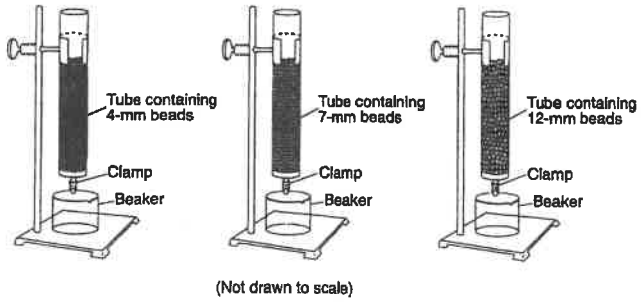
11 Which is most important in determining the amount of ground water that can be stored within a rock?

A) the rock's geologic age
B) the rock's hardness
C) the rock's porosity
D) the rock's color

12 Rainfall is most likely to infiltrate into soil that is

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

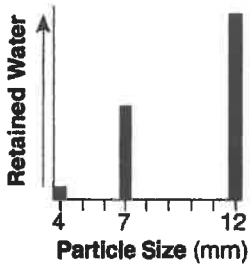
13 The diagram below shows three identical plastic tubes filled to the same level with spherical beads of different diameters. Each tube was filled with water to the top of the beads. The clamps were then opened to allow water to drain into the beakers.



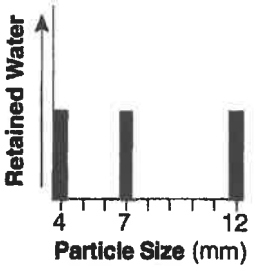
(Not drawn to scale)

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

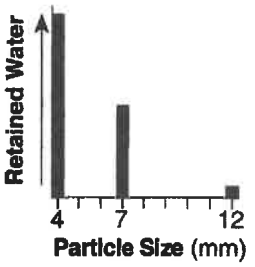
A)



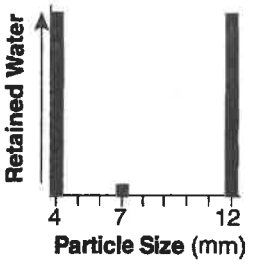
B)



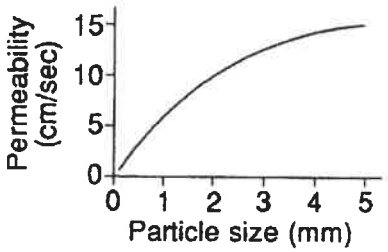
C)



D)



14 The graph below represents soil permeability.



As particle size increases, permeability

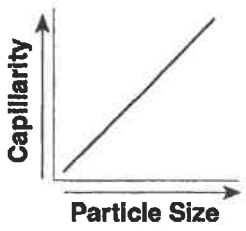
A) decreases B) increases
C) remains the same

15 The upward movement of water through tiny spaces in soil or rock is called

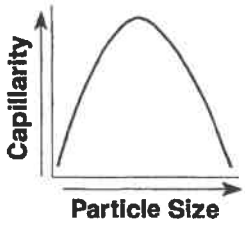
A) water retention B) capillary action
C) porosity D) permeability

16 Which graph shows the general relationship between soil particle size and the capillarity of the soil?

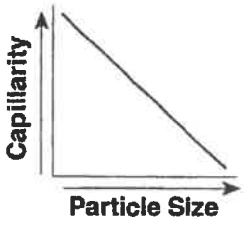
A)



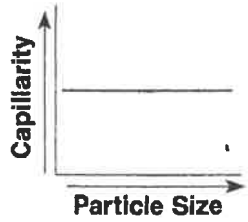
B)



C)

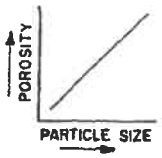


D)

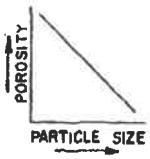


17 Which graph best represents the relationship between porosity and particle size for soil samples of uniform size, shape, and packing?

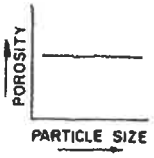
A)



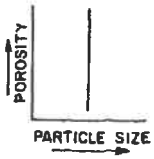
B)



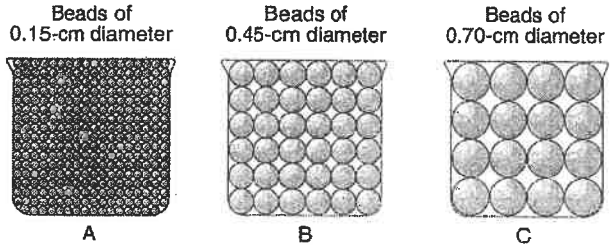
C)



D)

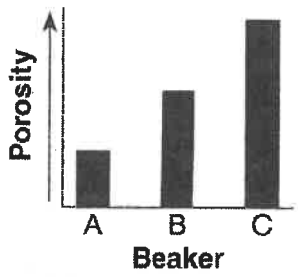


18 The diagram below represents three identical beakers filled to the same level with spherical beads.

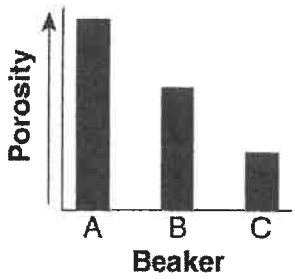


If the packing of the beads within each beaker is the same, which graph best represents the porosity within each beaker?

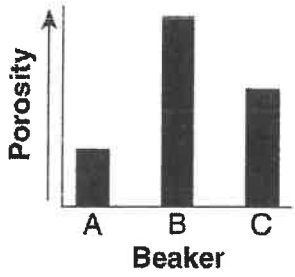
A)



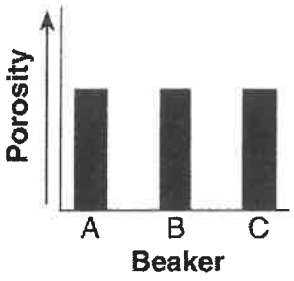
B)



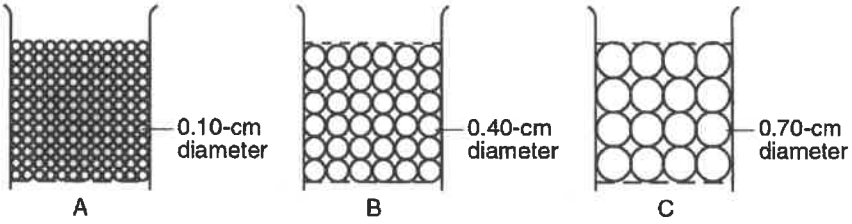
C)



D)



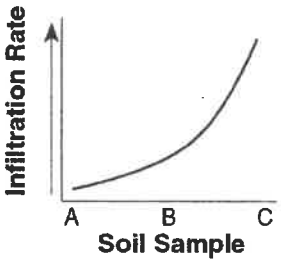
19 The diagrams below show the relative sizes of particles from soil samples A, B, and C. Equal volumes of each soil sample were placed in separate containers. Each container has a screen at the bottom. Water was poured through each sample to determine the infiltration rate.



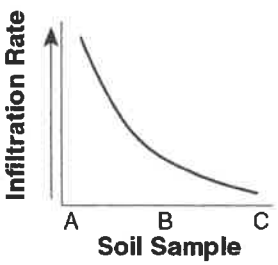
(Not drawn to scale)

Which graph best shows how the infiltration rates of the three soil samples would compare?

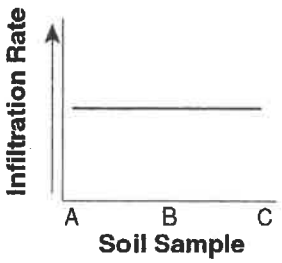
A)



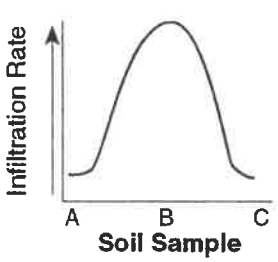
B)



C)



D)



20 Base your answer to the following question on the passage below.

Frozen Mammoth

A wooly mammoth was found in 1999 buried in the frozen soil of the Siberian tundra. Carbon-14 dating indicated that it had died about 20,000 years ago. Many fossils represent only the partial remains of organisms. However, a complete mammoth with bones, skin, hair, and internal organs intact represented a unique opportunity for scientists to investigate the lifestyle of this animal and the environment in which it lived.

The low permeability of the tundra soil helped to preserve the mammoth. Explain why the tundra soil has a low permeability.