Move mouse over "?" for answers or over 'key' for hints and/or explanations.

In order to make observations, an observer must always use
(1) proportions
(2) the senses
(3) mathematical calculations
(4) experiments

Using a ruler to measure the length of a stick is an example of
(1) extending the sense of sight by using an instrument
(2) measuring the rate of change of the stick by making inferences
(3) predicting the length of the stick by guessing
(4) calculating the percent of error by using a proportion

Which statement about a rock sample is an inference?
(1) A balance indicates the rock's mass is 254 grams.
(2) The rock scratches a glass plate.
(3) The rock was formed 100 million years ago.
(4) The rock has no visible crystals and is red.

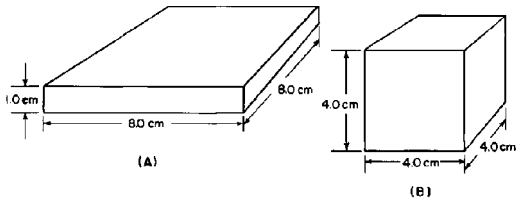
A prediction of next winter's weather is an example of
(1) an inference (3) a classification
(2) an observation (4) a measurement

The grouping of objects or events based on similar characteristics is called
(1) observation (3) interpretation
(2) classification (4) measurement

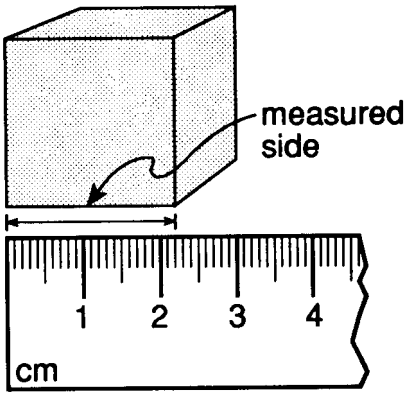
A student classifies several objects. The classification system should be based on
(1) interpretations (3) observations
(2) hypotheses (4) inferences

The primary purpose of a classification system is to enable people to
(1) eliminate inaccurate inferences
(2) organize observations in a meaningful way
(3) extend their powers of observation
(4) make measurements that are very accurate

Base your answer to the following question on the diagrams below. Objects *A* and *B* are solid and made of the same uniform material.

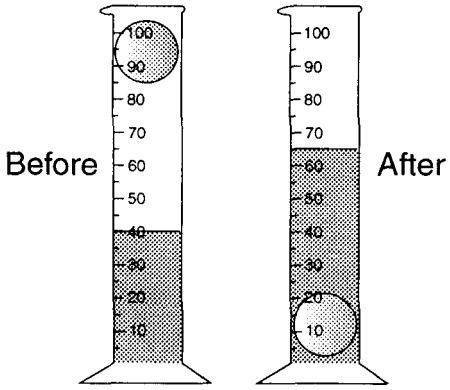


A student measures the mass of object *B* to be 156 grams, but the actual mass is 173 grams. The student's percent deviation (percentage of error) is approximately
(1) 1% (3) 10%
(2) 5% (4) 20%



If each side of the cube shown above has the same length as the measured side, what is the approximate volume of the cube?
(1) 4.84 cm^3 (3) 10.65 cm^3
(2) 2.20 cm^3 (4) 6.60 cm^3

The sphere was dropped into water in a graduated cylinder as shown below.



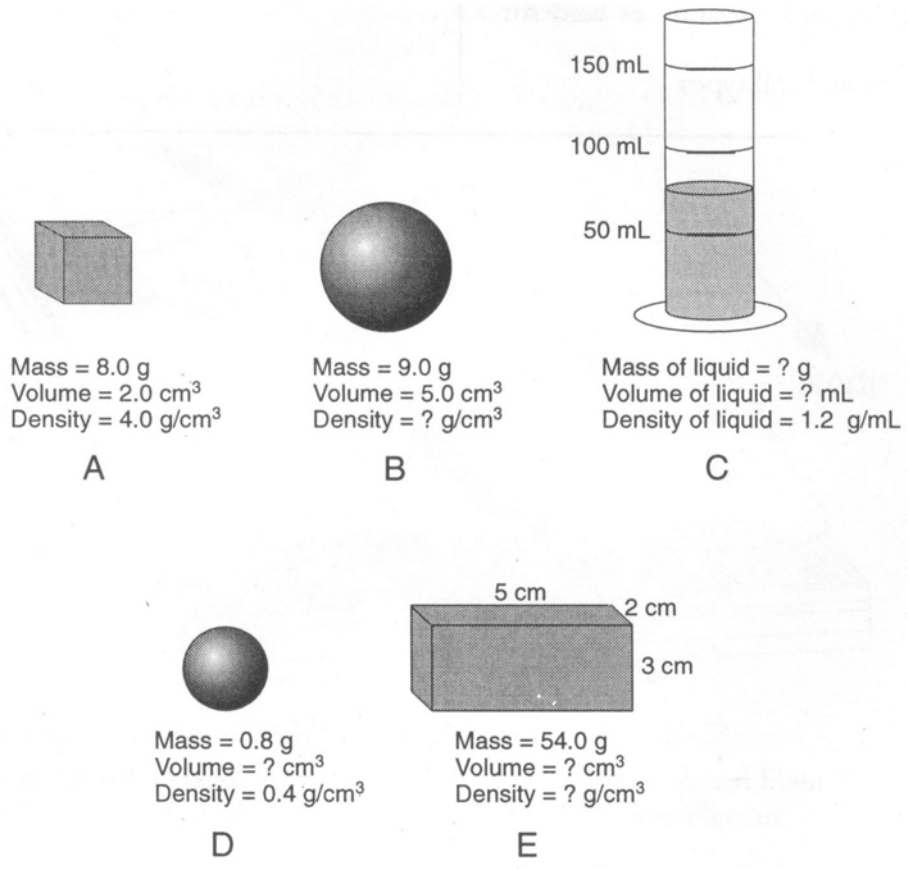
What is the volume of the sphere?
(1) 15 mL (3) 40 mL
(2) 65 mL (4) 25 mL

A student determines the volume of a cubic crystal to be 8.6 cubic centimeters. What is her percent deviation if the correct volume of the crystal is 8.0 cubic centimeters?
(1) 6.5% (3) 7.5%
(2) 6.0% (4) 7.0%

A student determines the density of a rock to be 2.2 grams per cubic centimeter. If the accepted density of the rock is 2.5 grams per cubic centimeter, what is the percent deviation (percentage of error) from the accepted value?
(1) 8.8% (3) 13.6%
(2) 30.0% (4) 12.0%

As a volume of air expands due to heating, the density of this air will
(1) decrease (3) remain the same
(2) increase

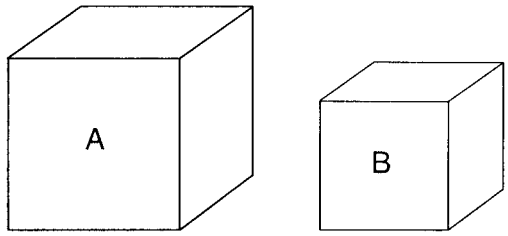
Base your answer to the following question on the *Earth Science Reference Tables*, the diagrams below, and your knowledge of Earth science. The diagrams represent five substances, *A* through *E*, at the same temperature. Some mass, volume, and density values are indicated for each substance. Substance *C* is a liquid in a graduated cylinder. [Note that 1 cubic centimeter = 1 milliliter. Objects are not drawn to scale.]



What is the volume of liquid *C*?

(1) 125.0 mL (2) 25.0 mL (3) 50.0 mL (4) 75.0 mL

Base your answer to the following question on the *Earth Science Reference Tables*, the diagrams below, and your knowledge of Earth science. The diagrams represent two different solid, uniform materials cut into cubes *A* and *B*.



Mass of A = 320 g
Volume of A = 64 cm³

Density of B = 3 g/cm³
Volume of B = 27 cm³

(Not drawn to scale)

What is the mass of cube *B*?

(1) 9 g (3) 3 g
(2) 27 g (4) 81 g

A rock's density is calculated as 2.7 g/cm³ but its accepted density is 3.0 g/cm³. Which equation, when solved, will provide the correct percent deviation from the accepted value?

(1) $\text{Deviation (\%)} = \frac{2.7}{3.0} \times 100$

(2) $\text{Deviation (\%)} = \frac{3.0 - 2.7}{2.7} \times 100$

(3) $\text{Deviation (\%)} = \frac{3.0 - 2.7}{3.0} \times 100$

(4) $\text{Deviation (\%)} = \frac{3.0}{2.7} \times 100$

Water has the greatest density at

(1) 100ºC in the gaseous phase
(2) 0ºC in the solid phase
(3) 4ºC in the solid phase
(4) 4ºC in the liquid phase

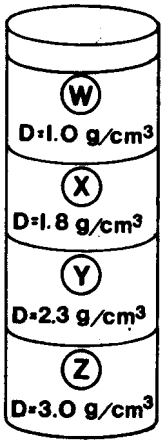
During a laboratory activity, four students each determined the density of the same piece of granite. The results are shown in the table below.

Student	Density Determined
1	2.69 g/cm^3
2	2.71 g/cm^3
3	2.72 g/cm^3
4	2.69 g/cm^3

The accepted value for the density of granite is 2.70 grams per cubic centimeter. Therefore, the results of this activity indicate that

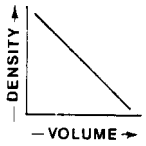
(1) each student determined the exact accepted value for the density of granite
(2) the balance used by student 3 was broken
(3) the density determined by each student contains a small error
(4) the accepted density of granite is incorrect

The diagram at the right represents a cylinder which contains four different liquids, *W*, *X*, *Y*, and *Z*, each with a different density (*D*) as indicated. A piece of solid quartz having a density of 2.7 g/cm^3 is placed on the surface of liquid *W*. When the quartz is released, it will pass through

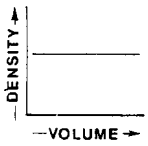


(1) *W* and *X*, but not *Y* or *Z*
(2) *W*, *X*, and *Y*, but not *Z*
(3) *W*, but not *X*, *Y*, or *Z*
(4) *W*, *X*, *Y*, and *Z*

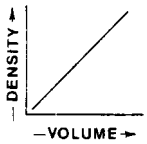
A student calculates the densities of five different pieces of aluminum, each having a different volume. Which graph best represents this relationship?



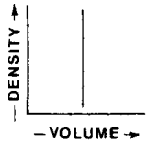
(1)



(3)

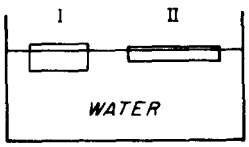


(2)

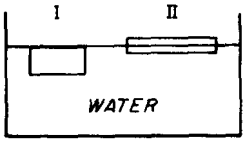


(4)

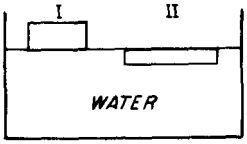
The diagrams below represent two differently shaped blocks of ice floating in water. Which diagram most accurately shows the blocks of ice as they would actually float in water?



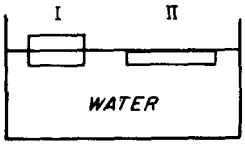
(1)



(3)

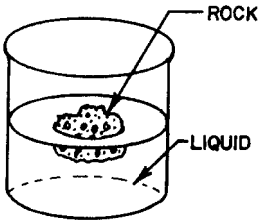


(2)



(4)

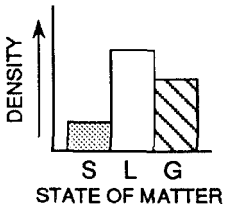
The diagram below shows a glass jar containing a clear liquid and a floating rock.



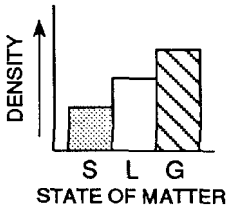
Which conclusion about the relative density of the rock and the liquid is true?

(1) The rock is less dense than the liquid.
(2) The rock is more dense than the liquid.
(3) The rock and the liquid have the same density.

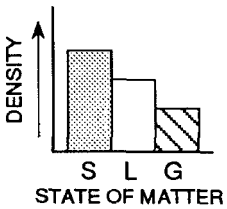
Which graph best represents the relationship between the density of a substance and its state of matter (phase) for most earth materials, *excluding* water?
[Key: *S* = solid, *L* = liquid, *G* = gas]



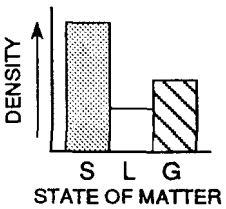
(1)



(3)



(2)



(4)

A mineral sample is found to have a density of 3.0 grams per cubic centimeter. It is then broken into two pieces, with one piece twice as large as the other. The smaller of the two pieces will have a density of

(1) 1.0 g/cm^3
(2) 1.5 g/cm^3
(3) 3.0 g/cm^3
(4) 6.0 g/cm^3

Compared to the density of liquid water, the density of an ice cube is

(1) always less
(2) always greater
(3) always the same
(4) sometimes less and sometimes greater

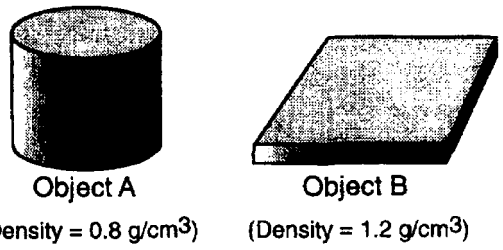
Under the same conditions of temperature and pressure, three different samples of the same uniform substance will have the same

(1) volume
(2) mass
(3) shape
(4) density

A quantity of water is frozen solid and then heated from 0ºC to 10ºC. Which statement best describes the properties of the water during this time?

(1) Volume changes but density remains constant.
(2) Mass changes but volume remains constant.
(3) Volume and density change.
(4) Mass and volume change.

The diagrams below represent two solid objects *A* and *B*. with different densities.



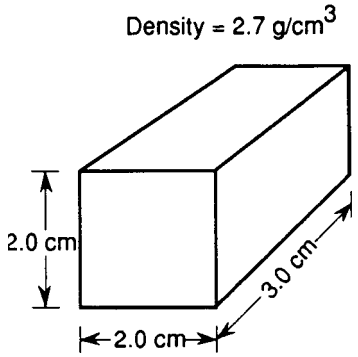
What will happen when the objects are placed in a container of water (water temperature = 4°C)?

(1) Both objects will sink.
(2) Both objects will float.
(3) Object *A* will float and object *B* will sink.
(4) Object *B* will float and object *A* will sink.

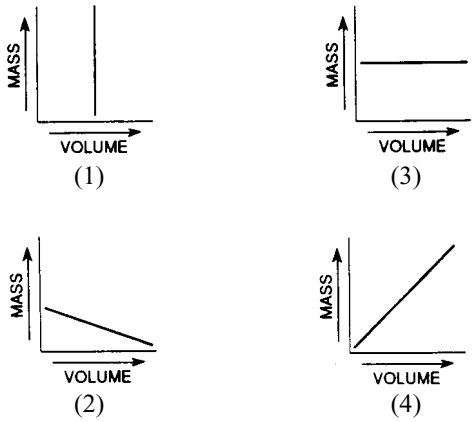
A black hole is a celestial feature believed to have a mass millions of times the mass of our Sun and a diameter less than the diameter of Earth. An object of such high mass and small volume would have

(1) an elliptical orbit with the Sun at one focal point
(2) an elliptical orbit with Earth at one focal point
(3) a very low density
(4) a very high density

Base your answers to questions **30** through **32** on the *Earth Science Reference Tables* and the diagram below, which represents a solid material of uniform composition.



Which graph best represents the relationship between the mass and volume of various-sized pieces of this material?



If this material is heated and expands, the density of the material will

(1) decrease
(2) increase
(3) remain the same

The mass of this piece of material is approximately

(1) 4.4 g
(2) 0.23 g
(3) 32 g
(4) 9.3 g

An empty 250-milliliter beaker has a mass of 60 grams. When 100 milliliters of oil is added to the beaker, the total mass is 140 grams. The density of the oil is approximately

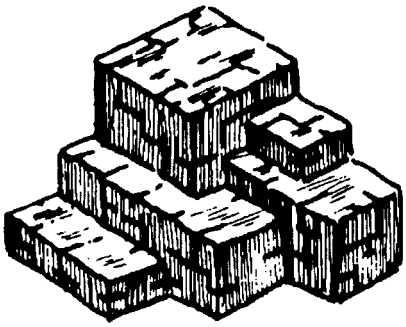
(1) 1.7 g/ml
(2) 0.6 g/ml
(3) 0.8 g/ml
(4) 1.4 g/ml

A 5.0-milliliter sample of a substance has a mass of 12.5 grams. What is the mass of a 100 milliliter sample of the same substance?

(1) 400 g
(2) 125 g
(3) 40.0 g
(4) 250 g

Base your answers to questions **35** and **36** on the *Earth Science Reference Tables* and the diagram and table below.

Mineral Sample A



Mass = 210 grams

Mineral Density Table

Mineral	Density (g/cm^3)	Mineral	Density (g/cm^3)
Gypsum	2.3	Hornblende	3.2
Orthoclase	2.6	Chalcopyrite	4.2
Quartz	2.7	Pyrite	5.0
Calcite	2.7	Magnetite	5.2
Dolomite	2.9	Galena	7.5
Fluorite	3.2	Copper	8.9

Under identical conditions, several samples of the mineral pyrite are measured, and their densities are compared. The values obtained should show that

(1) small samples are more dense than large samples
(2) all the pyrite samples have the same density
(3) large samples are more dense than small samples
(4) rounded samples are more dense than rough samples

When a sample of the mineral calcite is heated. it expands, causing its density to be

(1) exactly 2.7 g/cm^3
(2) between 2.7 and 3.0 g/cm^3
(3) greater than 3.0 g/cm^3
(4) less than 2.7 g/cm^3

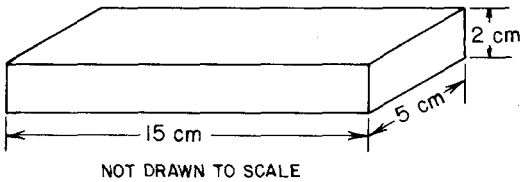
A rock sample has a mass of 16 grams and a volume of 8 cubic centimeters. When the rock is cut in half, what is the volume and density of each piece?

(1) 4 cm^3 and 2.0 g/cm^3
(2) 4 cm^3 and 4.0 g/cm^3
(3) 8 cm^3 and 0.5 g/cm^3
(4) 8 cm^3 and 1.0 g/cm^3

At 7:00 a.m., the air pressure was 1,012 millibars. By 11:00 a.m., the air pressure had dropped to 1,004 millibars. What was the rate of change in the air pressure?

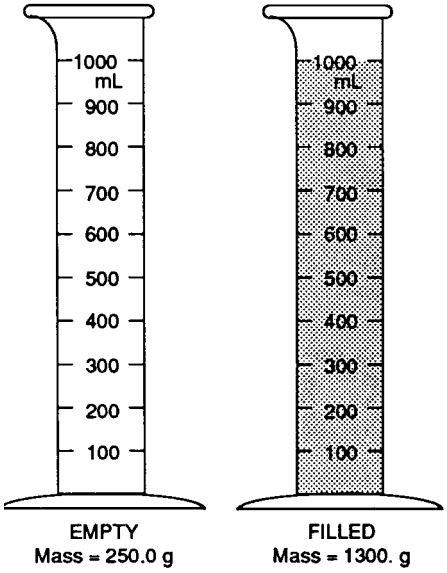
(1) 16 mb/hr
(2) 2 mb/hr
(3) 8 mb/hr
(4) 4 mb/hr

The diagram below represents a rectangular object with a mass of 450 grams. According to the *Earth Science Reference Table*, what is the density of the object?



(1) 1 gram per cubic centimeter
(2) 2 grams per cubic centimeter
(3) 3 grams per cubic centimeter
(4) 4 grams per cubic centimeter

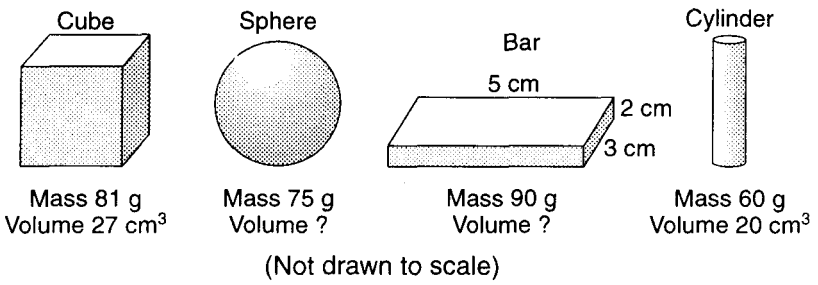
As shown below, an empty 1,000.-milliliter container has a mass of 250.0 grams. When filled with a liquid, the container and the liquid have a combined mass of 1,300. grams.



What is the density of the liquid?

(1) 1.00 g/mL
(2) 1.05 g/mL
(3) 1.30 g/mL
(4) 0.95 g/mL

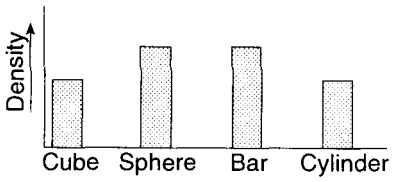
Base your answers to questions **41** and **42** on the diagrams below which represent four solid objects made of the same uniform material. The volumes of the sphere and the bar are not given.



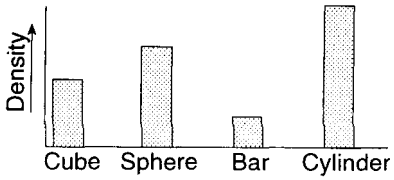
What is the density of the bar?

(1) 9.0 g/cm^3 (2) 30.0 g/cm^3 (3) 3.0 g/cm^3 (4) 90.0 g/cm^3

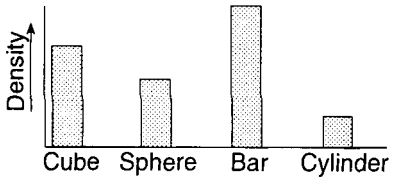
Which graph best represents the relative densities of the objects?



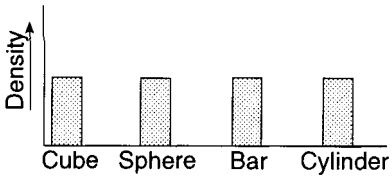
(1)



(3)

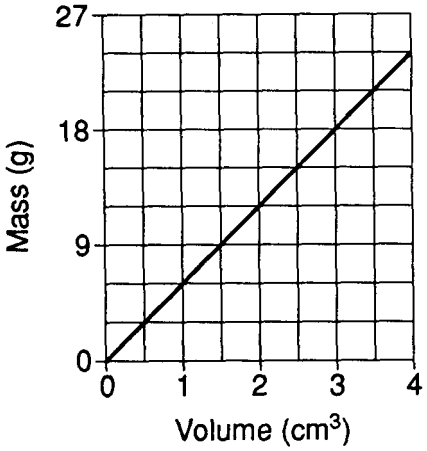


(2)



(4)

The graph below shows the relationship between the mass and volume of a mineral.

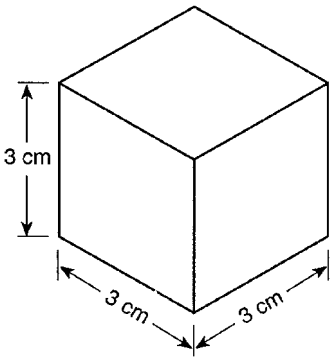


What is the density of this mineral?

(1) 6.0 g/cm^3 (3) 3.0 g/cm^3

(2) 9.0 g/cm^3 (4) 4.5 g/cm^3

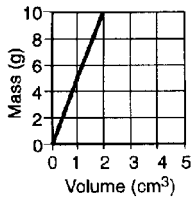
The mineral shown below is of uniform composition and has a density of 4 grams per cubic centimeter. What is the mass of this mineral?



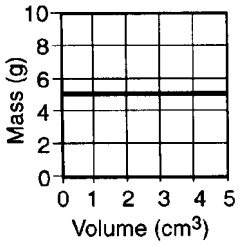
(1) 108 g (3) 9 g

(2) 54 g (4) 12 g

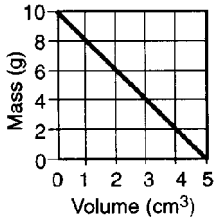
Which graph best represents the relationship between mass and volume of a material that has a density of 5 grams per cubic centimeter?



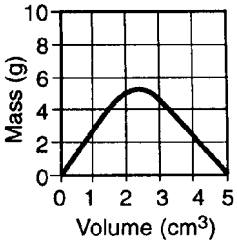
(1)



(3)

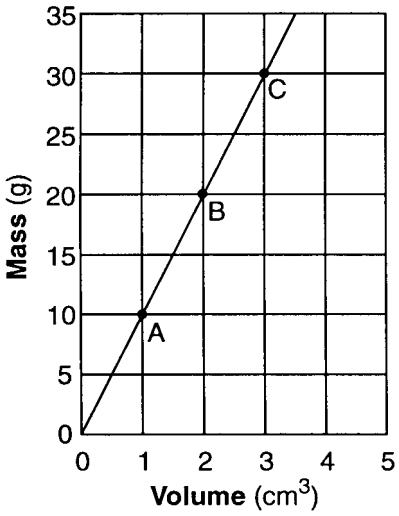


(2)



(4)

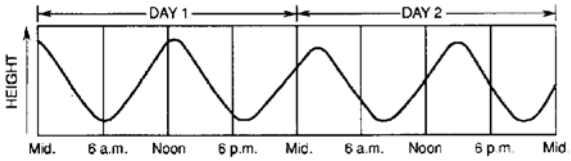
The graph below shows the relationship between mass and volume for three samples, *A*, *B*, and *C*, of a given material.



What is the density of this material?

(1) 1.0 g/cm^3
(2) 5.0 g/cm^3
(3) 10.0 g/cm^3
(4) 20.0 g/cm^3

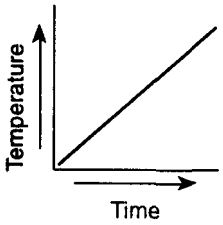
The graph below shows the changes in height of ocean water over the course of 2 days at one Earth location.



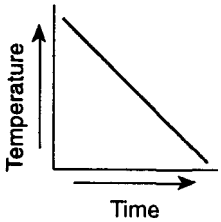
Which statement concerning these changes is best supported by the graph?

(1) The changes are noncyclic and may occur at any time.
(2) The changes are noncyclic and occur at sunrise and sunset.
(3) The changes are cyclic and occur at the same time every day.
(4) The changes are cyclic and occur at predictable time intervals.

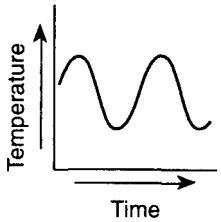
Which graph most likely illustrates a cyclic change?



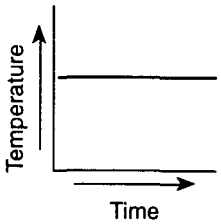
(1)



(3)

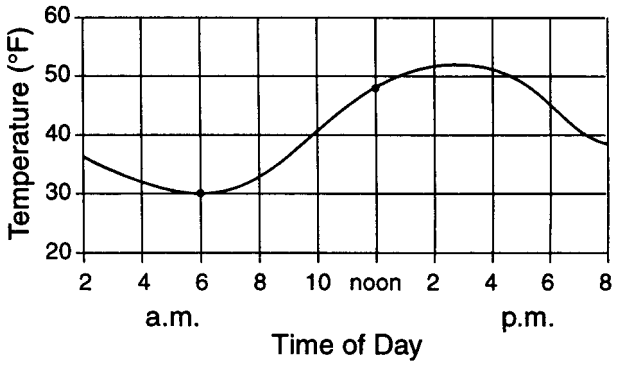


(2)



(4)

The graph below shows temperature readings for a day in April.



The average rate of temperature change, in Fahrenheit degrees per hour, between 6 a.m. and noon was

(1) 6º/hr (3) 3º/hr

(2) 8º/hr (4) 18º/hr

A student measures and records the temperature of water in a beaker for 8 minutes as shown below.

	Start								Finish
Time	0 min	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min
Temperature	90°C	83°C	78°C	73°C	68°C	64°C	60°C	57°C	54°C

What is the average rate of cooling for the water in the beaker during the 8-minute time interval?

(1) 3.2 C°/min (2) 3.6 C°/min (3) 4.5 C°/min (4) 4.0 C°/min

This review contains questions dealing with percent deviation (error). This involves a formula which has been removed from the reference tables. It is unlikely that similar questions will appear on future regents exams.