1. The grouping of objects or events based on similar characteristics is called
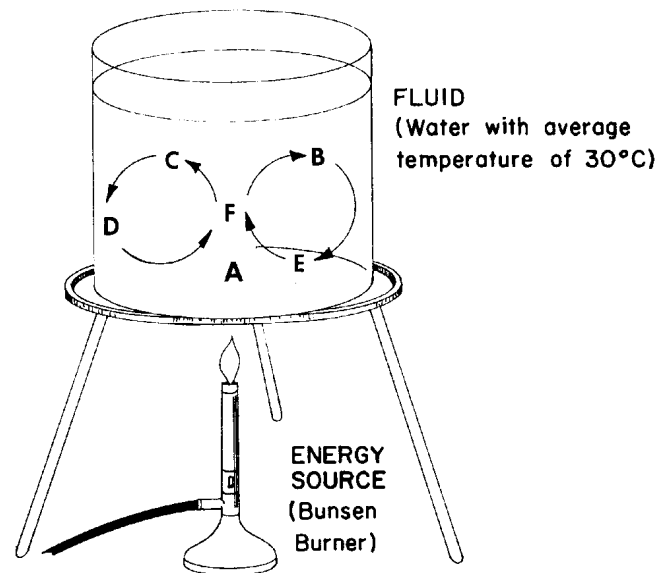
   A) observation   B) interpretation
   C) measurement   **D) classification**

2. In the classroom during a visual inspection of a rock, a student recorded four statements about the rock. Which statement about the rock is an observation?

   A) The rock formed deep in the Earth's interior.
   B) The rock cooled very rapidly.
   C) The rock dates from the Precambrian Era.
   D) The rock is black and shiny.

3. Which observation indicates that many parts of New York State were once covered by the sea?

   A) The coastline is still changing slowly.
   B) Fossils of sea animals are found in New York State bedrock.
   C) The Hudson River is partially affected by tides.
   D) Saltwater lakes are found in New York State.

4. Which statement made by a student after examining a rock specimen is an inference?

   A) The rock is of igneous origin.
   B) The rock has rounded edges.
   C) The rock is light-colored.
   D) The rock contains large crystals.

5. Which statement about a rock sample is an inference?

   A) The rock scratches a glass plate.
   B) The rock was formed 100 million years ago.
   C) A balance indicates the rock's mass is 254 grams.
   D) The rock has no visible crystals and is red.

6. A classification system is based on the use of

   A) the human senses to observe properties of objects
   B) instruments to observe properties of objects
   C) observed properties to group objects with similar characteristics
   D) inferences to make observations

7. Water has the greatest density at

   A) 100ºC in the gaseous phase
   B) 0ºC in the solid phase
   C) 4ºC in the solid phase
   D) 4ºC in the liquid phase

8. Water has its greatest density at a temperature of

   A) −6º C   B) 10º C   C) 32º C   **D) 4º C**

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

   A) always less
   B) always greater
   C) always the same
   D) sometimes less and sometimes greater

10. Base your answer to the following question on your knowledge of Earth science and on the diagram below. The diagram shows the apparatus used as a model to study large-scale motions within the Earth's atmosphere. The water was heated for several minutes.

   The density of the water in the beaker is least at point

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

11. The density of the Earth's core would be most nearly the same as the density of

   A) ocean water (1.02 g/cm^3)
   B) a meteorite (11.20 g/cm^3)
   C) the Moon (3.36 g/cm^3)
   D) a granite rock (2.27 g/cm^3)

12. As water cools from 4ºC to 0ºC, its density

   A) decreases   B) increases
   C) remains the same

13. Base your answer to the following question on the *Earth Science Reference Tables* and the information and diagram below. The diagram represents a three-dimensional solid object of uniform material.
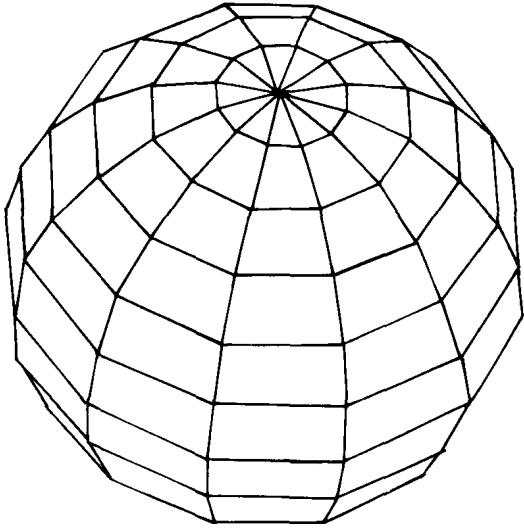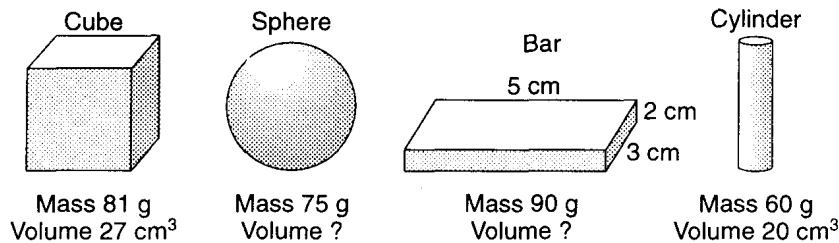

Mass = 80.0 grams
Volume = 25 cm³

What is the density of the object?

A) 1.3 g/cm³   B) 5.5 g/cm³
C) 3.2 g/cm³   D) 0.3 g/cm³

14. Base your answer to the following question 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.
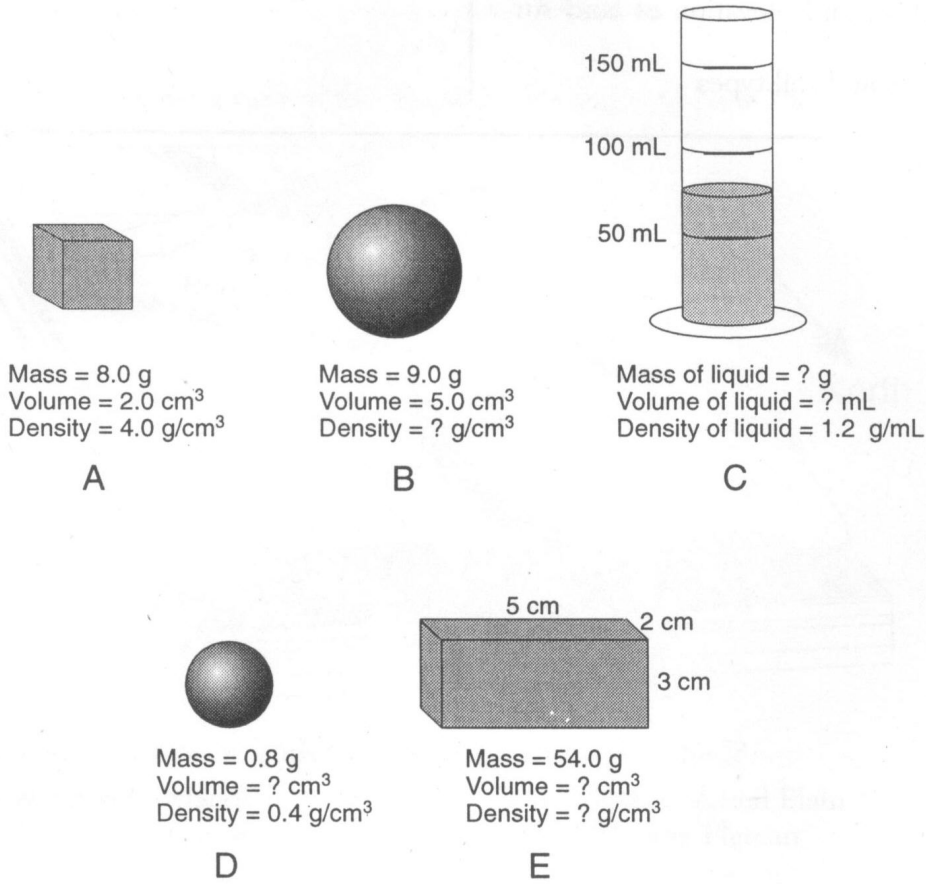

Cube
Mass 81 g
Volume 27 cm³

Sphere
Mass 75 g
Volume ?

Bar
5 cm
2 cm
3 cm
Mass 90 g
Volume ?

Cylinder
Mass 60 g
Volume 20 cm³

(Not drawn to scale)

What is the density of the bar?

A) 9.0 g/cm³   B) 30.0 g/cm³   **C) 3.0 g/cm³**   D) 90.0 g/cm³

15. Which of the following has the lowest density?

A) the planet Saturn   B) the planet Jupiter
C) the planet Earth   D) salt water

16. Base your answer to the following question on 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.]

150 mL

100 mL

50 mL

Mass = 8.0 g
Volume = 2.0 cm³
Density = 4.0 g/cm³

A

Mass = 9.0 g
Volume = 5.0 cm³
Density = ? g/cm³

B

Mass of liquid = ? g
Volume of liquid = ? mL
Density of liquid = 1.2 g/mL

C

5 cm

2 cm

3 cm

Mass = 0.8 g
Volume = ? cm³
Density = 0.4 g/cm³

D

Mass = 54.0 g
Volume = ? cm³
Density = ? g/cm³

E

Which two substances could be made of the same material?

A) *A* and *B* **B) *B* and *E*** C) *C* and *D* D) *A* and *E*

17. Base your answer to the following question on
the contour map below. Points *A*, *B*, *C*, *D*, *X*, and *Y* are locations on the map. Elevations are expressed in
feet. The maximum elevation of Basket Dome is indicated at point *X*.
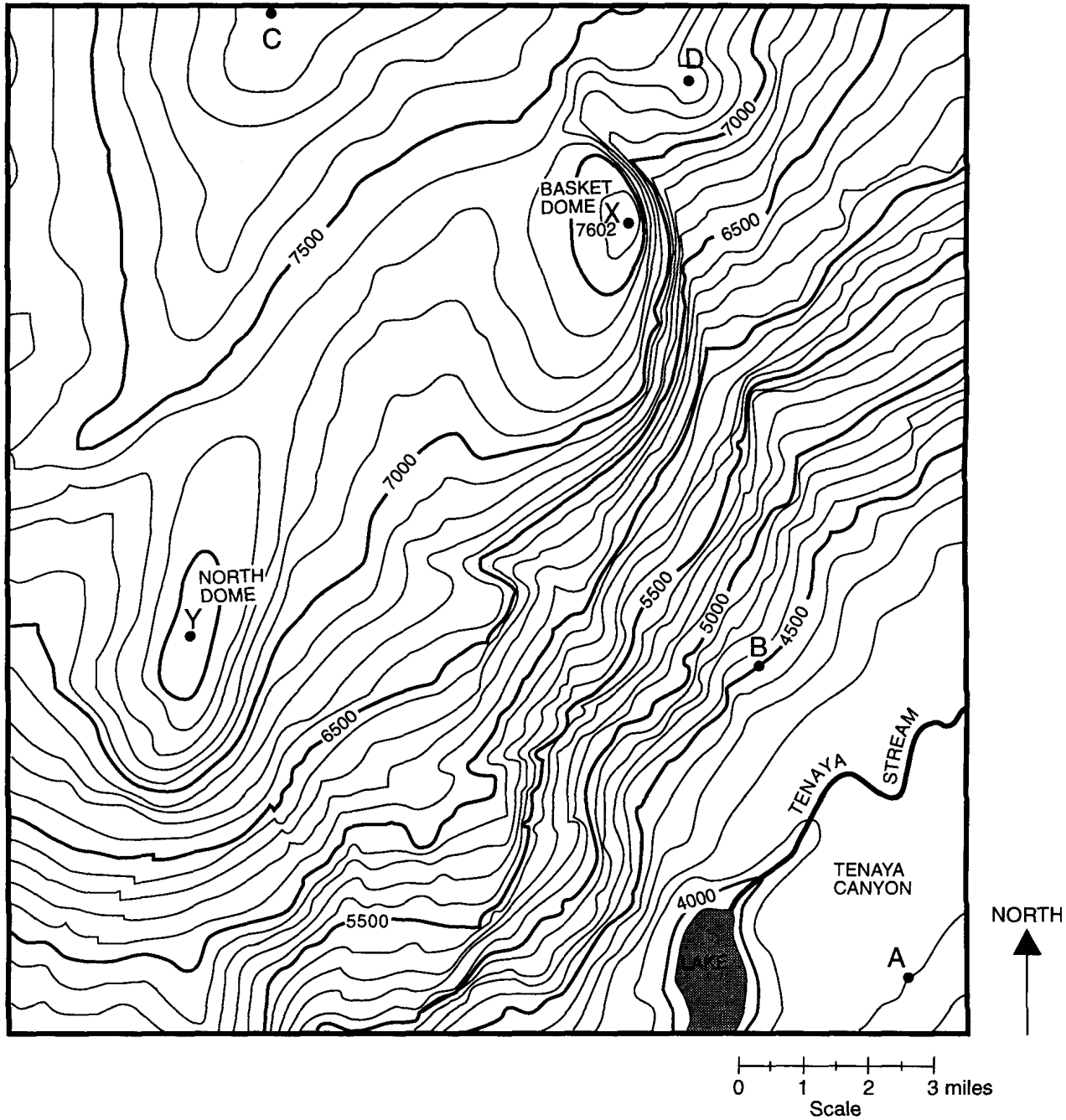
The highest elevation of Basket Dome 40 years ago was measured at 7,600 feet. What is the rate of change
in elevation for this area?

A) 0.6 in/yr   B) 1.7 in/yr   C) 24 in/yr   D) 40 in/yr

18. 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?

A) 16 mb/hr   **B) 2 mb/hr**
C) 8 mb/hr   D) 4 mb/hr

19. Base your answer to the following question on the United States time zone map shown below. The dashed lines represent meridians (lines of longitude).
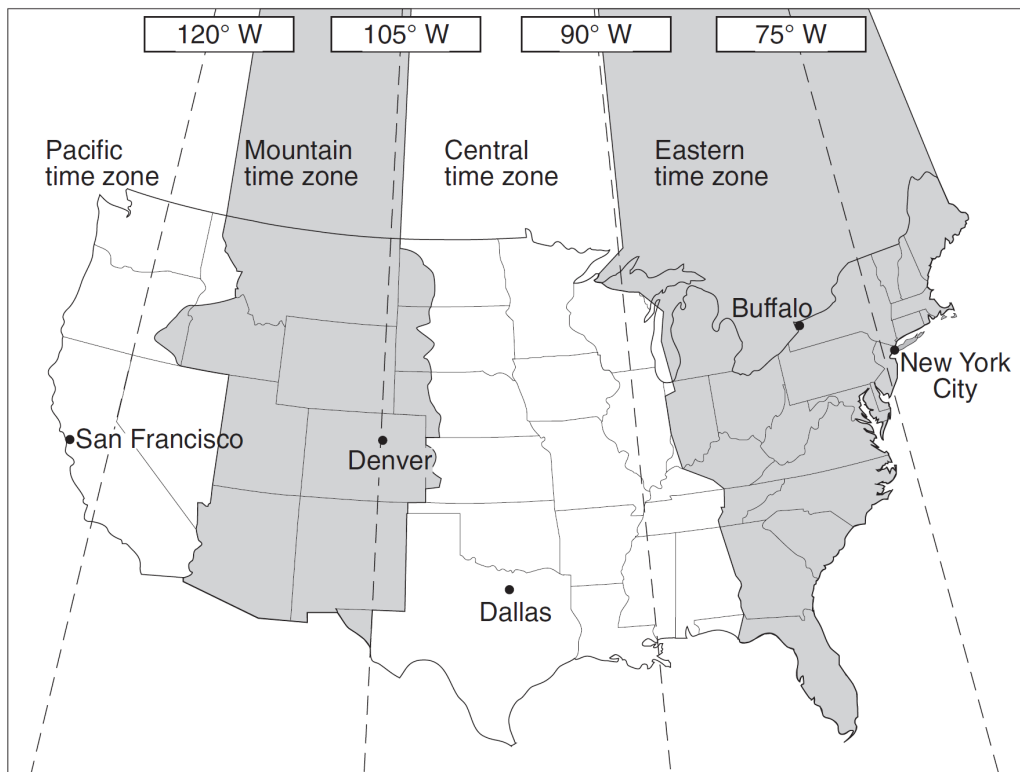
The basis for the time difference between adjoining time zones is Earth's

A) 1° per hour rate of revolution
B) 1° per hour rate of rotation
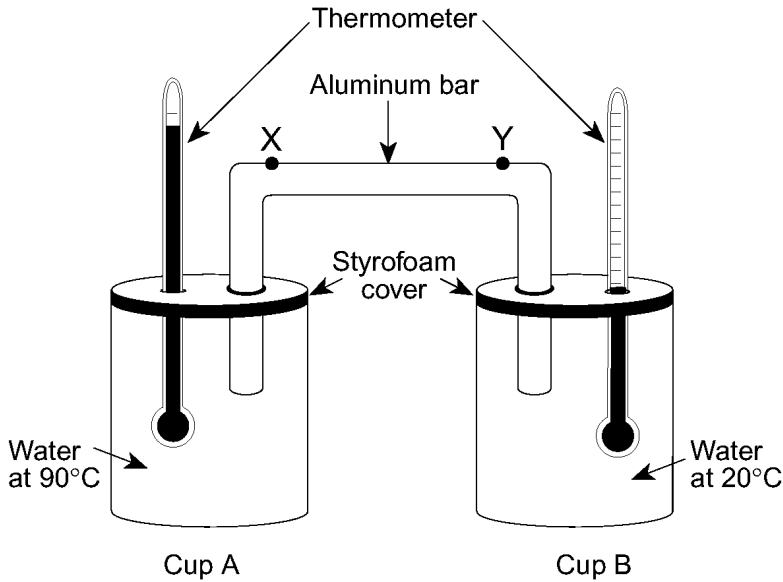C) 15° per hour rate of revolution
D) 15° per hour rate of rotation

20. Which group of substances is arranged in order of *decreasing* specific heat values?

A) iron, granite, basalt
B) copper, lead, iron
C) dry air, water vapor, ice
D) liquid water, ice, water vapor

21. Base your answer to the following question on the information about a laboratory procedure, diagram, and data table below.

Hot water at 90°C is poured into cup *A*. Cool water at 20°C is poured into cup *B*. Styrofoam covers are placed on the cups. An aluminum bar and a thermometer are placed through holes in each cover. Points *X* and *Y* are locations on the aluminum bar. The data table shows temperature readings taken every minute for 20 minutes.

| Minute	Temperature of Water (°C)	
	Cup *A*	Cup *B*
0	90	20
1	88	20
2	86	20
3	85	21
4	83	21
5	82	22
6	81	22
7	80	22
8	79	22
9	78	23
10	77	23
11	76	23
12	75	23
13	74	23
14	73	23
15	72	24
16	71	24
17	70	24
18	69	24
19	68	25
20	67	25

The rate of temperature change for the water in cup *A* for the first 10 minutes was approximately

A) 0.77 C°/min   **B) 1.3 C°/min**   C) 7.7 C°/min   D) 13.0 C°/min

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22. A 25-gram sample of halite was placed in a jar with five other mineral samples and water. The jar was shaken vigorously for 5 minutes. The halite sample was then found to have a mass of 15 grams. What was the rate of weathering of the halite sample?

A) 0.50 g/min   **B) 2.0 g/min**
C) 3.0 g/min   D) 10. g/min

23. Which graph most likely illustrates a cyclic change?

A)

B)

C)

D)
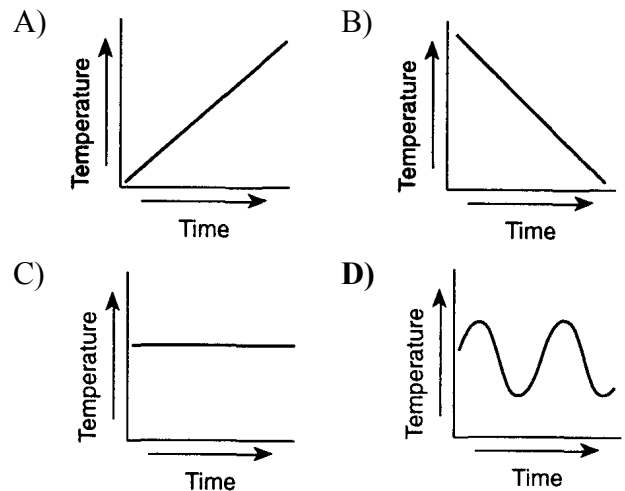
24. Which description of change is most closely associated with ocean tides and moon phases?

   A) cyclic and predictable
   B) cyclic and unpredictable
   C) noncyclic and predictable
   D) noncyclic and unpredictable

25. A centimeter is 0.01 meter. This measurement can also be expressed as

   A) 1×10^{-1} m   **B) 1×10^{-2} m**
   C) 1×10^{0} m   D) 1×10^{2} m

26. Base your answer to the following question on the image provided below.
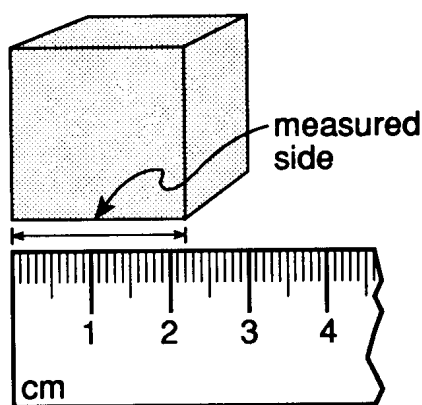
   ─measured side

   If each side of the cube shown above has the same length as the measured side, what is the approximate volume of the cube?

   A) 2.20 cm³   B) 4.84 cm³
   C) 6.60 cm³   **D) 10.65 cm³**

27. The diameter through the equator of Jupiter is about 143,000 kilometers. What is this distance written in scientific notation (powers of 10)?

   A) 143×10^{2} km   B) 1.43×10^{3} km
   C) 1.43×10^{5} km   D) 143×10^{5} km

28. The use of a triple-beam balance to determine the mass of a rock is an example of measuring by using

   A) all of the five senses
   B) inferences and interpretations
   C) a direct comparison with a standard
   D) a combination of dimensional quantities

29. A student determines the density of a mineral to be 1.5 grams per cubic centimeter. If the accepted value is 2.0 grams per cubic centimeter, what is the student's percent deviation (percent error)?

   A) 25.0%   B) 33.3%
   C) 40.0%   D) 50.0%

30. A student incorrectly measured the volume of a mineral sample as 63 cubic centimeters. The actual volume was 72 cubic centimeters. What was the student's approximate percent deviation (percentage of error)?

   A) 9.0%   **B) 12.5%**
   C) 14.2%   D) 15.3%

Base your answers to questions **31** through **33** on the diagrams below, which represent two different solid, uniform materials cut into cubes A and B.
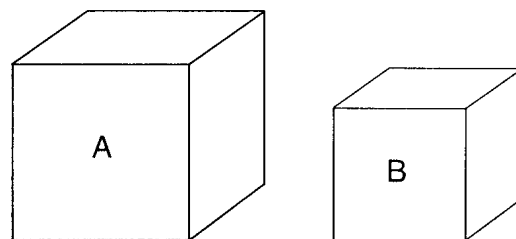
   Mass of A = 320 g   Density of B = 3 g/cm³
   Volume of A = 64 cm³   Volume of B = 27 cm³

   (Not drawn to scale)

31. If a parcel of air is heated, its density will

   **A) decrease**   B) increase
   C) remain the same

32. What is the mass of cube B?

   A) 9 g   B) 27 g   C) 3 g   **D) 81 g**

33. A student calculates the density of a third material as 8.3 grams per cubic centimeter instead of the accepted value of 8.0 grams per cubic centimeter. What is the student's approximate percent deviation (percent of error)?

   A) 3.8%   B) 30.0%
   C) 3.0%   D) 36.1%

34. The graph below shows the tidal changes in ocean water level, in meters, recorded at a coastal location on a certain day.

Tidal Changes
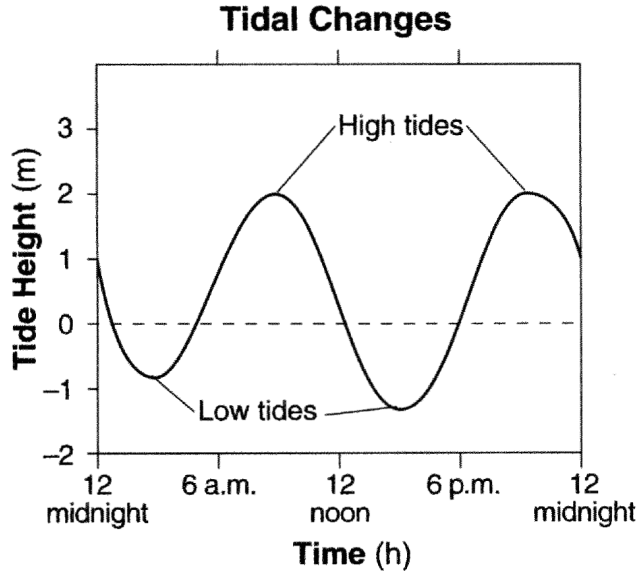
Approximately how many hours apart were the two high tides?

A) 6 h   **B) 12 h**   C) 18 h   D) 24 h

35. An observer recorded the times of three successive high tides at one Earth location as:

• 7:12 a.m.
• 7:38 p.m.
• 8:04 a.m.

What was the time of the next high tide?

A) 8:12 p.m.   **B) 8:30 p.m.**
C) 8:38 p.m.   D) 9:04 p.m.

1. D
2. D
3. B
4. A
5. B
6. C
7. D
8. D
9. A
10. A
11. B
12. A
13. C
14. C
15. A
16. B
17. A
18. B
19. D
20. D
21. B
22. B
23. D
24. A
25. B
26. D
27. C
28. C
29. A
30. B
31. A
32. D
33. A
34. B
35. B