

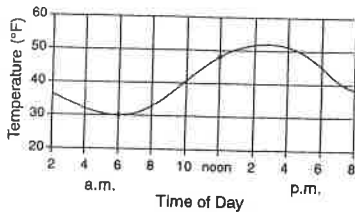
Set 1 — Rate of Change

1. The temperature of water in a container was 60°C . Ten minutes later, the water temperature was 35°C . What was the rate of cooling of the water?

- (1) $25^{\circ}\text{C}/\text{min}$
- (2) $2.5^{\circ}\text{C}/\text{min}$
- (3) $35^{\circ}\text{C}/\text{min}$
- (4) $3.5^{\circ}\text{C}/\text{min}$

1 _____

2. 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) $6^{\circ}\text{F}/\text{hr}$
- (2) $8^{\circ}\text{F}/\text{hr}$
- (3) $3^{\circ}\text{F}/\text{hr}$
- (4) $18^{\circ}\text{F}/\text{hr}$

2 _____

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

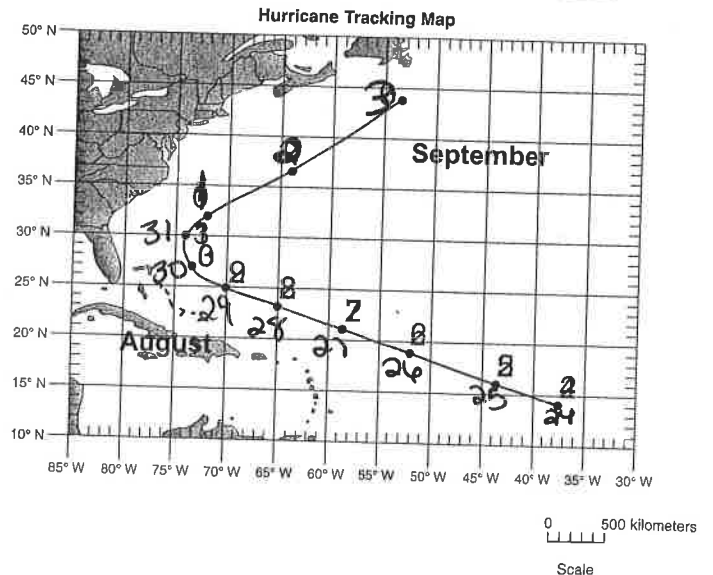
Minute	Temperature of Water ($^{\circ}\text{C}$)	
	Cup A	Cup B
0	90	20
1	88	20
2	86	20
3	85	21
4	83	21
5	82	22
6	81	22
7	80	22
8	79	22
9	78	23
10	77	23

- (1) $0.77^{\circ}\text{C}/\text{min}$
- (2) $1.3^{\circ}\text{C}/\text{min}$
- (3) $7.7^{\circ}\text{C}/\text{min}$
- (4) $13.0^{\circ}\text{C}/\text{min}$

3 _____

4. Calculate the average daily rate of movement of the hurricane from August 24 to August 28. Follow the directions given below.

- a) Write the equation used to determine the rate of change.
- b) Substitute data into the equation.
- c) Calculate the average daily rate of movement of hurricane and label it with the proper units.



Set 2 — Rate of Change

5. The highest elevation of Mt. Zembat in Alaska 40 years ago was measured at 7600 feet. Today the highest elevation is 7598 feet. What is the rate of change in elevation for this mountain.

- (1) 0.05 ft/yr
- (2) 0.6 ft/yr
- (3) 0.45 ft/yr
- (4) 20 ft/yr

5 _____

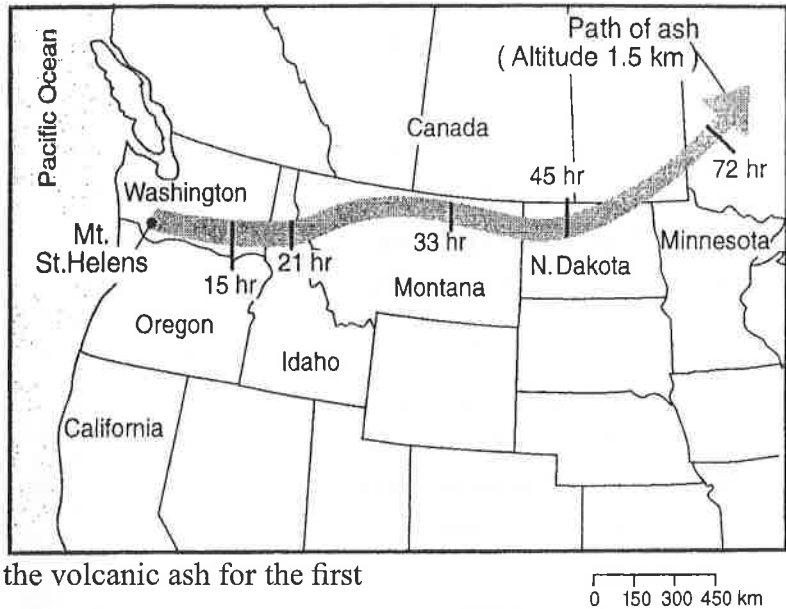
6. A 25-gram sample of halite was placed in a jar with five other mineral samples and water. The jar was shaken vigorously for 5 minutes. The halite sample was then found to have a mass of 15 grams. What was the rate of weathering of the halite sample?

- (1) 0.50 g/min
- (2) 2.0 g/min
- (3) 3.0 g/min
- (4) 10. g/min

6 _____

Base your answers to question 7 on the information and the accompanying map.

The eruption of Mt. St. Helens in 1980 resulted in the movement of volcanic ash across the northwestern United States. The movement of the ash at 1.5 km above sea level is shown as a shaded path on the map. The times marked on the path indicate the length of time the leading edge of the ash cloud took to travel from Mt. St. Helens to each location.



7. Calculate the average rate of movement of the volcanic ash for the first 15 hours, following the directions below.

- a) Write the equation used to determine the average rate of the volcanic ash movement.

- b) Substitute values into the equation.

- c) Solve the equation and label the answer with the correct units.

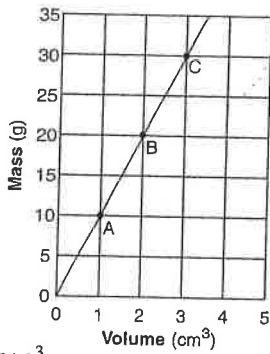
Set 1 — Density of a Substance

1. 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) 8 cm³ and 0.5 g/cm³
- (2) 8 cm³ and 1.0 g/cm³
- (3) 4 cm³ and 2.0 g/cm³
- (4) 4 cm³ and 4.0 g/cm³

1 _____

2. The accompanying graph 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/cm³
- (2) 5.0 g/cm³
- (3) 10.0 g/cm³
- (4) 20.0 g/cm³

2 _____

Note that question 3 has only three choices.

3. As air on the surface of Earth warms, the density of the air

- (1) decreases
- (2) increases
- (3) remains the same

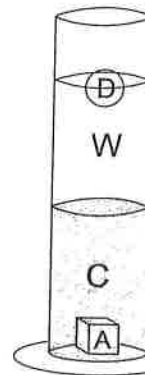
3 _____

4. If the mass of a spinel crystal is 9.5 grams, what is the volume of this spinel crystal?

Gemstone Mineral	Composition
emerald	Be ₃ Al ₂ (Si ₆ O ₁₈)
sapphire	Al ₂ O ₃
spinel	MgAl ₂ O ₄
zircon	ZrSiO ₄

- (1) 0.4 cm³
- (2) 2.5 cm³
- (3) 5.7 cm³
- (4) 36.1 cm³

5. Liquid *W* was added to a cylinder containing liquid *C* and object *A*. Objects *B* and *D* were then dropped into the cylinder. Which statement is true?



- (1) Liquid *W* is denser than liquid *C* and object *D*.
- (2) Liquid *C* is denser than liquid *W* and object *A*.
- (3) Liquid *C* is less dense than liquid *W* and object *A*, but more dense than liquid *W* and object *B*.
- (4) Object *A* is denser than liquid *C* but not as dense as liquid *W* and object *D*.

Name: _____

me

Scientific notation is a way to write a number in a compact form. The number 1,000,000,000 is much easier to write as 10⁹ while 10⁸ is much easier to write as 10⁸.

Though we think of 10⁸ as a large number, it is much smaller than 10⁹. Think about the difference in the number of zeros. 10⁸ is much more than 10⁹.

The small number 10⁻⁸ is a negative exponent. It is much smaller than 10⁸.

The line below shows how to write "1,000 dollars" given as well.

Decimal notation

Scientific notation

Write each number in scientific notation.

10² = _____
 10⁴ = _____
 10⁷ = _____

Write each number in decimal notation.

3 × 10² = _____
 7 × 10⁴ = _____
 2.4 × 10³ = _____

Write each number in decimal notation.

10 = _____
 100 = _____
 100,000,000 = _____

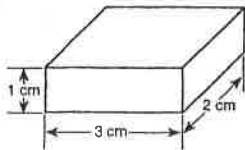
Write each number in scientific notation.

400 = _____
 60,000 = _____
 750,000 = _____

For more practice...

Set 2 — Density of a Substance

The diagram below represents a solid object with a density of 3 grams per cubic centimeter. What is the mass of this object?

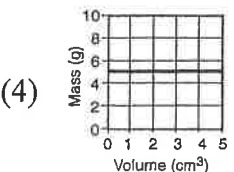
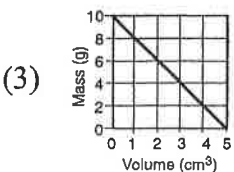
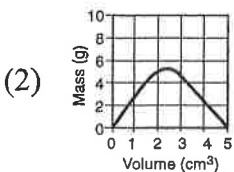
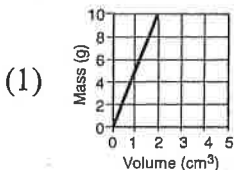


(Not drawn to scale)

- (1) 0.5 g (3) 18 g
 (2) 2 g (4) 36 g

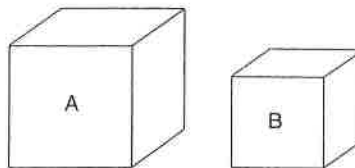
6 _____

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



7 _____

Base your answers to questions 8, 9, and 10 on 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 Density of B = 3 g/cm³
 Volume of A = 64 cm³ Volume of B = 27 cm³

(Not drawn to scale)

8. What is the density of cube *A*?

- (1) 0.2 g/cm³
 (2) 5.0 g/cm³
 (3) 12.8 g/cm³
 (4) 64.0 g/cm³

8 _____

9. What is the mass of cube *B*?

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

9 _____

Note that question 10 has only three choices.

10. Assume cube *B* was broken into many irregularly shaped pieces. Compared to the density of the entire cube, the density of one of the pieces would be

- (1) less
 (2) greater
 (3) the same

10 _____

11. Explain how heat would change the density of a parcel of air.