DENSITY

Name _____

Which has the greater mass, air or lead? Most of you would answer lead, but actually this question does not have an answer. To compare these two things you need to now how much of each you have. A large amount of air could have a greater mass than a small amount of lead. To compare different things, we have to compare the masses of each that occupy the same space, or volume. This is called density.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Solve the following problems.

1. What is the density of carbon dioxide gas if 0.196 g occuples a volume of 100 mL?

   Answer: _____

2. A block of wood 3.0 cm on each side has a mass of 27 g. What is the density of this block?

   Answer: _____

3. An irregularly shaped stone was lowered into a graduated cylinder holding a volume of water equal to 2.0 mL. The height of the water rose to 7.0 mL. If the mass of the stone was 25 g, what was its density?

   Answer: _____

4. A 10.0 cm^3 sample of copper has a mass of 89.6 g. What is the density of copper?

   Answer: _____

5. Silver has a density of 10.5 g/cm^3 and gold has a density of 19.3 g/cm^3. Which would have a greater mass, 5 cm^3 of silver or 5 cm^3 of gold?

   Answer: _____

6. Five mL of ethanol has a mass of 3.9 g, and 5.0 mL of benzene has a mass of 4.4 g. Which liquid is denser?

   Answer: _____

7. A sample of iron has the dimensions of 2 cm x 3 cm x 2 cm. If the mass of this rectangular-shaped object is 94 g, what is the density of iron?

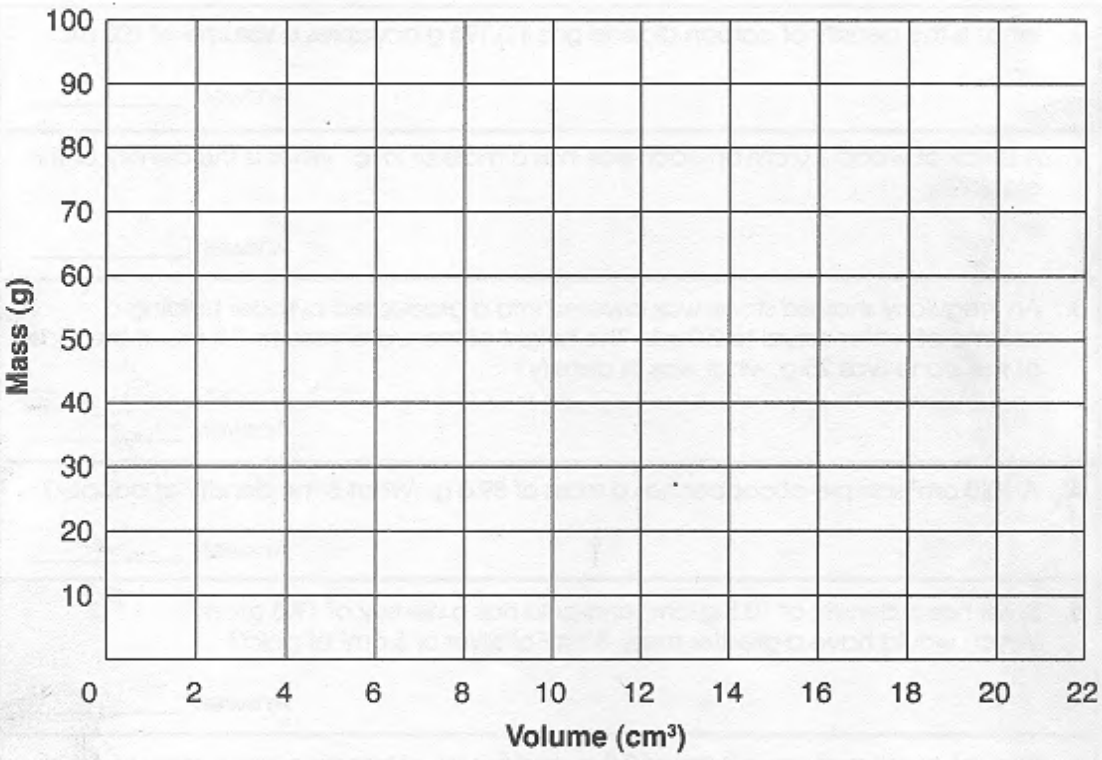
   Answer: _____

GRAPHING OF DATA

Name _____

Graphing is a very important tool in science since it enables us to see trends that are not always obvious. Graph the following data and answer the questions below.

Mass of Liquid (g)	Volume of Liquid (cm^3)
20	4
100	20
75	15
40	8
10	2



1. As mass increases, what happens to the volume? _____
2. As volume increases, what happens to the mass? _____
3. How many grams would occupy 12 mL? _____
4. What volume would 90 g occupy? _____
5. What is the density of the liquid? _____

DETERMINING SPEED (VELOCITY)

Name _____

Speed is a measure of how fast an object is moving or traveling. Velocity is a measure of how fast an object is traveling in a certain direction. Both speed and velocity include the distance traveled compared to the amount of time taken to cover this distance.

$$\text{speed} = \frac{\text{distance}}{\text{time}} \qquad \text{velocity} = \frac{\text{distance}}{\text{time}} \text{ in a specific direction}$$

Answer the following questions.

1. What is the velocity of a car that traveled a total of 75 kilometers north in 1.5 hours?

   _____

2. What is the velocity of a plane that traveled 3,000 miles from New York to California in 5.0 hours? _____

3. John took 45 minutes to bicycle to his grandmother's house, a total of four kilometers. What was his velocity in km/hr? _____

4. It took 3.5 hours for a train to travel the distance between two cities at a velocity of 120 miles/hr. How many miles lie between the two cities? _____

5. How long would it take for a car to travel a distance of 200 kilometers if it is traveling at a velocity of 55 km/hr? _____

6. A car is traveling at 100 km/hr. How many hours will it take to cover a distance of 750 km? _____

7. A plane traveled for about 2.5 hours at a velocity of 1200 km/hr. What distance did it travel? _____

8. A girl is pedaling her bicycle at a velocity of 0.10 km/min. How far will she travel in two hours? _____

9. An ant carries food at a speed of 1 cm/s. How long will it take the ant to carry a cookie crumb from the kitchen table to the ant hill, a distance of 50 m? Express your answer in seconds, minutes and hours. _____

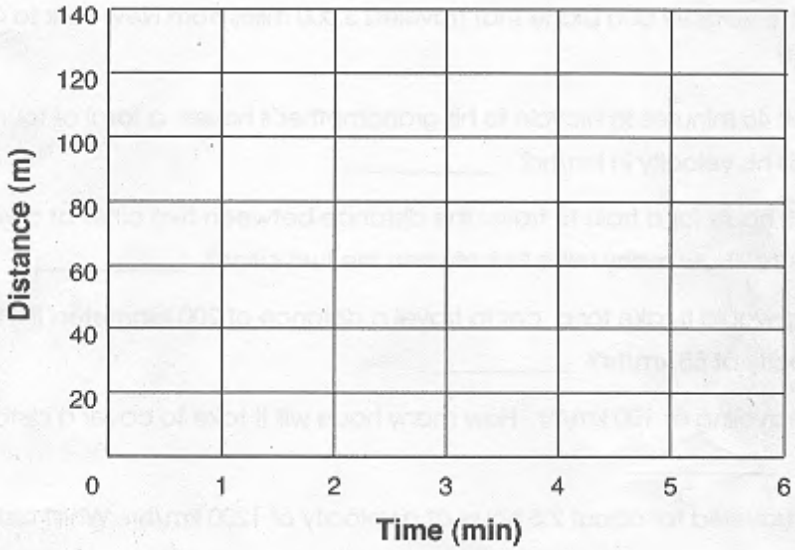
10. The water in the Buffalo River flows at an average speed of 5 km/hr. If you and a friend decide to canoe down the river a distance of 16 kilometers, how many hours and minutes will it take? _____

CALCULATING AVERAGE SPEED

Name _____

Graph the following data on the grid below and answer the questions at the bottom of the page.

Time (min)	Distance (m)
0	0
1	50
2	75
3	90
4	110
5	125



$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

1. What is the average speed after two minutes? _____
2. After three minutes? _____
3. After five minutes? _____
4. What is the average speed between two and four minutes? _____
5. What is the average speed between four and five minutes? _____

ACCELERATION CALCULATIONS

Name _____

Acceleration means a change in speed or direction. It can also be defined as a change in velocity per unit of time.

$$a = \frac{v_f - v_i}{t}$$

where a = velocity
v_f = final velocity
v_i = initial velocity
t = time

Calculate the acceleration for the following data.

	Initial Velocity	Final Velocity	Time	Acceleration
1.	0 km/hr	24 km/hr	3 s	_____
2.	0 m/s	35 m/s	5 s	_____
3.	20 km/hr	60 km/hr	10 s	_____
4.	50 m/s	150 m/s	5 s	_____
5.	25 km/hr	1200 km/hr	2 min	_____

6. A car accelerates from a standstill to 60 km/hr in 10.0 seconds.
   What is its acceleration? _____

7. A car accelerates from 25 km/hr to 55 km/hr in 30 seconds.
   What is its acceleration? _____

8. A train is accelerating at a rate of 2.0 km/hr/s.
   If its initial velocity is 20 km/hr, what is its velocity after 30 seconds? _____

9. A runner achieves a velocity of 11.1 m/s 9 s after he begins.
   What is his acceleration? _____
   What distance did he cover? _____