

# GRAPHING DISTANCE VS. TIME

Name \_\_\_\_\_

Plot the following data on the graph and answer the questions below.

Distance (km)

0

5

12

20

30

42

56

Time (s)

0

10

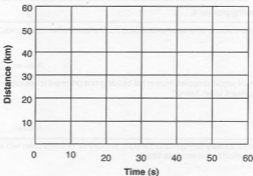
20

30

40

50

60



1. What is the average speed at  $t = 20$  s? \_\_\_\_\_
2. What is the average speed at  $t = 30$  s? \_\_\_\_\_
3. What is the acceleration between 20 s and 30 s? \_\_\_\_\_
4. What is the average speed at  $t = 40$  s? \_\_\_\_\_
5. What is the average speed at  $t = 60$  s? \_\_\_\_\_
6. What is the acceleration between 40 s and 60 s? \_\_\_\_\_
7. Is the object accelerating at a constant rate? \_\_\_\_\_

## GRAVITY AND ACCELERATION (I)

Name \_\_\_\_\_

The acceleration of a freely falling body is  $9.8 \text{ m/sec/sec}$  due to the force of gravity.

Using the formula,  $a = \frac{v_f - v_i}{t}$ , we can calculate the velocity of a falling object at any time if the initial velocity is known.

**Example:** What is the velocity of a rubber ball dropped from a building roof after 5 seconds?

**Answer:**  $9.8 \text{ m/sec/sec} = \frac{v_f - 0}{5 \text{ sec}}$

$$v_f = 49 \text{ m/sec}$$

Solve the following problems.

1. What is the velocity of a quarter dropped from a tower after 10 seconds?

Answer: \_\_\_\_\_

2. If a block of wood dropped from a tall building has attained a velocity of  $78.4 \text{ m/s}$ , how long has it been falling?

Answer: \_\_\_\_\_

3. If a ball that is freely falling has attained a velocity of  $19.6 \text{ m/s}$  after two seconds, what is its velocity five seconds later?

Answer: \_\_\_\_\_

4. A piece of metal has attained a velocity of  $107.8 \text{ m/sec}$  after falling for 10 seconds. What is its initial velocity?

Answer: \_\_\_\_\_

5. How long will it take an object that falls from rest to attain a velocity of  $147 \text{ m/sec}$ ?

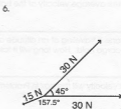
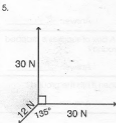
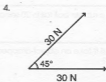
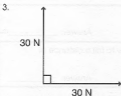
Answer: \_\_\_\_\_

# FORCE DIAGRAMS

Name \_\_\_\_\_

Find the resultant force in each of the following diagrams and draw the resultant vector. Use a ruler and a protractor where necessary. Scale: 1 cm = 10 N, where N represents newtons of force.

1. \_\_\_\_\_ 2. \_\_\_\_\_



## FORCE AND ACCELERATION

Name \_\_\_\_\_

A force is a push or a pull. To calculate force, we use the following formula,

$$F = ma \quad \text{where } F = \text{force in newtons}$$
$$m = \text{mass in kg}$$
$$a = \text{acceleration in m/sec}^2$$

**Example:** With what force will a rubber ball hit the ground if it has a mass of 0.25 kg?

**Answer:**  $F = (0.25 \text{ kg})(9.8 \text{ m/s}^2)$   
 $F = 2.45 \text{ N}$

Solve the following problems.

1. With what force will a car hit a tree if the car has a mass of 3,000 kg and it is accelerating at a rate of 2 m/s<sup>2</sup>?

Answer: \_\_\_\_\_

2. A 10 kg bowling ball would require what force to accelerate it down an alleyway at a rate of 3 m/s<sup>2</sup>?

Answer: \_\_\_\_\_

3. What is the mass of a falling rock if it hits the ground with a force of 147 newtons?

Answer: \_\_\_\_\_

4. What is the acceleration of a softball if it has a mass of 0.50 kg and hits the catcher's glove with a force of 25 newtons?

Answer: \_\_\_\_\_

5. What is the mass of a truck if it is accelerating at a rate of 5 m/s<sup>2</sup> and hits a parked car with a force of 14,000 newtons?

Answer: \_\_\_\_\_

# MOTION MATCHING

Name \_\_\_\_\_

Match the correct term in Column I with its definition in Column II.

**I**

- \_\_\_\_\_ kinetic
- \_\_\_\_\_ centripetal
- \_\_\_\_\_ mass
- \_\_\_\_\_ acceleration
- \_\_\_\_\_ velocity
- \_\_\_\_\_ weight
- \_\_\_\_\_ gravity
- \_\_\_\_\_ inertia
- \_\_\_\_\_ speed
- \_\_\_\_\_ momentum
- \_\_\_\_\_ newton

**II**

- amount of matter in an object
- amount of force exerted on an object due to gravity
- distance covered per unit of time
- rate at which velocity changes over time
- speed in a given direction
- unit of measurement for force
- energy of motion
- tendency of a moving object to keep moving
- depends on the mass and velocity of an object
- type of force that keeps objects moving in a circle
- attractive force between two objects

