

## ACCELERATION CALCULATIONS

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

$$a = \frac{v_f - v_i}{t} \quad \text{where } a = \text{velocity}$$

$$v_f = \text{final velocity}$$

$$v_i = \text{initial velocity}$$

$$t = \text{time}$$

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?

## GRAVITY AND ACCELERATION (I)

Name \_\_\_\_\_

The acceleration of a freely falling body is 9.8 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?

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

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

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 m/s, how long has it been falling?

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

3. If a ball that is freely falling has attained a velocity of 19.6 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 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 m/sec?

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