



Class – IX

Motion

Question 1:

A bus starting from rest moves with a uniform acceleration of 0.1ms^{-2} for 2 minutes. Find (a) the speed acquired, (b) the distance travelled.

Answer 1:

Here we have,

Initial velocity (u) = 0 m/s

Acceleration (a) = 0.1ms^{-2}

Time (t) = 2 minute = 120 seconds

The speed acquired:

$$v = 0 + 0.1 \times 120 \text{ m/s}$$

$$v = 12 \text{ m/s}$$

Thus, the bus will acquire a speed of 12 m/s after 2 minute with the given acceleration.

(b) The distance travelled:

We know that, $s = ut + \frac{1}{2}at^2$

$$0 \times 120 + \frac{1}{2} \times 0.1 \times (120)^2$$

$$\frac{1}{2} \times 0.1 \times 14400 \text{ m} = 720 \text{ m}$$

Thus, bus will travel a distance of 720 m in the given time of 2 minute.

Question 2:

A train is travelling at a speed of 90 km/h. Brakes are applied so as to produce a uniform acceleration of -0.5 m/s^2 . Find how far the train will go before it is brought to rest.

Answer 2:

Here, we have,

Initial velocity, $u = 90 \text{ km/h} = \frac{90 \times 1000}{3600} \text{ ms}^{-1} = 25$

ms^{-1} Final velocity, $v = 0 \text{ m/s}$

Acceleration, $a = -0.5 \text{ m/s}^2$

Distance travelled = ?

$$\text{Using, } v^2 = u^2 + 2as$$

Therefore, train will go 625 m before it brought to rest.

Question 3:

A trolley, while going down an inclined plane, has an acceleration of 2 cm/s^2 . What will be its velocity 3 s after the start?

Answer 3:

Here we have,

Initial velocity, $u = 0 \text{ m/s}$

Acceleration (a) = $2 \text{ cm/s}^2 = 0.02 \text{ m/s}^2$

Time (t) = 3 s

Final velocity, $v = ?$

We know that, $v = u + at$

Therefore, $v = 0 + 0.02 \times 3 \text{ m/s}$

$v = 0.06 \text{ m/s}$

Therefore the final velocity of trolley will be 0.06 m/s after start.

Question 4:

A racing car has a uniform acceleration of 4 m/s^2 . What distance will it cover in 10 s after start?

Answer 4:

Here we have,

Acceleration, $a = 4 \text{ m/s}^2$

Initial velocity, $u = 0 \text{ m/s}$

Time, $t = 10 \text{ s}$

Distance covered (s) = ?

We know that, $s = ut + \frac{1}{2} at^2$

$s = 0 \times 10 + \frac{1}{2} \times 4 \times (10)^2 \text{ m}$

$s = 2 \times 100 \text{ m}$

$s = 200 \text{ m}$

Thus, racing car will cover a distance of 200 m after start in 10 s with given acceleration.

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Question 5:

A stone is thrown in a vertically upward direction with a velocity of 5 m/s. If the acceleration of the stone during its motion is 10 m/s^2 in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?

Answer 5:

Here we have,

Initial velocity (u) = 5 m/s

Final velocity (v) = 0 m/s

Acceleration (a) = -10 m/s^2

Height, i.e. Distance, s = ?

Time (t) taken to reach the height = ?

We know that, $v^2 = u^2 + 2as$

$$\square 0 = (5)^2 + 2 \times -10 \times s$$

$$\square 0 = 25 - 20s$$

$$\square s = 25/20 \text{ m}$$

$$\square s = 1.25 \text{ m}$$

Now, we know that, $v = u + at$

$$0 = 5 + (-10) \times t$$

$$0 = 5 - 10t$$

$$t = 5/10 \text{ s}$$

$$t = 0.5 \text{ s}$$

Thus, stone will attain a height of 1.25 m and time taken to attain the height is 0.5 s.