

# Numerical Questions for Motion

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**Question 1** A train accelerates from 36 km/h to 54 km/h in 10 sec.

- (i) Acceleration
- (ii) The distance travelled by car.

**Answer**

a) Acceleration is given by

$$a = \frac{\Delta v}{\Delta t}$$

So  $a = 2 \text{ m/s}^2$

b) Distance is given by

$$S = ut + \frac{1}{2}at^2$$

So  $s = 125 \text{ m}$

**Question 2** A body whose speed is constant

- (a) Must be accelerated
- (b) Might be accelerated
- (c) Has a constant velocity
- (d) Cannot be accelerated.

**Answer**

Might be accelerated

**Question 3** A truck traveling at 54 km/h is slow down to 36 km/h in 10 sec. Find the retardation of

**Answer**

Acceleration is given by

$$a = \frac{\Delta v}{\Delta t}$$

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

Negative sign implies retardation

**Question 4** A particle is moving in a circle of diameter 20m. What is its distance and as per the table given below

S.No	Rounds	Displacement	Distance
1	1		
2	1.5		
3	2		
4	2.5		

**Answer**

S.No	Rounds	Displacement	Distance
1	1	0	$20\pi$
2	1.5	20m	$30\pi$
3	2	0	$40\pi$
4	2.5	20m	$50\pi$

**Question 5** A scooter travelling at 10 m/s speed up to 20 m/s in 4 sec. Find the acceleration of train.

**Answer**

Acceleration is given by

$$a = \frac{\Delta v}{\Delta t}$$

So  $a=1.25 \text{ m/s}^2$

**Question 6** A train starts from rest and accelerate uniformly at the rate of  $5 \text{ m/s}^2$  for 5 sec.

Calculate the velocity of train in 5 sec.

**Answer**

25m/s

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**Question 7** A object moves with uniform positive acceleration. Its velocity-time graph will be

- (a) A straight line parallel to the time axis
- (b) A straight line inclined at an obtuse angle to the time axis
- (c) A straight line inclined at an acute angle to the time axis
- (d) None of these.

**Solutions (c)**

**Question 8** The maximum speed of a train is 90 km/h. It takes 10 hours to cover a distance of 500 km. Find the ratio of its average speed to maximum speed?

**Solution**

Average speed=500/10=50 km/hr

Ratio of average speed to maximum speed= 50:90=5:9

**Question 9** A car start from rest and acquire a velocity of 54 km/h in 2 sec. Find (i) the acceleration (ii) distance travelled by car assume motion of car is uniform?

**Solution**

a) Acceleration is given by

$$a = \frac{\Delta v}{\Delta t}$$

So a=7.5 m/s<sup>2</sup>

b) Distance is given by

$$S = ut + \frac{1}{2}at^2$$

**Question 10** An object dropped from a cliff falls with a constant acceleration of 10 m/s<sup>2</sup>. Find its speed 5 s after it was dropped.

**Solution:**

V=u+at

u=> 0

v=10X5=50 m/s

**Question 11** A ball is thrown upwards and it goes to the height 100 m and comes down

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1) What is the net displacement?

2) What is the net distance?

**Solution:**

As it comes down to the initial point

Net displacement is zero

Net distance=200 m

## Practice Questions

**Question 12** two cars A and B race each other. The Car A ran for 2 min at a speed of 7.5 km/h, slept for 56 min and again ran for 2 min at a speed of 7.5 km/h. find the average speed of the car A in the race.

**Question 13** Anand leaves his house at 8.30 a.m. for his school. The school is 2 km away and classes start at 9.00 a.m. If he walks at a speed of 3 km/h for the first kilometer, at what speed should he walk the second kilometer to reach just in time?

**Question 14** An object moves along a straight line with an acceleration of 2 m/s<sup>2</sup>. If its initial speed is 10 m/s, what will be its speed 2 s later?

**Question 15** A bullet hits a Sand box with a velocity of 20 m/s and penetrates it up to a distance of 6 cm. Find the deceleration of the bullet in the sand box.

**Question 16** A particle experiences constant acceleration for 20 seconds after starting from rest. If it travels a distance  $D_1$  in the first 10 seconds and distance  $D_2$  in the next 10 seconds then,

(a)  $D_2 = D_1$

(b)  $D_2 = 2D_1$

(c)  $D_2 = 3D_1$

(d)  $D_2 = 4D_1$