

NCERT solution for Motion and Time

Question 1

Classify the following as motion along a straight line, circular or oscillatory motion:

- (i) Motion of your hands while running.
- (ii) Motion of a horse pulling a cart on a straight road.
- (iii) Motion of a child in a merry-go-round.
- (iv) Motion of a child on a see-saw.
- (v) Motion of the hammer of an electric bell.
- (vi) Motion of a train on a straight bridge.

Answer

S. No	Answer	Reason
a)	Oscillatory motion	As hands moves to and fro and repeat their motion after given interval
b)	Straight line motion	As horse is pulling the cart on straight road
c)	Circular motion	As merry go round moves in a circular motion
d)	Oscillatory motion	The child goes up and down and this get repeated after fixed interval
e)	Oscillatory motion	As hammer hits the electric bell and vibrate
f)	Straight line motion	As train is moving along straight bridge

Question 2

Which of the following are not correct?

- (i) The basic unit of time is second.
- (ii) Every object moves with a constant speed.
- (iii) Distances between two cities are measured in kilometers.
- (iv) The time period of a given pendulum is not constant.
- (v) The speed of a train is expressed in m/h.

Answer

S.no	Answer	Reason
a)	Correct	Sec is the SI unit of time
b)	Not correct	Every object may or may not moves with a constant speed. Some are accelerating also
c)	Correct	The distance between cities are measured in km only as km is big unit of distance
d)	Not correct	Time period of a given pendulum is always constant because it depends on the length of the pendulum
e)	Not correct	The speed of a train is measured in km/h or in m/s.

Question 3

A simple pendulum takes 32 s to complete 20 oscillations. What is the time period of the pendulum?

Answer

Numbers of oscillations = 20

Time taken = 32 sec

Time period of the pendulum = Time taken/Numbers of oscillations = $32/20$
= 1.6 s.

Question 4

The distance between two stations is 240 km. A train takes 4 hours to cover this distance. Calculate the speed of the train.

Answer

Distance between two stations = 240 km
Time taken = 4 hrs.
Speed of train is given as
= Distance/Time taken = $240/4 = 60$ km/hr.

Question 5.

The odometer of a car reads 57321.0 km when the clock shows the time 08:30 AM. What is the distance moved by the car, if at 08:50 AM, the odometer reading has changed to 57336.0 km? Calculate the speed of the car in km/min during this time. Express the speed in km/h also.

Answer

Given

Initial reading of odometer = 57321.0 km

Final reading of odometer = 57336.0 km

Initial Time = 8:30 AM

Final Time = 8:50 AM

We know that Odometer measure the distance travelled by the car

So Total distance covered by car = Final reading of odometer - Initial reading of odometer

$$= 57336.0 - 57321.0 = 15.0 \text{ km}$$

Total time taken by Car = Final Time - Initial Time = 8:50 AM - 8:30 AM = 20 minutes = $20/60$ hrs. = $1/3$ hrs.

Now Speed of the car is defined as

$$= \text{Total distance covered} / \text{Total time taken} = 15.0/20 = 0.75 \text{ km/min}$$

Also

$$\text{Speed of the car in km/hr.} = 15 / (1/3) = 45 \text{ km/hr.}$$

Question 6

Salma takes 15 minutes from her house to reach her school on a bicycle. If the bicycle has a speed of 2 m/s, calculate the distance between her house and the school.

Answer

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Given

Speed of bicycle = 2 m/s

Time taken = 15 mins = 15 × 60 secs = 900 secs

Now we know that

Speed = Distance/Time

Therefore

Distance = Speed × Time = 2 × 900 meters = 1800 meters = 1.8 km

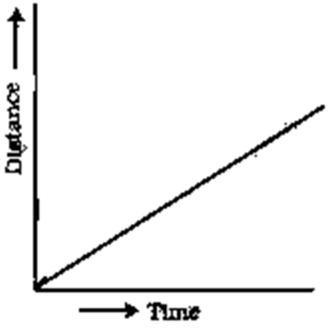
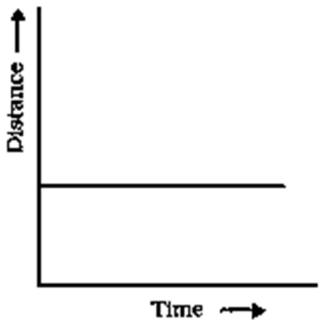
Question 7.

Show the shape of the distance-time graph for the motion in the following cases:

(i) A car moving with a constant speed.

(ii) A car parked on a side road.

Answer

<p>A car moving with a constant speed covers equal distance in equal line.</p> <p>So it is represented by the give straight line</p>	
<p>A car parked on a side road So it is not moving and no distance is being covered by it. So distance remains constant with time</p>	

Question 8

Which of the following relations is correct?

- (i) Speed = Distance \times Time
- (ii) Speed = Distance/Time
- (iii) Speed = Time/Distance
- (iv) Speed = 1/Distance \times Time

Answer

- (ii) Speed = Distance/Time

Question 9

The basic unit of speed is:

- (i) km/min
- (ii) m/min
- (iii) km/h
- (iv) m/s

Answer

- (iv) m/s

Question 10.

A car moves with a speed of 40 km/h for 15 minutes and then with a speed of 60 km/h for the next 15 minutes. The total distance covered by the car is:

- (i) 100 km
- (ii) 25 km
- (iii) 15 km
- (iv) 10 km

Answer

(ii) 25 km

Firstly, the car is moving with 40km/h for 15 minutes.

15 minutes = $15/60$ hrs. = $1/4$ hrs.

Distance covered = $40 \times 1/4 = 10$ km

Secondly, the car is moving with 60km/h for 15 minutes. Distance covered = $60 \times 1/4 = 15$ km

Therefore

Total distance covered = $10 \text{ km} + 15 \text{ km} = 25 \text{ km}$

Question 11

Suppose the two photographs, shown in Fig. 13.1 and Fig. 13.2, had been taken at an interval of 10 seconds. If a distance of 100 meters is shown by 1 cm in these photographs, calculate the speed of the blue car.

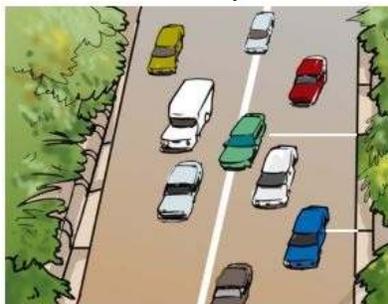


Fig. 13.1 Vehicles moving in the same direction on a road.

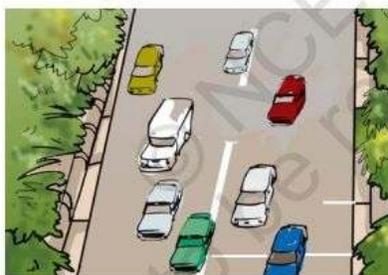


Fig. 13.2 Position of vehicles shown in Fig. 13.1 after some time

Answer

First, measure the distance with the help of scale and then proceed as given below.

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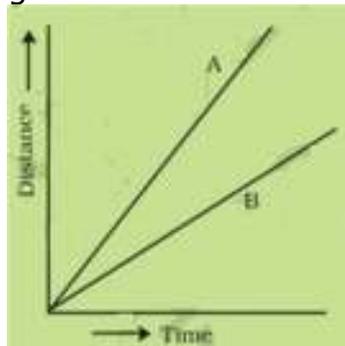
Suppose the distance measured by scale is 2cm.
 Multiply 2 with 100 to get the actual distance = $2 \times 100 = 200 \text{ m}$. (1cm = 100m)

Interval time between the photos taken = 10 s.

Speed of the blue car = $200/10 \text{ m/s} = 20 \text{ m/s}$

Question 12

Below shows the distance-time graph for the motion of two vehicles A and B. Which one of them is moving faster?

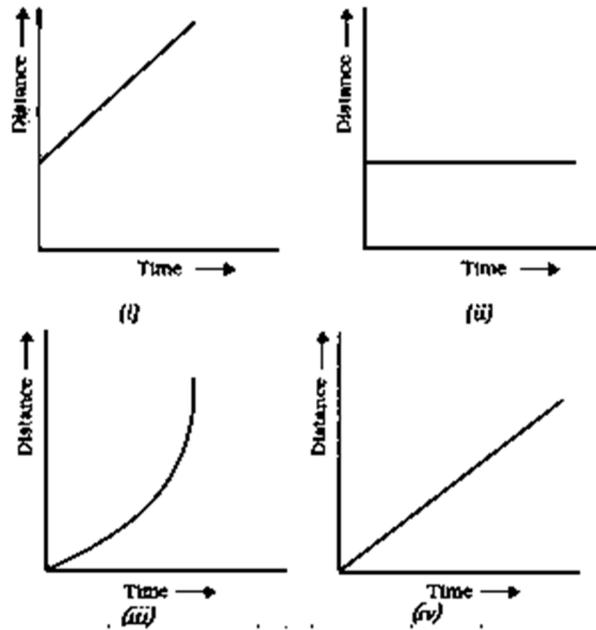


Answer

Vehicle A is moving faster because it has more slope than vehicle B. In distance-time graph, speed is measured by its slope.

Question 13

Which of the following distance-time graphs shows a truck moving with speed which is not constant?



Answer

Option (iii) because the slope of the graph is not a straight line and hence it does not show a uniform motion.