

NCERT Solutions for Class 7 Science Chapter 13

Motion and Time Class 7

Chapter 13 Motion and Time Exercise Solutions

Exercise : Solutions of Questions on Page Number : 156

Q1 :

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 :

- (i) Oscillatory motion

While running, the hands move to and fro and repeat their motion after a given interval of time. Hence, it is an oscillatory motion.

- (ii) Straight line

The horse is pulling a cart on a straight road. Therefore, it has a motion along a straight line.

- (iii) Circular motion

Merry-go-round has a circular motion. Therefore, a child sitting inside it will also have a circular motion.

- (iv) Oscillatory motion

The child on a see-saw goes up and down continuously. It oscillates up-down. Therefore, it is an oscillatory motion.

- (v) Oscillatory motion

The hammer hits the electric bell and vibrates rapidly. Therefore, it is an oscillatory motion.

- (vi) Straight line

The train is moving on a straight bridge. Therefore, it has a motion along a straight line.

Q2 :

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 kilometres.
- (iv) The time period of a given pendulum is not constant.
- (v) The speed of a train is expressed in m/h.

Answer :

- (i) Correct
Second is the SI unit of time.

- (ii) Not correct

An object can move with constant or variable speed.

(iii) Correct

The distance between two cities can be very large. Since kilometre is a bigger unit of distance, the distance between two cities is measured in kilometres. (iv) Not correct

Time period of a pendulum depends on the length of the thread. Hence, it is constant for a particular pendulum.

(v) Not correct

The speed of a train is measured either in km/h or in m/s.

Q3 :

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

Answer :

Number of oscillations = 20

Total time taken to complete 20 oscillations = 32 s

$$\text{Time period} = \frac{\text{Total time taken}}{\text{Number of oscillations}} = \frac{32}{20} = 1.6 \text{ s}$$

Q4 :

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 the two stations = 240 km

Time taken = 4 h

$$\text{Speed} = \frac{\text{Distance}}{\text{Time taken}} = \frac{240}{4} = 60 \text{ km/h}$$

Q5 :

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 :

Initial reading of the odometer of the car = 57321.0 km

Final reading of the odometer of the car = 57336.0 km

Distance covered by the car

= Final reading of the odometer of the car - Initial reading of the odometer of the car

= 57336.0 - 57321.0 = 15 km

The given car starts at 8:30 a.m. and stops at 8:50 a.m.

Therefore, time taken by the car to cover the distance is (8:50 - 8:30) min = 20 min

Distance covered by the car = 15 km

Time taken by the car = 20 min

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}} = \frac{15}{20} = 0.75 \text{ km/min}$$

Again,

$$60 \text{ min} = 1 \text{ h}$$

$$20 \text{ min} = \frac{1}{60} \times 20 = \frac{1}{3} \text{ h}$$

$$\text{Time taken by the car} = \frac{1}{3} \text{ h}$$

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}} = \frac{15}{\frac{1}{3}} = 45 \text{ km/h}$$

Q6 :

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 :

Time taken by Salma to reach her school from her home = 15 min = $15 \times 60 = 900 \text{ s}$ Speed

of her bicycle = 2 m/s

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

$$\text{Distance covered} = \text{Speed} \times \text{Time taken} = 2 \times 900 = 1800 \text{ m} \quad 1000 \text{ m} \\ = 1 \text{ km}$$

$$\therefore 1800 \text{ m} = \frac{1}{1000} \times 1800 = 1.8 \text{ km}$$

Q7 :

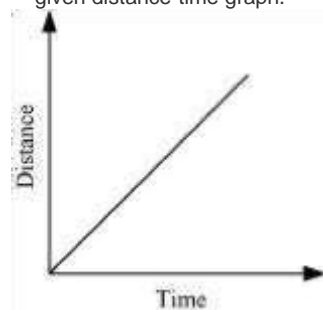
Show the shape of the distance-time graph for the motion in the following cases:

(i) A car moving with a constant speed.

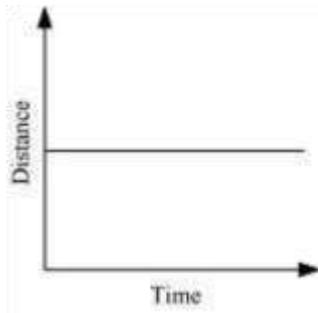
(ii) A car parked on a side road.

Answer :

(i) A car moving with a constant speed covers equal distance in equal intervals of time. Such motion of car is represented in the given distance-time graph.



(ii) The distance-time graph of a car parked on a road side is such that with the increase in time, there is no change in distance, as shown in the given figure.



Q8 :

Which of the following relations is correct?

(i) $\text{Speed} = \text{Distance} \times \text{Time}$

(ii)
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

(iii)
$$\text{Speed} = \frac{\text{Time}}{\text{Distance}}$$

(iv)
$$\text{Speed} = \frac{1}{\text{Distance} \times \text{Time}}$$

Answer :

(ii) Speed of an object is given by the relation

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Q9 :

The basic unit of speed is:

(i) km/min

(ii) m/min

(iii) km/h

(iv) m/s

Answer :

(iv) m/s

The basic unit of distance is metre (m).

The basic unit of time is second (s).

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Therefore, the basic unit of speed is m/s.

Q10 :

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

Case I

Speed of the car = 40 km/h

$$\text{Time taken} = 15 \text{ min} = \frac{15}{60} = 0.25 \text{ h}$$

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

Distance covered, $d_1 = \text{Speed} \times \text{Time taken} = 40 \times 0.25 = 10 \text{ km}$

Case II

Speed of the car = 60 km/h

$$\text{Time taken} = 15 \text{ min} = \frac{15}{60} = 0.25 \text{ h}$$

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

Distance covered, $d_2 = \text{Speed} \times \text{Time taken} = 60 \times 0.25 = 15 \text{ km}$

Total distance covered by the car, $d = d_1 + d_2 = 10 + 15 = 25 \text{ km}$ Therefore, the total distance covered by the car is 25 km.

Q11 :

Suppose the two photographs, shown in Figure 1 and Figure 2, had been taken at an interval of 10 seconds. If a distance of 100 metres is shown by 1 cm in these photographs, calculate the speed of the blue car.

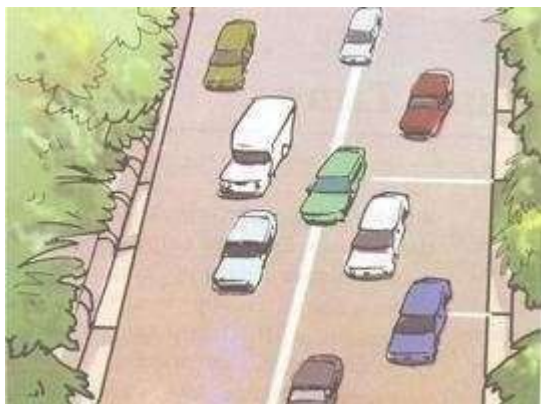


Figure 1 Vehicles moving in the same direction of on a road

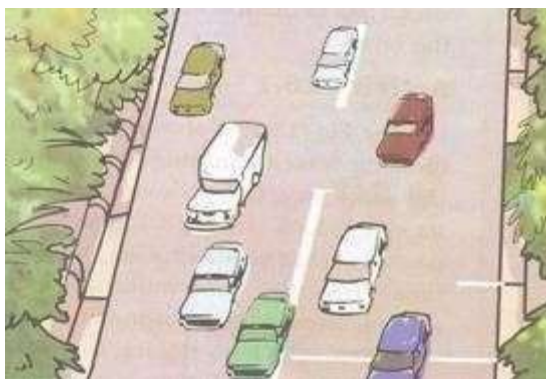


Figure 2 Position of vehicles shown in Figure 1 after some time

Answer :

The distance covered by the blue car (as evident from the photograph) from one white strip to another, which is measured by scale is 1.4 cm.

It is given that 1 cm is equivalent to 100 m.

Therefore, 1.4 cm is equivalent to 140 m.

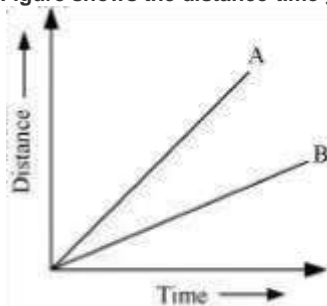
Distance travelled by the car = 140 m

Time interval between the two photographs = 10 s

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}} = \frac{140}{10} = 14 \text{ m/s}$$

Q12 :

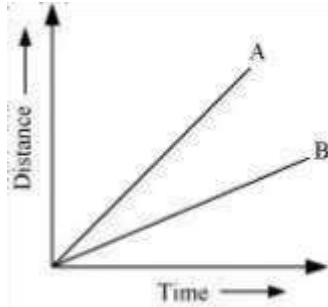
Figure shows the distance-time graph for the motion of two vehicles A and B. Which one of them is moving faster?



Distance-time graph for the motion of two cars

Answer :

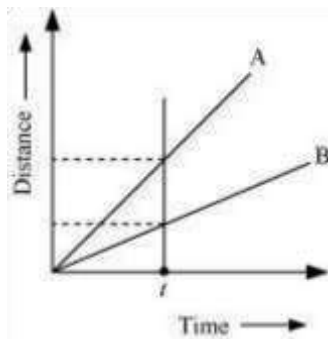
Vehicle A is moving faster than vehicle B.



Speed is given by the relation

$$\text{Speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

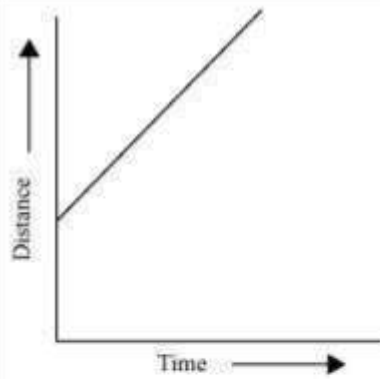
This relation shows that speed of a vehicle is greater if it covers maximum distance in a given interval of time. To compare the distance, draw a line perpendicular to the time-axis, as shown in the following distance-time graph.



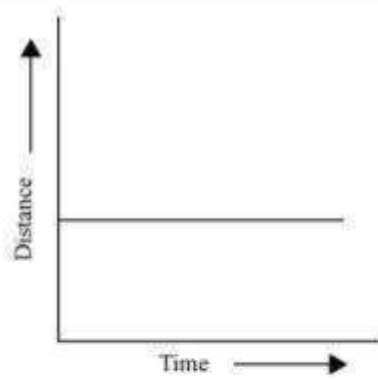
From the graph, it is evident that for a given time t , the distance covered by vehicle A is more than vehicle B. Hence, vehicle A is moving faster than vehicle B.

Q13 :

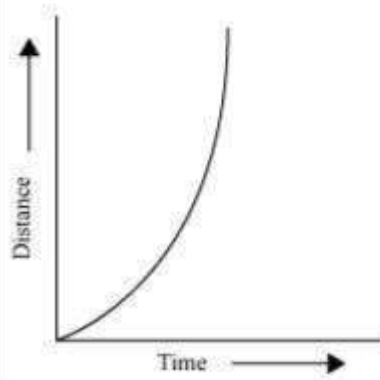
Which of the following distance-time graphs shows a truck moving with speed which is not constant?



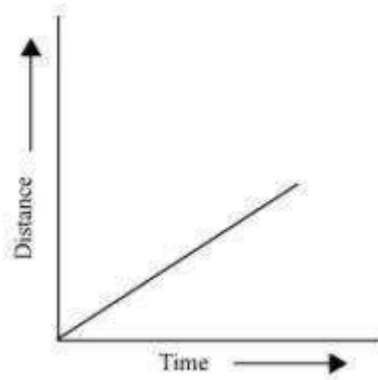
(i)



(ii)



(iii)



(iv)

Answer :

Graph (iii)

In a distance-time graph, the constant speed of a truck will be represented by a straight line.

In a distance-time graph, a straight line parallel to the time axis indicates that the truck is not moving.

A curved line on the distance-time graph indicates that the truck is moving with a speed which is not constant.