Science

(Chapter – 13) (Motion and Time)

(Class – VII)

Exercises

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 1:

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

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 2:

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

Question 3:

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

Answer 3:

The time taken to complete one oscillation is known as time period of the pendulum.

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

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 4:

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

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 5:

Distance covered by car = 57336.0 km - 57321.0 km = 15.0 km
Time taken between 08:30 AM to 08:50 AM = 20 minutes = 20/60 hour = 1/3 hour
So, speed in km/min

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

Speed in km/h

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

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.

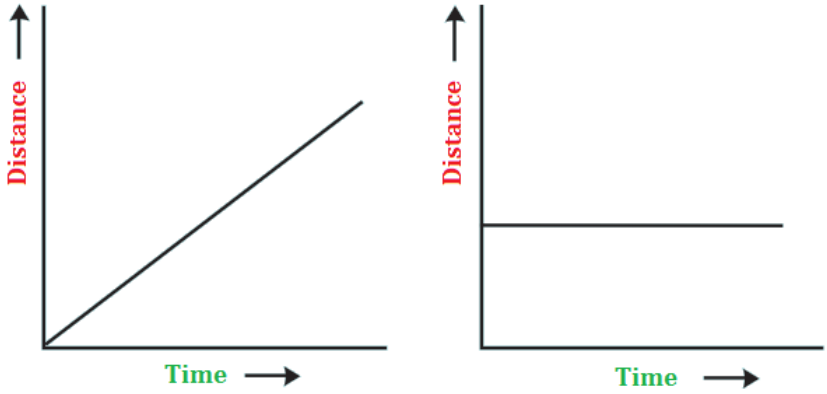
Answer 6:

Speed = 2 m/s
Time taken = 15 minutes = 15 × 60 seconds = 900 seconds
Now, distance = speed × time = 2 × 900 = 1800 m = 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 7:



A car moving with a constant speed

A car parked on a side road

Question 8:

Which of the following relations is correct?

(i) $Speed = Distance \times Time$

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

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

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

Answer 8:

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

Question 9:

The basic unit of speed is:

(i) km/min

(ii) m/min

(iii) km/h

(iv) m/s

Answer 9:

(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 10:

(ii) 25 km

Solution:

Case I:

Speed = 40 km/h

Time = 15 min = 15/60 hour

Distance = Speed × Time = $40 \times \frac{15}{60} = 10$ km

Case II:

Speed = 60 km/h

Time = 15 min = 15/60 hour

Distance = Speed × Time = $60 \times \frac{15}{60} = 15$ km

Total distance = 10 km + 15 km = 25 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 metres is shown by 1 cm in these photographs, calculate the speed of the blue car.

Fig. 13.1

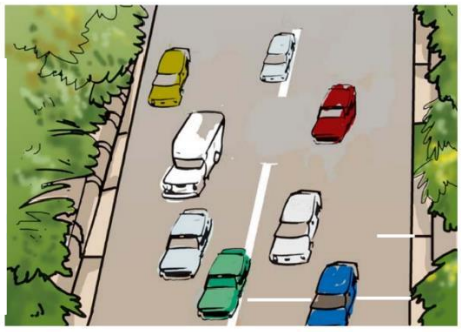


Fig. 13.2

Answer 11:

From the figures 13.1 and 13.2, we conclude that the distance covered by blue car is 2 cm.

Fig. 13.1

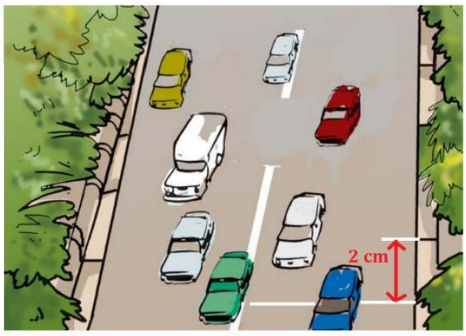


Fig. 13.2

So, the distance covered = 2 × 100 m = 200 m

Time taken = 10 seconds

$$Speed = \frac{Distance}{Time} = \frac{200\ m}{10\ s} = 20\ m/s$$

Question 12:

Fig. 13.15 shows the distance-time graph for the motion of two vehicles A and B. Which one of them is moving faster?

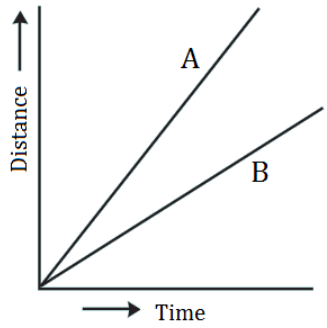


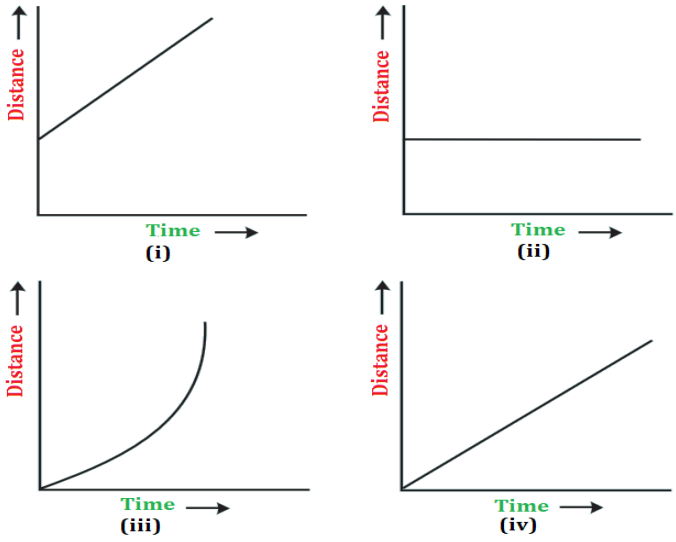
Fig. 13.15 Distance-time graph for the motion of two cars

Answer 12:

Vehicle A is traveling longer distance in lesser time as compared to Vehicle B. So, vehicle A is moving faster.

Question 13:

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



Answer 13:

(iii) Graph is not a straight line, so it shows a truck moving with speed which is not constant.