

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**

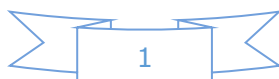
Question 3:

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.

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



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:

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

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

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

Speed in km/h

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

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

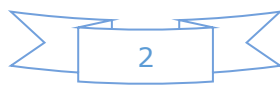
Time taken = 15 minutes = 15 × 60 seconds = 900 seconds

Now, distance = speed × time = 2 × 900 = 1800 m = 1.8 km

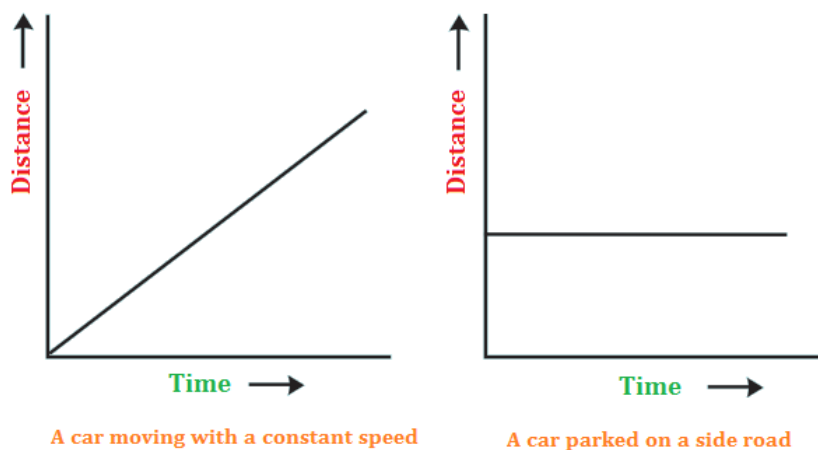
Question 7:

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:



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

Case II:

Speed = 60 km/h

Time = 15 min = $15/60$ hour

Distance = Speed \times 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

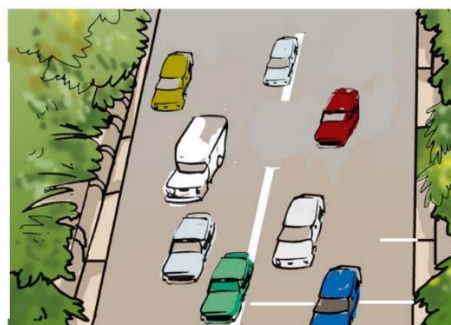


Fig. 13.2

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

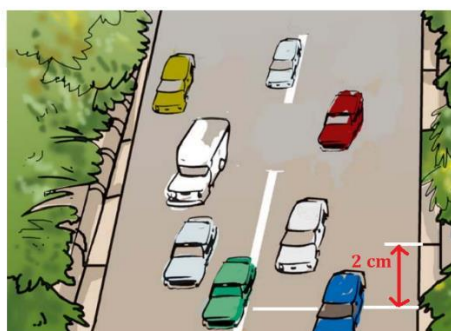


Fig. 13.2

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

Time taken = 10 seconds

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

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?

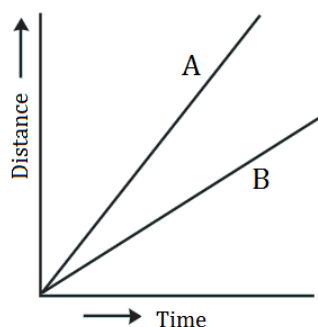


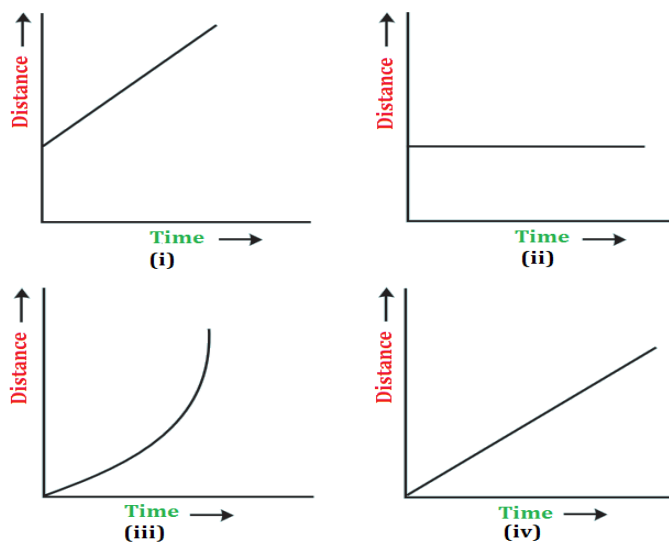
Fig. 13.15 Distance-time graph for the motion of two cars

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.