Chapter 9-Motion and Time- Textbook Exercise -(Solved)

Question1 . Classify the following as motion along a straight line, circular or oscillatory motion-

(i) Motion of your hands while running.

- **Answer- Oscillatory motion.**
- **Explanation-** The hands move back and forth in a regular rhythmic pattern, which is characteristic of oscillatory motion.

(ii) Motion of a horse pulling a cart on a straight road.

- **Answer- Straight-line motion.**
- **Explanation-** The horse pulls the cart along a straight path, which is indicative of linear motion.

(iii) Motion of a child in a merry-go-round.

- **Answer- Circular motion.**
- **Explanation-** The child moves in a circular path around the centre point of the merry-go-round, which is a defining characteristic of circular motion.

(iv) Motion of a child on a see-saw.

- **Answer- Oscillatory motion.**
- **Explanation-** The child moves up and down about a fixed point, creating a repetitive motion that is typical of oscillatory movement.

(v) Motion of the hammer of an electric bell.

- **Answer- Oscillatory motion.**
- **Explanation-** The hammer moves rapidly back and forth to strike the bell, making it an oscillatory motion.

(vi) Motion of a train on a straight bridge.

- **Answer- Straight-line motion.**
- **Explanation-** The train moves along the bridge in a single direction without changing its path, defining it as linear motion.

[Also Check - Chapter 9 – Motion and Time – 4 Worksheets Solved and Unsolved]

Question 2 . Which of the following are not correct?

(i) The basic unit of time is second.

- **Answer- Correct.**
- **Explanation-** The second is the basic unit of time in the International System of Units (SI).

(ii) Every object moves with a constant speed.

- **Answer- Not correct.**
- **Explanation-** Objects can move with varying speeds; constant speed (uniform motion) is a special case and not universally applicable. Most objects experience non-uniform motion, where their speed changes over time.

(iii) Distances between two cities are measured in kilometres.

- **Answer- Correct.**
- **Explanation-** Kilometres are a standard unit for measuring larger distances such as those between cities because they provide a convenient scale for such measurements.

(iv) The time period of a given pendulum is constant.

- **Answer- Correct, provided the conditions are constant.**
- **Explanation-** The time period of a pendulum, for small amplitudes, depends only on the length of the pendulum and the gravitational acceleration, both of which are constant for a specific pendulum in a given location.

(v) The speed of a train is expressed in m/h.

- **Answer- Not correct.**
- **Explanation-** Speed is typically expressed in metres per second (m/s) or kilometres per hour (km/h), not metres per hour (m/h).

Question 3- A simple pendulum takes 32 s to complete 20 oscillations. What is the time period of the pendulum?

Answer-

The time period of a pendulum is the duration it takes to complete one full oscillation. To find the time period, we divide the total time taken by the number of oscillations.

Total time taken = 32 seconds
Number of oscillations = 20

Time period (T) = Total time taken / Number of oscillations
Time period (T) = 32 s / 20
Time period (T) = 1.6 seconds

Therefore, the time period of the pendulum is 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-

To calculate the speed of the train, we use the formula- Speed = Distance / Time

First, ensure that the distance and time are incompatible units. Since the distance is in kilometres (km) and the time is in hours (h), we can use them directly.

Distance = 240 km
Time = 4 hours

Speed = Distance / Time
Speed = 240 km / 4 h
Speed = 60 km/h

Therefore, the speed of the train is 60 kilometres per hour.

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-

To calculate the distance moved by the car, we subtract the initial odometer reading from the final reading.

Initial odometer reading = 57321.0 km
Final odometer reading = 57336.0 km

Distance moved = Final odometer reading - Initial odometer reading
Distance moved = 57336.0 km - 57321.0 km
Distance moved = 15.0 km

Now, to calculate the speed of the car in km/min, we need to find out the time taken in minutes. The car travelled this distance between 08-30 AM and 08-50 AM.

Time taken = 08-50 AM - 08-30 AM
Time taken = 20 minutes

Speed in km/min = Distance moved / Time taken
Speed in km/min = 15.0 km / 20 min
Speed in km/min = 0.75 km/min

To express this speed in km/h, we convert minutes to hours. There are 60 minutes in an hour, so-

Speed in km/h = Speed in km/min × 60
Speed in km/h = 0.75 km/min × 60
Speed in km/h = 45 km/h

Therefore, the car moved a distance of 15.0 km, with a speed of 0.75 km/min, which is equivalent to 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-

To calculate the distance, we use the formula- Distance = Speed × Time

First, convert the time from minutes to seconds, since the speed is given in metres per second (m/s).

1 minute = 60 seconds
15 minutes = 15 × 60 seconds = 900 seconds

Now, calculate the distance using the speed of 2 m/s and the time of 900 seconds.

Distance = Speed × Time
Distance = 2 m/s × 900 s
Distance = 1800 metres

Therefore, the distance between Salma's house and the school is 1800 metres.

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-

(i) A Car Moving with a Constant Speed-
The distance-time graph for a car moving at a constant speed will be a straight line with a positive slope. The slope of the line indicates the speed of the car. A constant slope (a straight line) reflects constant speed.

(ii) A Car Parked on a Side Road-
The distance-time graph for a car that is parked will be a horizontal line. This indicates that the distance remains constant over time, meaning the car is not moving. A horizontal line on a distance-time graph signifies no change in position, hence the car is stationary.

Question 8- Which of the following relations is correct?

(i) Speed = Distance × Time
(ii) Speed = Distance / Time
(iii) Speed = Time / Distance
(iv) Speed = 1 / (Distance × Time)

Answer-

To determine the correct relation for speed, we refer to the basic definition of speed in physics. Speed is defined as the rate at which an object covers a distance. It is calculated as the distance travelled divided by the time it takes to travel that distance.

Let's evaluate each option-

(i) Speed = Distance × Time-
This relation is incorrect because multiplying distance by time would give a unit of distance-squared over time, which is not the unit of speed.

(ii) Speed = Distance / Time-
This is the correct relation for speed. Speed is the distance travelled divided by the time taken to travel that distance. This relation gives the unit of speed as distance per unit time (e.g., metres per second, kilometres per hour).

(iii) Speed = Time / Distance-
This relation is incorrect because it would give a unit of time per distance, which is not how speed is measured.

(iv) Speed = 1 / (Distance × Time)-
This relation is also incorrect. The inverse of distance times time does not represent speed and does not yield a meaningful unit in the context of measuring speed.

Therefore, the correct relation is-
(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-

The basic unit of speed is defined as the distance covered per unit time. In the context of physics and according to international standards, the basic unit of speed is metres per second (m/s). This is because the metre is the standard unit of distance, and the second is the standard unit of time. **Therefore, the correct answer is-**

(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-

To calculate the total distance covered by the car, we need to consider each segment of the journey separately and then sum up the distances.

First Segment-
Speed = 40 km/h
Time = 15 minutes
Convert time to hours- 15 minutes = 15/60 hours = 0.25 hours
Distance = Speed × Time = 40 km/h × 0.25 h = 10 km

Second Segment-
Speed = 60 km/h
Time = 15 minutes = 0.25 hours
Distance = Speed × Time = 60 km/h × 0.25 h = 15 km

Total Distance = Distance in first segment + Distance in second segment
Total Distance = 10 km + 15 km
Total Distance = 25 km

Therefore, the total distance covered by the car is 25 km, making the correct answer-

(ii) 25 km

Question 11- Suppose the two photographs shown in Fig. 9.1 and Fig. 9.2 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 fastest car.

Answer-

To calculate the speed of the fastest car, we need to determine the distance covered by the car between the two photographs and divide it by the time interval between the photographs.

- Measure the distance moved by the fastest car in centimetres (cm) as shown in the photographs.
- Convert the distance to metres (m) using the given scale. According to the scale, 1 cm represents 100 metres.
- The time interval between the photographs is given as 10 seconds.

- Use the formula for speed- Speed = Distance / Time.

Let's assume the fastest car moved 'x' cm in the photographs.

Distance in metres = x cm × 100 metres/cm

Speed = (x cm × 100 metres/cm) / 10 seconds

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Chapter 13 – Motion and Time–Class 7 science- Question and Answer (Fill in the Blanks)

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Class 7 science -Chapter 13 – Motion and Time- Complete Notes

Class 7 science -Chapter 13- Motion and Time– Definition, Explanation with Examples of Important Keywords

Chapter 13- Motion and Time–Class 7 science- Question and Answer (Solved MCQs)

Class 7 – Science- Chapter 13- Motion and Time- Question Answer (Long Question Answer)

Class 7 -Science- Chapter 13- Motion and Time Question Answer (Short Question Answer)

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