St. Andrews Scots School

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Session: 2025 – 2026
(Answer Key)

Class: VII | **Subject: Science** | **Chapter: Motion and Time**

CHECKPOINT 1

1. (T) 2. (F) 3. (F) 4. (T) 5. (F) 6. (F)

CHECKPOINT 2

1. Graph 2. Line graph 3. Axes 4. Tabular data 5. Inclined straight line
6. Horizontal line

PRACTICE TIME

A. 1. (d) 2. (d) 3. (c) 4. (b) 5. (c)

B. 1. (b) 2. (a) 3. (b) 4. (a)

C. 1. Revolutionary motion 2. Speed 3. Sundial 4. Stopwatch 5. Mean
6. Origin

D. 1. We observe
- The distance travelled by the object.
- The time taken to travel this distance.

2. Babita travels at a higher speed.
3. kilometer/hour (km/h).
4. Sand clock
5. Speedometer
6. Non-uniform motion.

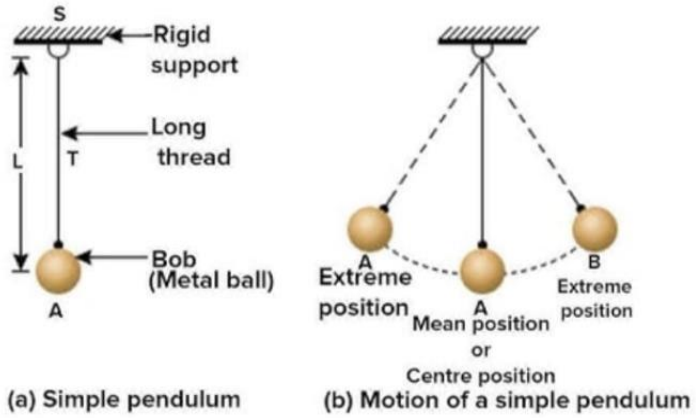
E. 1. We measure the distance covered by an object and time taken to cover this distance.

2. We know, 1 km = 1000 m and 1 h = 60 min = 60 X 60 s
$\therefore$ 1 km/h = $\frac{1000 \text{ m}}{\quad}$ = $\frac{\quad 05 \quad}{\quad}$ m/s

60 X 60 s 18

3. If a moving body covers unequal distances in equal intervals of time or equal distances in Unequal intervals of time, it is said to be in non-uniform motion.
   On the other hand, if a moving body covers equal distances in equal intervals of time, it is said to be in uniform motion.

4. If initially, the bob is displaced from its mean position, say O to point A and released, it comes back to its mean position and continues to move forward to point B, comes back towards the mean position.
   Thus, the motion of the bob starting form point O to point A, then A to B via O, and finally back to O from B, is counted as one oscillation.



(a) Simple pendulum (b) Motion of a simple pendulum

5. **Multiples of second**

   1 minute = 60 seconds
   1 hour = 60 minutes = (60X60) seconds = 3600 seconds
   1 day = 24 hours
   1 month = 30 days
   1 year = 12 months = 365.25 days or 365 days 6 hours

   Some other multiples of second are decade, century and millennium.

   Submultiples of second

   Microsecond and nanosecond are some of the submultiples of a second.

6. Average speed is the mean of all the speeds of a body when it is in non-uniform motion. The average speed is calculated by dividing the total distance travelled by the total time taken in covering the distance.

$$\text{Average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$$

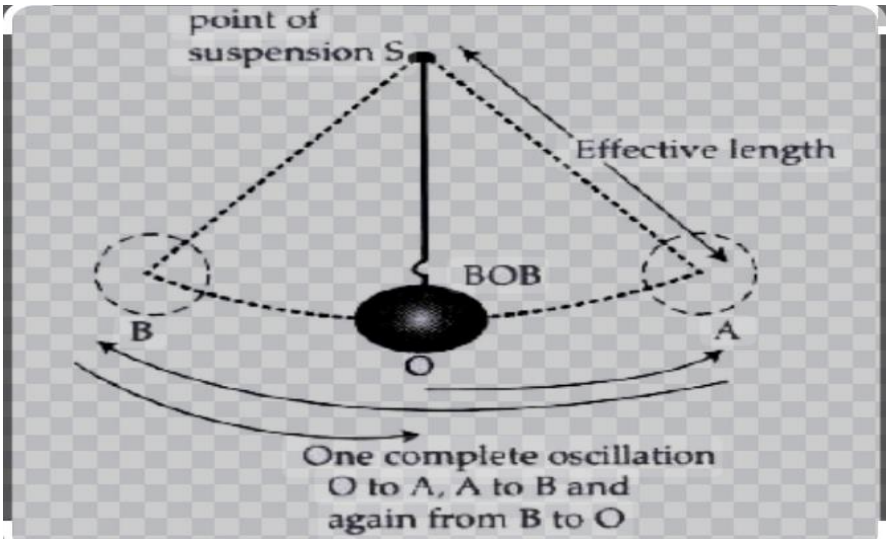
7. As the distances travelled vary during the same duration of time, the motion represented by the data is non-uniform motion.

8. The given readings of odometer show that Hina travelled a distance of 28 km.

9. Speed of an object is defined as the distance travelled by the object in a unit time. The SI unit of speed is m/s (metre per second). The other commonly used unit is km/h (kilometer per hour).

F. 1. The time taken by the bob to complete one oscillation is known as the time period of the Simple pendulum.
The time period f a simple pendulum can be calculated experimentally as follows:
Take a 1m long cotton thread and tie a metallic bob to one of its ends. Tie its other end to a rigid support (iron stand) in such a manner that the thread and the bob do not touch the ground or any other object. Let the bob come to rest. Mark the mean position of the bob carefully with a pen or chalk on the ground or the wall behind the pendulum. Keep a stopwatch ready. Slightly displace the bob to one side and release without pushing it. Start the stopwatch as soon as the bob reaches the mean position. Count 1 oscillation when the bob crosses the mean position, in the same direction. Count 20 oscillations and stop the stopwatch at the end of 20th oscillations.

Now, calculate time period by dividing the time taken for completing the oscillations by the number of oscillations.



2. The speed of a ball rolling on the floor can be measured by following method:
Take each of the footballs (toys), one at a time. Place the football on a surface and mark its initial position. Carefully, start the stopwatch as soon as you allow the football to move and stop it when the football stops. Note this time. Mark the last point of the journey of the football. Measure the length of the path travelled by the football. Now, calculate the speed of the football by dividing the distance travelled by the time taken.

3. A sundial can be made as follows:
Take a big cardboard sheet and cut out a circular piece of 50 cm diameter. Take a wooden rod of about 20 cm. Fix it upright at the centre of cardboard disc with the help of a good

adhesive. Keep this arrangement in the sun on a sunny day in an open space at 6 am in the morning. Observe the shadow of the central rod on the disc, mark its position at the circumference of the disc with the help of a pencil and write the time at this point. Note the position of the shadow and mark its presence near the circumference of the disc after every hour till the sunset. Your sundial is ready.

SUNDIAL

4. Before the invention of pendulum clock, the time was measured by rising and setting of the sun, from one moon to next one, by the earth to complete one revolution around the sun, by sundials, water clocks and sand clocks.
   (a) The time period of a simple pendulum is not affected by increasing or decreasing displacement of the bob.

   (b) Time period is directly proportional to the length of the simple pendulum. Hence, if the length of the string is increased, the time period would also increase and vice versa.

G. 1. Distance swum by a fish = 18 m, Time taken = 6s

$$\therefore \quad \text{Speed of the fish} = \frac{\text{Distance}}{\text{Time}} = \frac{18\ \text{m}}{6\ \text{s}} = 3\ \text{m/s}$$

2. For Santro car,

Distance = 120 km, Time = 3 h, speed = ?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{120\ \text{km}}{3\ \text{h}} = 40\ \text{km/h}$$

For Maruti Zen car,

Distance = 150 km, Time = 4 h, speed = ?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{150\ \text{km}}{4\ \text{h}} = 37.5\ \text{km/h}$$

From the above calculations, we have 40 km/h > 37.5 km/h
Thus, Santro car was moving faster.

3. Amit, Aman and Neeraj all the three ran a race of same distance, i.e., 100 m. But, they covered the track in different interval of time. Let us arrange the time taken by them in increasing order.

   Aman (18.9 s) < Amit (19.5 s) < Neeraj (20.5 s)

   Thus, we see that Aman covered the track in the least duration of time, so he won the race. Also, we observe that Neeraj took maximum time to cover the track, hence he got the third position.

4. Distance = 12 m, Time = 15 s, Speed = ?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{12\text{ m}}{15\text{ s}} = 0.8\text{ m/s or } 80\text{ cm/s}$$

($\therefore$ 1 m = 100 cm)

Thus, the speed of the ant was 80 cm/s or 0.8 m/s.

5. Speed = 5 m/s, Distance = 62 m, Time = ?

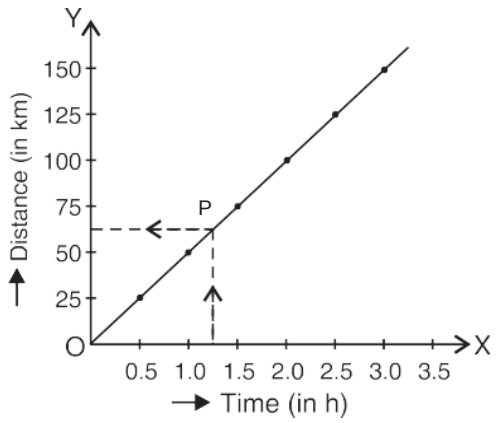
As $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$,

Hence, $\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{62\text{ m}}{5\text{ m/s}} = 12.4\text{ s}$

6. Distance = 200 km, Time = 2.5 h, Average speed = ?

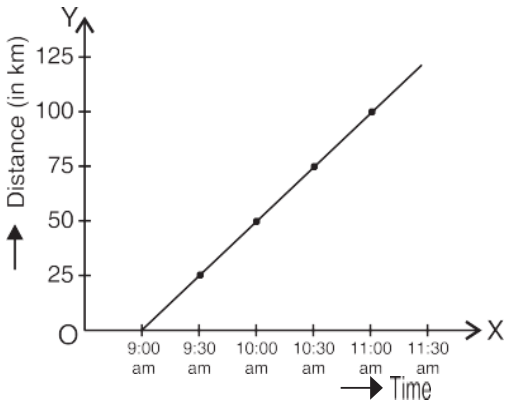
$$\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}} = \frac{200\text{ km}}{2.5\text{ h}} = 80\text{ km/h}$$

7. (a) Let us draw a distance-time graph using the given data.



From the graph, we observe that the object is moving with a uniform speed. When we move from point 1.25 h (of time axis) vertically upward, we arrive at point P on the graph then move parallel to time axis towards distance axis. Hence, we reach at a point where the value is 62.5 km. Thus, the distance travelled at time 1.25 h is 62.5 km.

(b) Using the data, let us plot a distance-time graph.



(i) The graph so obtained is a straight line, hence the vehicle is moving with a uniform speed.

(ii) Time duration = 9:30 – 9:00
= 30 min
Distance covered = 25 – 0 = 25 km

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{25 \text{ km}}{30 \text{ min}} = \frac{25}{\frac{1}{2}} \text{ km/h} \quad (\because 60 \text{ min} = 1 \text{ h})$$
$$= 50 \text{ km/h}$$

Again, speed (in m/s) = 50 km/h
$$= 50 \times \frac{5}{18} \text{ m/s} = 13\frac{8}{9} \text{ m/s}$$

H. 1. Speed of ant = 2m/min, Time = 45 s = $\frac{45}{60}$ min

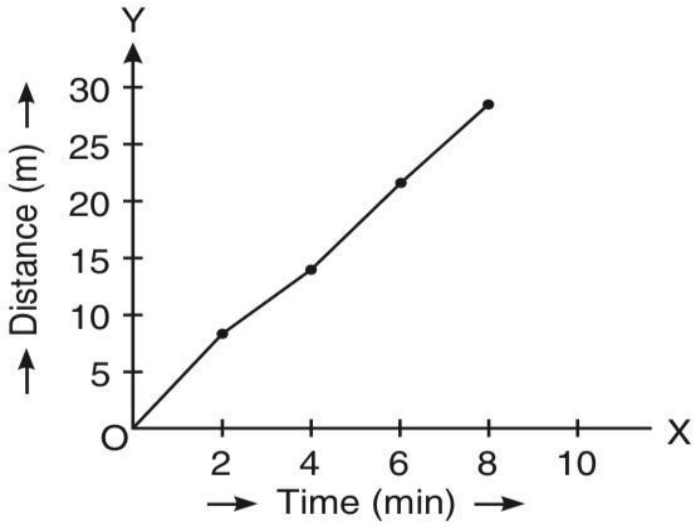
Distance = Speed x time

$$= 2 \text{ m/min} \times \frac{45}{60} \text{ min}$$
$$= 1.5 \text{ m}$$

$\because$ 1 m = 100 cm
$\because$ 1.5 m = 1.5 x 100 cm = 150 cm
Also 1000 m = 1 km
1.5 m = 1.5 ÷ 1000 km = 0.0015 km

2. First of all, let us find the time taken and distance travelled.

Time Taken (min)	2	4	6	8
Distance Travelled (m)	8	14	22	28



Passage/Case-based Questions

1. Speed is the rate at which an object covers a distance.
2. 50 km/h = 50 X $\frac{5}{18}$ m/s = 13.89 m/s ($\because$ 1 km/h = 5/18 m/s)