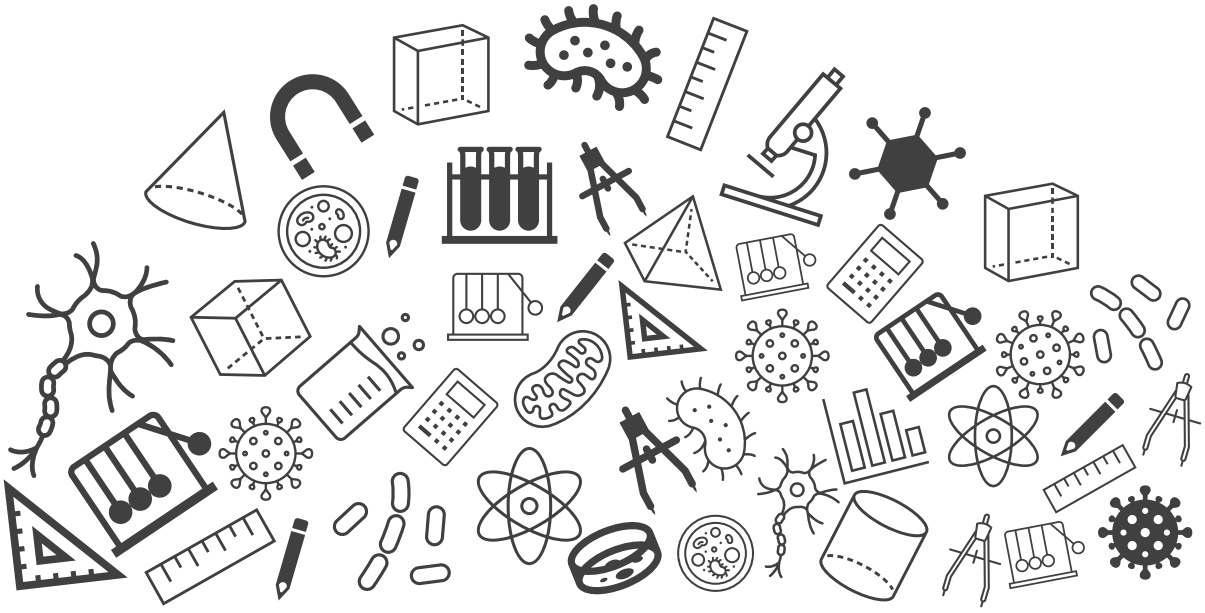
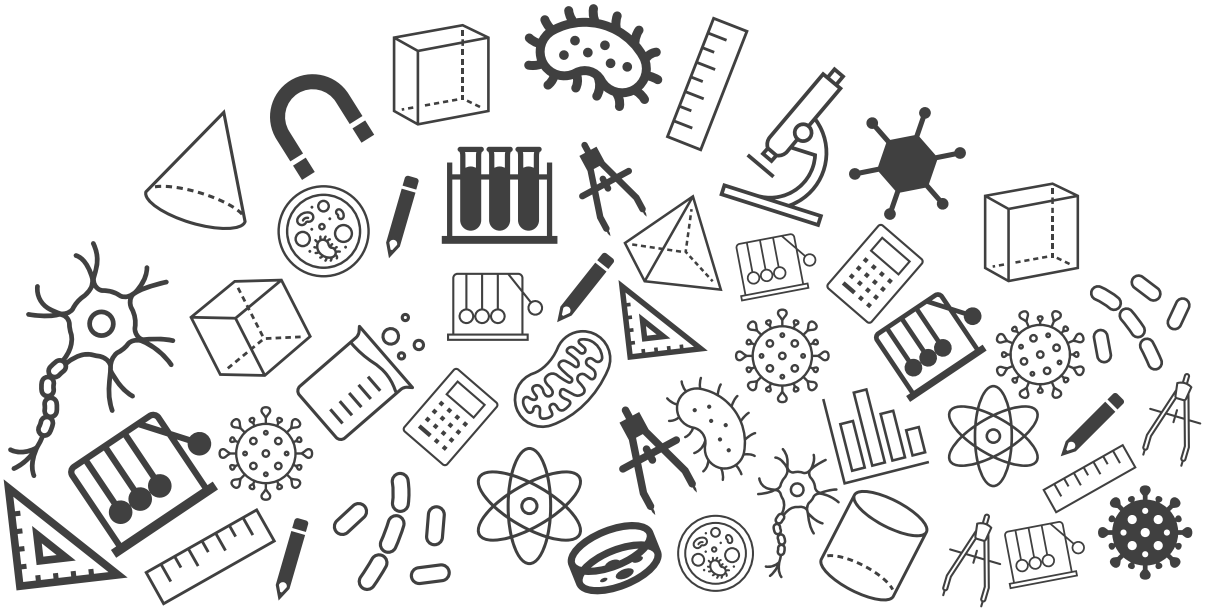
Grade 07 : Science
Exam Important Questions



Motion and Time



Motion and Time

Topic : Exam Important Questions

1. A car covers 20 km in the first hour and 30 km in the last 4 hours. Find:
   i) Speed of car in the first hour
   ii) Speed of the car in the last four hours
   iii) Average speed of the car
   [4 marks]

   Solution:
   i) Speed of the car in the first hour = Distance/Time
   = 20 / 1
   = 20 km/h
   [1 mark]

   ii) Speed of the car in the last 4 hours = Distance/Time
   = 30 /4
   = 7.5 km/h
   [1 mark]

   iii) Total distance covered = 20 + 30 = 50 km [0.5 marks]

   Total time taken = 1 + 4 = 5 h
   [0.5 marks]

   Average speed = total distance/total time
   = 50 / 5
   = 10 km/h
   [1 mark]

2. The odometer of a car reads $5000\ \text{km}$ at the start of a trip and $5480\ \text{km}$ at the end of the trip. If the trip took $8\ \text{hr}$, calculate the average speed of the car in m/min.
[2 marks]

Total distance covered by the car $= (5480 - 5000)\ \text{km} = 480\ \text{km}$
[0.5 marks]

Total time taken $= 8\ \text{hours}$

We know,
Average speed = $\frac{Total\ distance\ covered}{Total\ time\ taken}$
$= \frac{480}{8} = 60\ \text{km/h}$
[1 mark]

We have to express the average speed in m/min. Now,

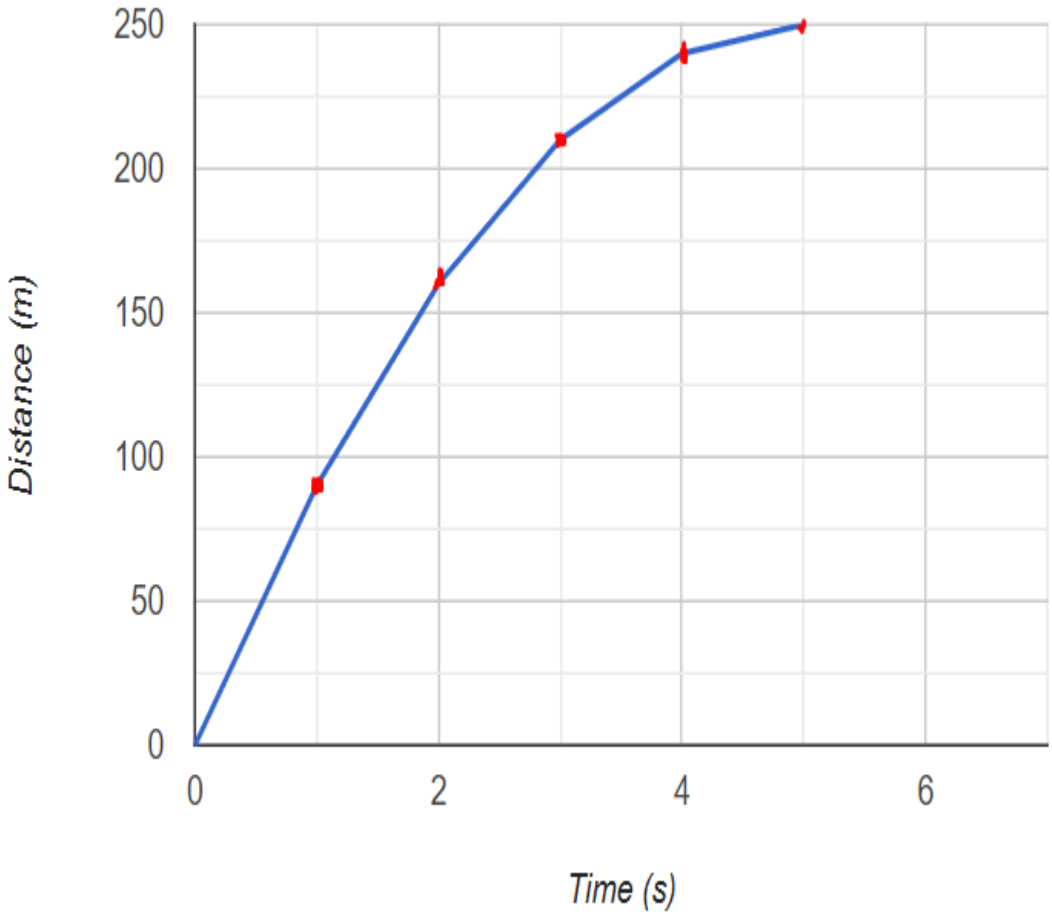
$1\ \text{km} = 1000\ \text{m}$
and $1\ \text{hr} = 60\ \text{min}$

60 km/h = $\frac{60 \times 1000}{60}$ m/min = 1000 m/min

[0.5 marks]

3. With the help of a distance-time graph, find out whether the motion by the object is uniform motion or non-uniform motion. [2 marks]

Time (s)	0	1	2	3	4	5
Distance (m)	0	90	160	210	240	250



(1.5 marks)

The graph is clearly non-linear, therefore the object is undergoing non-uniform motion. (0.5 marks)

4. Plot a distance-time graph of the tip of the second hand of a clock by selecting 4 points on x-axis and y-axis respectively. The circumference of the circle traced by the second hand is 64 cm.
[4 marks]

Solution:
Given that, the tip of a second hand of a clock covers a distance of 64 cm in one rotation, so, the time taken is 60 seconds.

The distance-time graph for this motion can be made by taking four points at intervals of 15 s. Here are the distances travelled:

i. 16 cm in 15 s

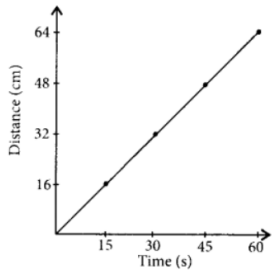
ii. 32 cm in 30 s

iii. 48 cm in 45 s

iv. 64 cm in 60 s

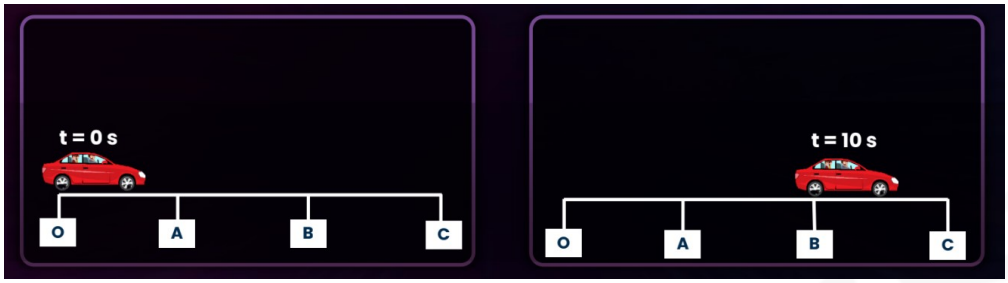
[2 marks]

Hence, the distance-time graph is shown below and the motion is uniform motion:



[2 marks]

5. Suppose the given two photographs had been taken at an interval of 10 s. If a distance of 100 m is shown by each partition in these photographs, calculate the speed of the car.
[2 marks]



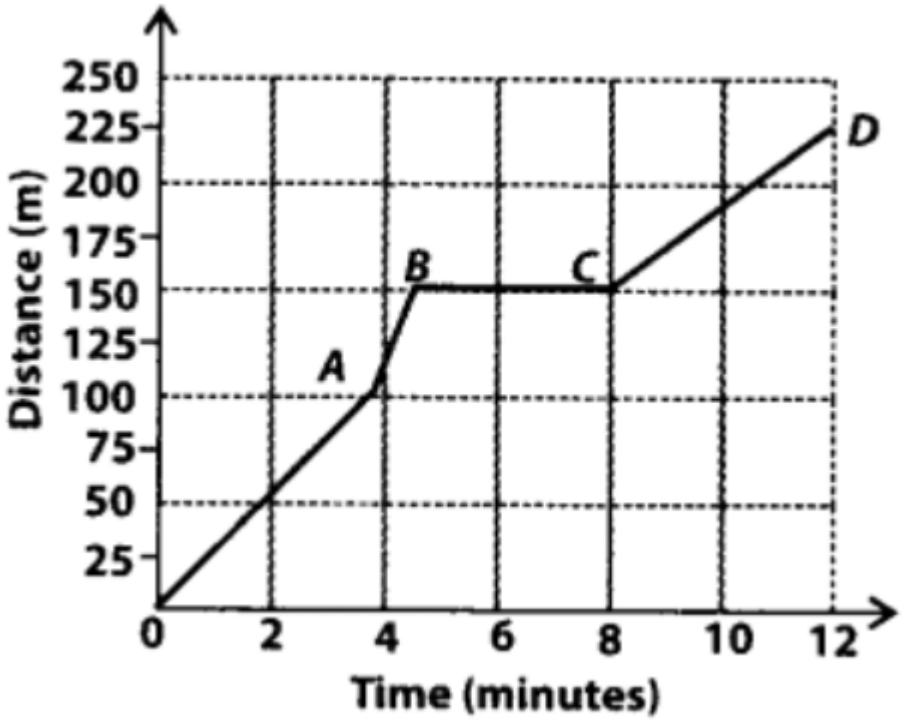
Solution:
This question can be solved in two steps.
Step 1:
Given:
The distance between each partition, i.e., OA = AB = BC = 100 m.
Now, the distance travelled by car will be OA + AB = 100 + 100 = 200 m.
Time taken to cover this distance = Time interval between the two photographs = 10 s
[1 mark]

Step 2:
We know that,
Speed = Distance travelled/ Time taken

Speed = (200 m)/(10 s) = 20 m/s.

Thus, the speed of the car is 20 m/s.
[1 mark]

6. Boojho goes to the football ground to play football. The distance-time graph of his journey from his home to the ground is given as figure.



(a) What does the graph between point B and C indicate about the motion of Boojho?

(b) Is the motion between 0 to 4 minutes uniform or non-uniform?

(c) What is his speed between 8 and 12 minutes of his journey?

[3 marks]

(a) Graph between point B and C is a horizontal line which indicates that Boojho is at rest, i.e. his speed is zero.
(1 mark)

(b) Motion between 0 to 4 minutes is non-uniform as distance-time graph for this time interval is not a single straight line.
(1 mark)

(c) Speed of Boojho between 8 and 12 minutes of his journey

$= \frac{Total\ dis\tan ce\ covered\ in\ the\ time\ interval}{Time\ interval}$ =

$\frac{(225-150)\ m}{(12-8)\ min} = \frac{75}{4}$ = 18.75 m/min

(1 mark)

7. A simple pendulum takes 20 s to complete 5 oscillations. What is the time period of the pendulum?
[2 marks]

Time period is defined as the time taken to complete one complete oscillation.
[0.5 marks]

It is given that the pendiulum takes 20 s to complete 5 oscillation.
[0.5 marks]

Therefore, by unitary method,
One oscillation will take 20/5 = 4 s.
Therefore, the time period of the pendulum will be 4 seconds.
[1 mark]

8. What is a sundial? How does it work? [2 marks]

Sundial: 1 mark
Working: 1 mark

Sundials are the oldest known instruments for telling time. The surface of a sundial has markings for each hour of daylight. As the Sun moves across the sky, another part of the sundial casts a shadow on these markings. The position of the shadow shows what time it is.

Sundial works on the principle that the sun takes up similar positions each day. Depending on the location of the sun with respect to the dial, the dial would have different shadows by which people can approximately tell the time of the day.