

CHAPTER - MOTION AND TIME (PART-III)Measuring Speed

We have learnt how to measure distance and time, we can calculate the speed of an object. Now, we should learn how to measure the speed by doing an activity.

Speedometer and Odometer

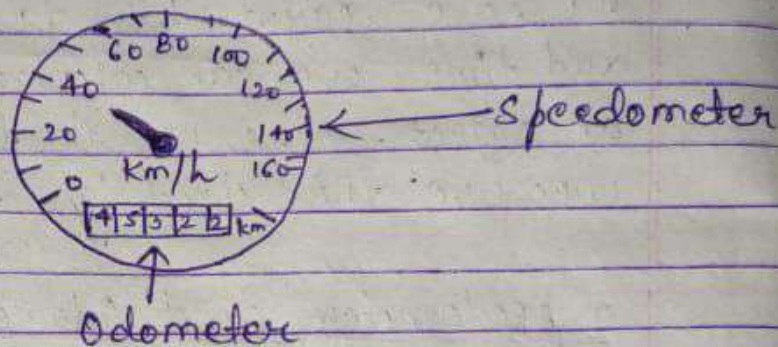
The speedometer is an instrument on a vehicle's dashboard which indicates the speed of the vehicle when it is moving.

This instrument tells us the speed of a running vehicle at that instant of time in kilometre per hour.

Example → A panel of instruments fitted on the top of a scooter or a motorcycle. In the same way, metres can be seen on the dashboard of cars, buses and other vehicles. In addition to the speedometer, there is another instrument in a vehicle called odometer.

An instrument which is used for measuring the distance travelled by a vehicle is known as an odometer. This instrument measures the distance in kilometres. Usually, a small rectangular window

within speedometer dial with the symbol km (as shown in the figure below) gives the (metre) odometer reading.



Graphical Representation of Motion

By drawing the distance-time graph, the motion of an object can be represented in diagram form. A distance-time graph represents how the distance travelled by a moving object changes with time.

Method to Draw Distance-Time Graph

To draw a distance-time graph, use a graph paper.

For drawing the distance-time graph for a moving object, we require the readings of distances travelled by the object and the corresponding time values which have been obtained experimentally.

The distance travelled by a car at various times are :

Distance (km)	0	2	4	6	8	10
Time (min)	0	2	4	6	8	10

Step ① firstly, take the graph paper and draw a horizontal line Ox (x -axis) and a vertical line Oy (y -axis) at right angles to each other.

Step ② Now, write time (min) on x -axis and distance (km) on the y -axis and also put arrows with them.

Step ③ In this problem, we have only small time values (0, 2, 4, 6, 8 and 10 min) to represent. So, the scale to be used for showing time values 0, 2, 4, 6, 8 and 10 on the line Ox can be $2 \text{ min} = 2 \text{ cm}$. Mark all the time values on Ox with the given scale.

Step ④ Again, the distance values given in this problem are small (0, 2, 4, 6, 8 and 10 km) so, the scale to be used for representing distance values on the graph can be $2 \text{ km} = 2 \text{ cm}$. We now mark the distance values 0, 2, 4, 6, 8 and 10 on the line Oy .

Step ⑤ We can see in the graph that the first reading given in this problem is time = 0 and distance = 0.

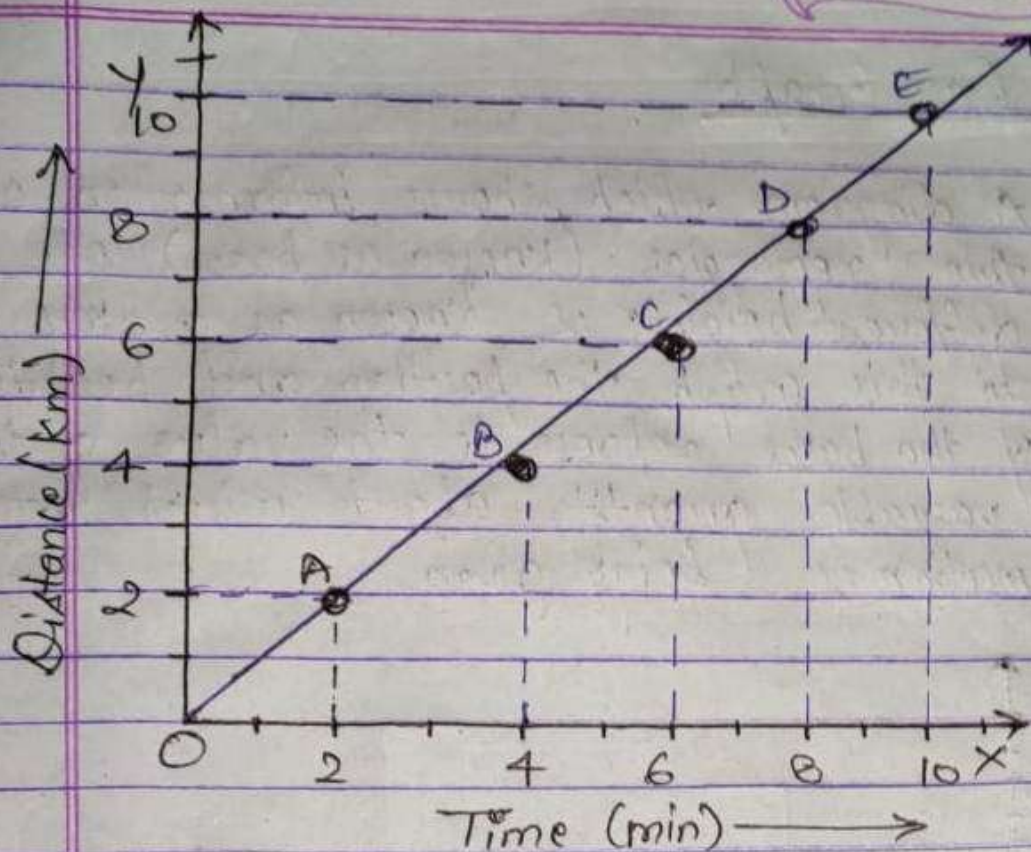
The point O (called origin) represents the 0 (zero) values both for time and distance. Therefore, at point O on graph paper, time is 0 and distance is also 0. The second reading is time = 2 min and distance = 2 km.

Step 6 Now, the vertical line above the 2 min mark on the graph paper and horizontal line on the right side of 2 km mark on graph paper crosses at point (A). So, we put a pencil dot at point A.

Step 7 In the same way, the third, fourth, fifth and sixth reading of time and the corresponding readings of distance will give us points B, C, D and E on the graph paper which are marked as pencil dots.

Step 8 After joining the point O and the dots at point A, B, C, D and E with a pencil line, we will get a straight line graph OE. So, this is the required distance-time graph for the motion of the car.

Since the distance-time graph for the motion of the car is a straight line, so from here we can conclude that the car is moving with a constant speed (or uniform speed).



Distance-Time graph of the car.

Scale of the graph

On x-axis,

1 big division represents 1 min

On y-axis

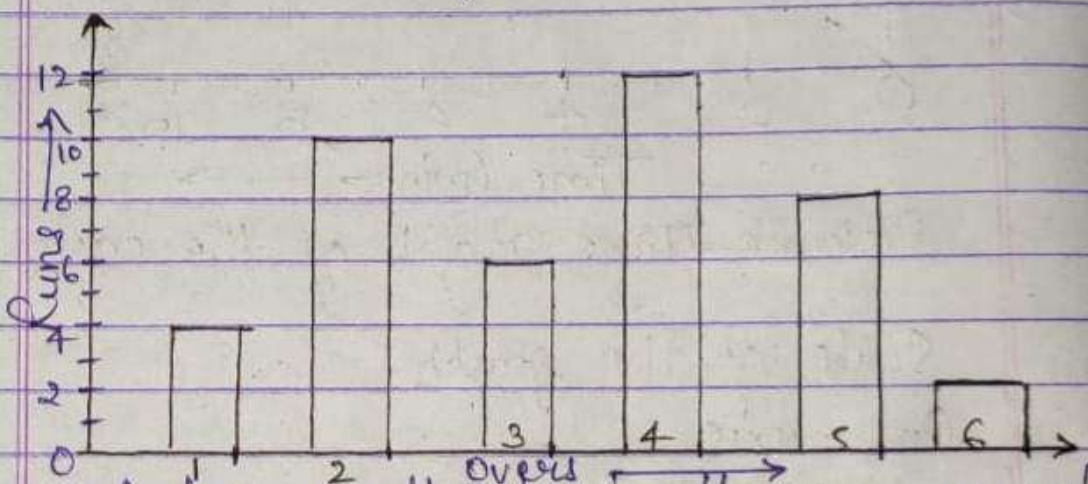
1 big division represents 1 km.

Other Types of Graph

We generally see while reading newspapers, magazine etc, that the present information is represented in various forms of graphs in order to make it interesting. These graphs generally bar graphs and pie chart as shown below:

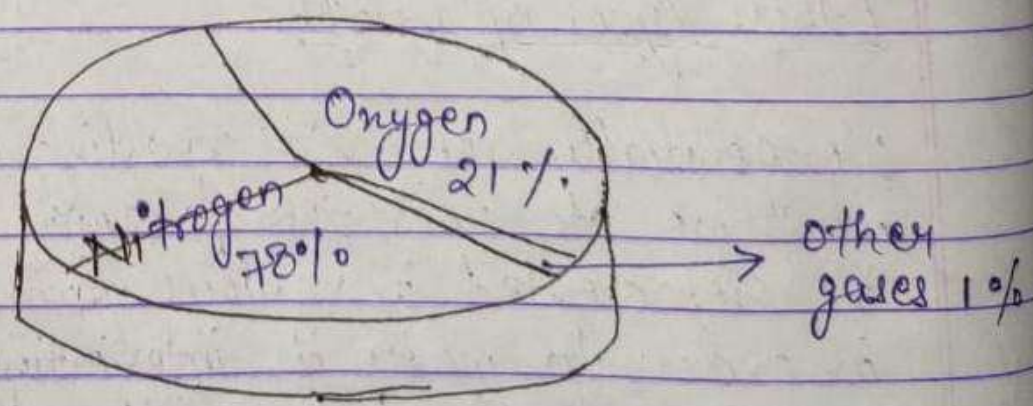
Bar Graph

A diagram which shows information as thin rectangles (known as bars) of different heights is known as a bar graph. In this graph, the position and heights of the bars represents the value of the variable quantity about which information is being given.



A bar graph showing the runs scored in six overs of a cricket match.

Pie Chart



A pie chart showing the composition of air.

A kind of graph or diagram which shows the percentage composition of something in the form of slices of a circle (the whole circle representing 100%) is known as a pie chart.

Home Assignment

- ① What is the use of speedometer and odometer in a vehicle? What is the basic difference between the two?
- ② What is distance-time graph?
- ③ Collect information about a moving car and make a chart of distance and time taken and then represent it graphically. Also, classify the motion of the car as uniform or non-uniform.
- ④ What is the difference between a line-graph (as distance-time graph) and bar graph.
- ⑤ Draw a pie chart showing the distribution of water on earth.