Distance-Time graph

A distance-time graph shows how far an object has travelled in a given time. It is a simple line graph that denotes distance versus time findings on the graph.

- Distance is plotted on the Y-axis.
- Time is plotted on the X-axis.

Note: Curved lines on a distance-time graph indicate that the speed is changing.

Importance of Distance-Time Graph

We deal with the distance-time graph while studying the motion of bodies. If we record distance and time for the motion of a body and plot the same data on a rectangular graph, we will obtain a distance-time graph corresponding to the motion of that body.

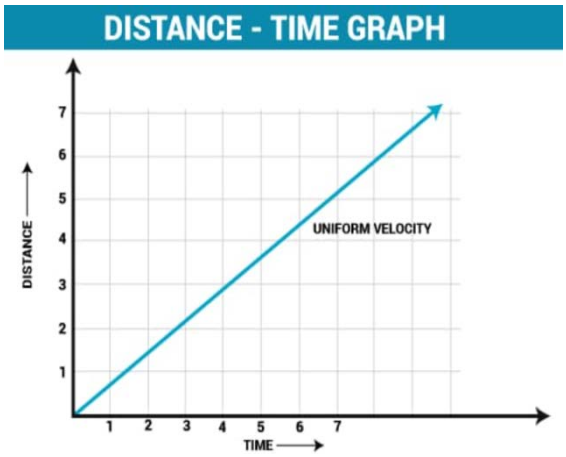
- It is used to study the motion of an object.
- The distance is represented on the Y-axis and time is represented on the X-axis.
- The motion is uniform when the distance-time graph is a straight line.
- If the distance-time graph is moving upwards then the speed of the object is increasing.
- If the distance-time graph is moving downwards then the speed of an object is decreasing
- The object is said to be at rest if the distance-time graph is parallel to the X-axis.
- The object's speed is determined by the slope of the distance-time graph.
- If there is a curve in the distance-time graph then the speed of the object is changing.

Distance-Time graph

Example:

For better understanding, let us consider an example of uniform motion. A bus driver drives at a constant speed which is indicated by the speedometer and the driver measures the time taken by the bus for every kilometre. The driver notices that the bus travels 1 kilometre every 2 minutes.

He prepares the data table after this so that he has a clear understanding of everything and then draws the graph as shown below.



By this table, he had a clear idea about the speed which is: ½ × 60 = 30 km/hr.

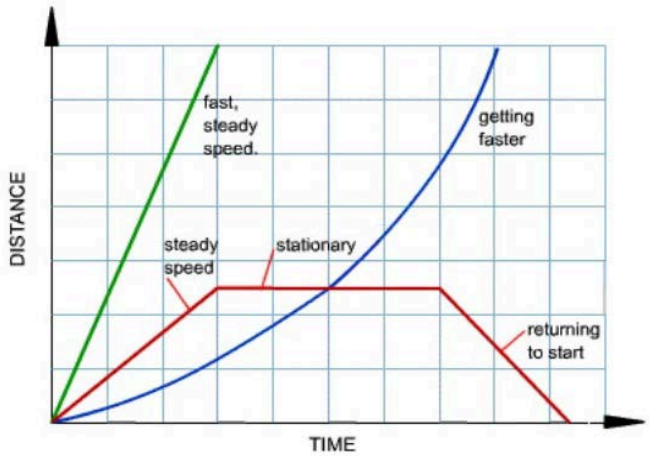
The graph is a straight line and the motion of the bus is also uniform. Also, from the graph, we can find the speed of the bus at any instant of time. The initial and final position of the car can be found as the following:

Speed = (Final Position-Initial position)/Time

Distance-Time graph

The slope of the line can be found by drawing a rectangle anywhere near the straight line which determines the speed of the bus. If an object is not moving, the distance-time graph results in a horizontal line which shows that the object is at rest.

Distance-Time Graph



Conclusion:

The following things can be concluded now:

- If the distance-time graph is a straight line then the motion is uniform.
- If the distance-time graph of a body is given, its speed can be calculated using the slope of the graph.
- The slope of the straight-line graph is the same irrespective of the interval which is chosen. This implies that the speed of an object under uniform motion remains constant.