

MOTION GRAPHS

Describing the motion of an object can be difficult to do with words. Sometimes graphs make understanding the motion of an object easier to picture.

Remember:

- Motion is a change in position measured by distance and time.
- Speed tells us the rate at which an object moves.
- Velocity tells the speed and direction of a moving object.
- Acceleration tells us the rate speed or direction changes.

DISTANCE-TIME GRAPHS

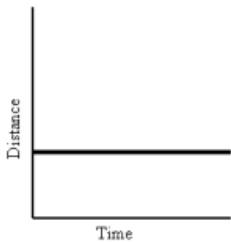
Plotting distance against time can tell you a lot about motion. Let's look at the axes:



Time is always plotted on the x-axis (bottom of the graph). The further to the right on the axis, the longer the time from the start.

Distance is plotted on the y-axis (side of the graph). The higher up the graph, the further from the start.

If an object is not moving, a horizontal line is shown on the distance-time graph:



Time is increasing to the right, but its distance does not change. It is not moving. We say it is **at rest**.

If an object is moving at a constant speed, it means it has the same increase in distance in a given time:

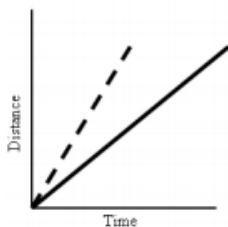


Time is increasing to the right, and distance is increasing constantly with time. The object moves at a **constant speed**.

EXAMPLE:

Let's look at two moving objects:

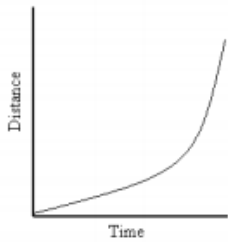
Both of the lines in the graph show that each object moved the same distance, but the steeper dashed line got there before the other.



The steeper line indicates a larger distance moved in a given time. In other words, a **higher speed**.

Both lines are straight, so both speeds are constant.

Graphs that show acceleration look different from those that show a constant speed:



The line on this graph is curving upwards. This shows an increase in speed, since the line is getting steeper. In other words, in a given time, the distance the object moves is changed. It is getting larger. This is called **acceleration**.

SUMMARY

A distance-time graph tells us how far an object has moved with time.

- The steeper the graph, the faster the motion.
- A horizontal line means the object is not changing its position (it is at rest).
- A downward sloping line means the object is returning to the start.

