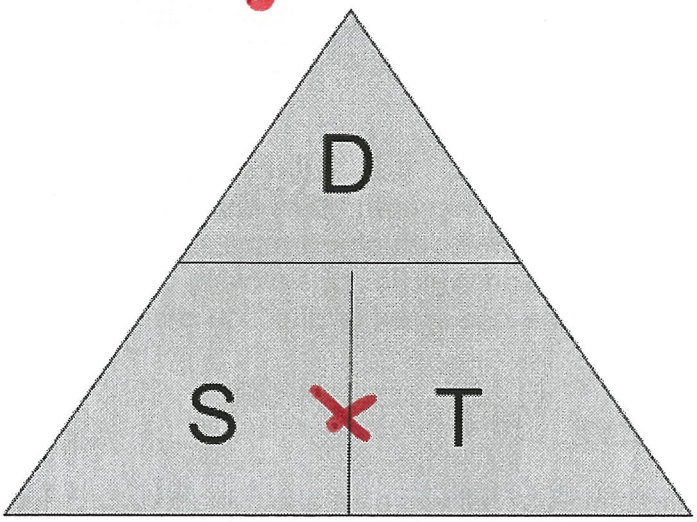
Speed Notes

- **Motion** is a change in the Position of an object.
- **Speed** is the distance an object travels in a unit of time.
- **Distance** is the Space between two objects.
- **Time** is a measure of Change using minutes, seconds, days, years, etc.



Three Speed Equations: If you know two of the three measurements, you can figure out the third!!!!

- Distance= S x T
- Speed= $\frac{D}{T}$
- Time= $\frac{D}{S}$

If a bunny hops 118 meters in 32 seconds, what is his speed? Show your work!

d= 118 m
t= 32 s
s= ? 3.6875 m/s

$\frac{D}{T}$

Ernie, the earthworm, is crawling at a speed of 1.5 meters/minute. How far can he travel in 60 minutes?

d= ? 90 m
t= 60
s= 1.5

60 x 1.5 S x T

How long would it take a motorcycle traveling at 43 miles per hour to travel 531 miles?

d= 531
t= ? 12.35 hours
s= 43

$\frac{D}{S}$

Name_____

Motion Graphs

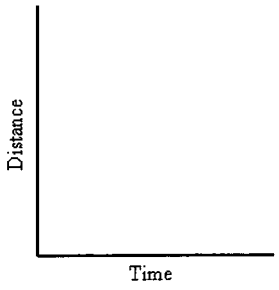
Describing the motion of an object is occasionally hard to do with words. Sometimes **graphs** help make motion easier to picture, and therefore understand.

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

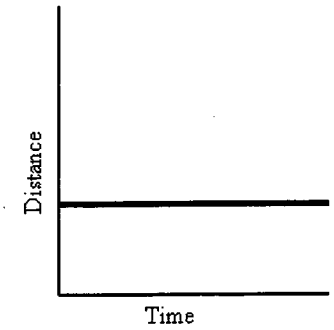
Plotting distance against time can tell you a lot about motion. Let's look at the axes:



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.

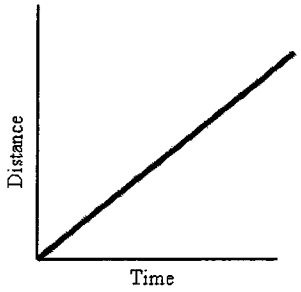
Distance is plotted on the Y-axis (side of the graph). The higher up the graph, the further from the start.

If an object is not moving, a horizontal line is shown on a 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**.

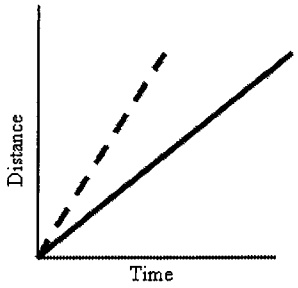
If an object is moving at a constant speed, it means it has the same increase in distance in a given time:



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

Constant speed is shown by straight lines on a graph.

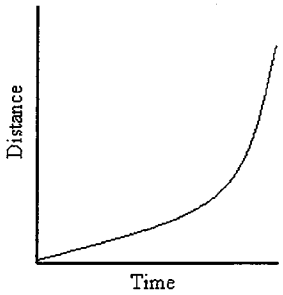
Let's look at two moving objects:
Both of the lines in the graph show that each object moved the same distance, but the steeper dashed line got there before the other one:



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

Both lines are **straight**, so both speeds are **constant**.

Graphs that show acceleration look different from those that show constant speed.



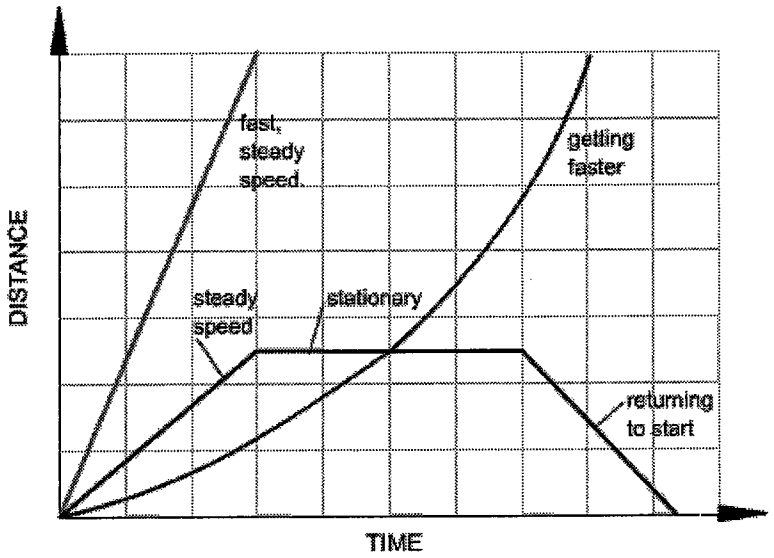
The line on this graph is curving upwards. This shows an **increase in speed**, since the line is getting steeper:

In other words, in a given time, the distance the object moves is change (getting larger). It is **accelerating**.

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 not moving, it is at rest.
- A downward sloping line means the object is returning to the start.



(Graph from:
http://www.bbc.co.uk/schools/gcsebitesize/physics/forces/speedvelocityaccelerationfhrev2.shtml)