Uniform Motion Review

Kinematics
A branch of physics dealing with the physical description of motion (eg. Speed, distance, displacement). The word itself is from the Greek "kinema" meaning motion.

Uniform Motion
Straight line movement at a constant speed (studied in Science 1206).

Motion can also be non-uniform (acceleration).

Non-uniform motion
Involves changes in speed, direction or both.

Basic Concepts

Scalar Quantity: has magnitude (or size) but no direction (eg. temperature).

Vector Quantity: has both magnitude and direction (eg. velocity).

Distance: a measure of the total amount (distance) travelled, regardless of direction.
Scalar or vector?

Displacement: the net travel of an object measured from its starting point to its ending point.
Scalar or vector?

Position: the displacement from a given origin. Scalar or vector?

Average speed: the distance travelled per unit time. Scalar or vector?

$$v_{average} = \frac{dis\tan ce}{time} = \frac{d}{t}$$

Average velocity: the displacement per unit time. Scalar or vector?

$$\vec{v}_{average} = \frac{displacement}{time} = \frac{\vec{d}}{t}$$

In doing calculations with average speed and average velocity recall how to convert from km/h to m/s and vice versa.

$\frac{km}{h} \rightarrow \frac{m}{s}$ divide by 3.6

$\frac{m}{s} \rightarrow \frac{km}{h}$ multiply by 3.6 (or dimensional analysis)

We will discuss significant figure rules throughout the examples that follow.

Example:
If a car travels 140.0 km in 1.5 h, what is its average speed in km/h?

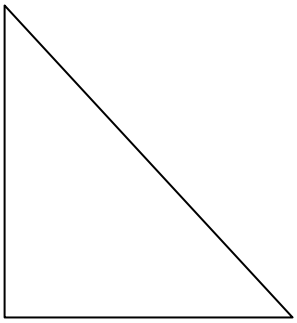
Example:
The sum of two vectors is 0. What can you say about the magnitude and direction of the two initial vectors?

Example:
John swims 400.0 m (E) and then 150.0 m (W). If the trip took 2.5 min find John's average speed and average velocity.

Example:
John swims 400.0 m (E) and then 150.0 m (N). If the trip took 2.5 min find John's average speed and average velocity.

Trigonometry Review

Trigonometry is a branch of mathematics based on right triangles.



$$\sin\theta = \frac{opposite}{hypothenuse} \qquad \cos\theta = \frac{adjacent}{hypothenuse} \qquad \tan\theta = \frac{opposite}{adjacent}$$

Examples:

To get the correct compass heading imagine a compass rose on the angle.
Direction Diagrams:

Example:
On Valentine's day John sets out down the road at 8.0 km/h. Twelve minutes later, Mary chases after him at 12 km/h.

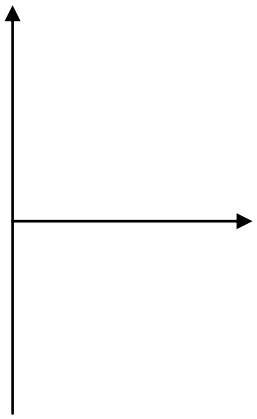
a) How long does it take Mary to catch John, in minutes?
b) How far has John travelled when he is caught?

Uniform Motion Graphs:

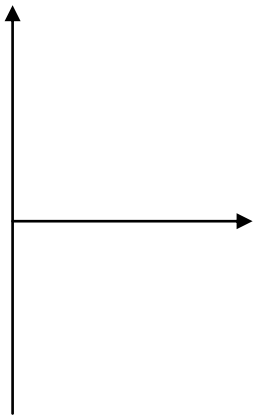
With any motion graph you can do three things:

i) read values from the graph.
ii) find the slope(s)
iii) calculate the area between the curve and the x-axis of the graph.

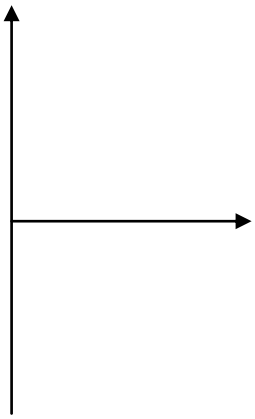
For constant speed, graphs generally look like the following:



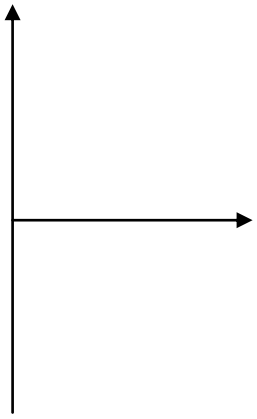
Positive slope means fixed speed to the right. Begins motion to the right of reference point.



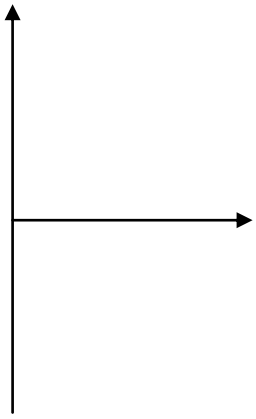
Negative slope means fixed speed to the left.



Positive slope means fixed speed to the right. Object begins motion to left of reference point.

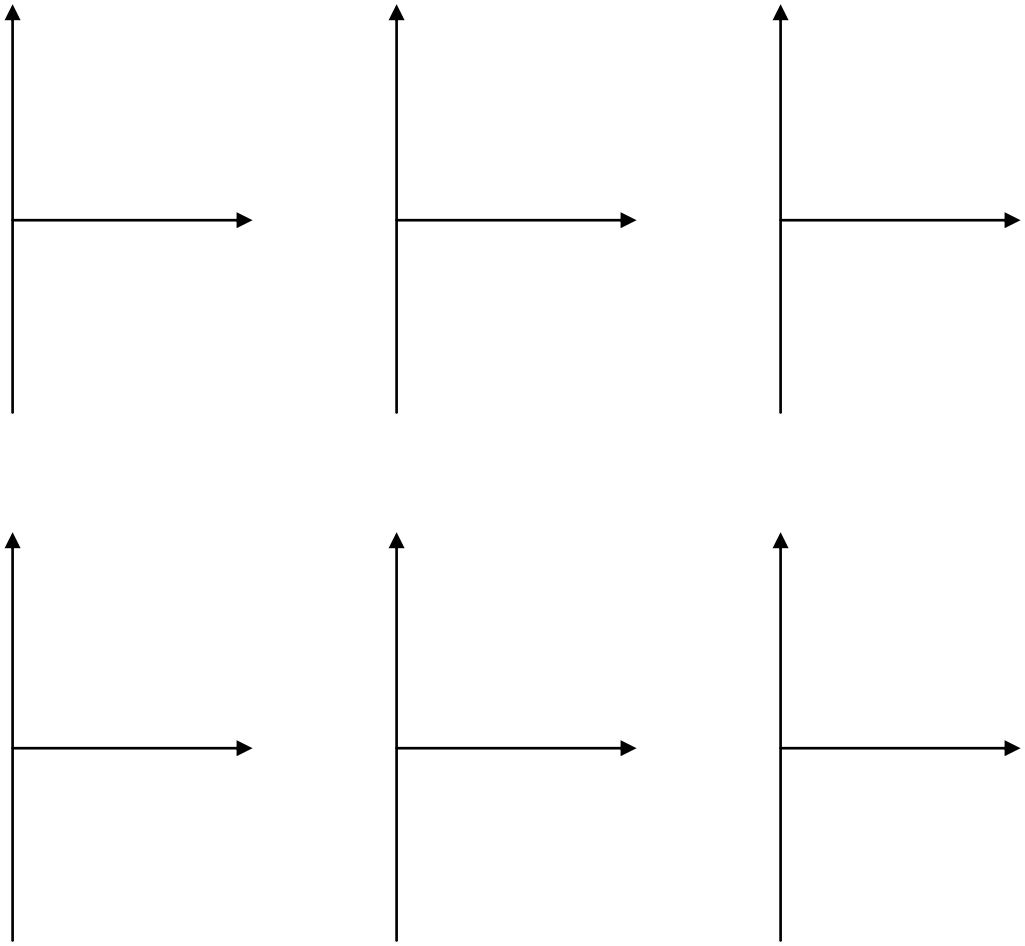


Object has a fixed speed to the right.



Object has a fixed speed to the left.

Practice graphs:



Useful summary on p. 47 of text.