

Topic 1C: Rate of change in position

Skill 9: Speed or Velocity Equation

The “rate at which position changes” is known as speed or velocity.

Speed is the rate at which position changes **WITHOUT DIRECTION** – how fast you are traveling. (Example: value on the speedometer regardless of whether your moving forward or backward)

$$v = \frac{\text{distance}}{\text{time}}$$

Velocity is the rate at which position changes **INCLUDING DIRECTION** – (used when flying a plane)

$$v = \frac{\text{displacement}}{\text{time}}$$

You will also see constant velocity written as \bar{v} which means average velocity.

Average velocity is the total distance over the total time for an object that might not be moving at a constant rate. The same symbol can be used for average and constant since the constant speed or velocity equals the average speed or velocity.

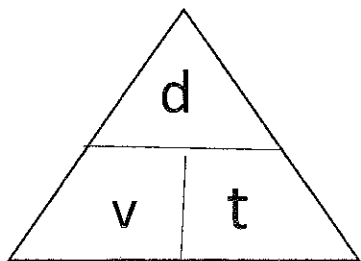
Speed and velocity are the same whenever objects travel in a straight line in one direction.

Speed is a scalar quantity because it has only a magnitude. **Velocity is a vector** quantity because it has both a magnitude and a direction.

Problem solving is not limited to velocity given “d” and “t”. Rearranging the equations gives us

$$d = vt \quad \text{and} \quad t = \frac{d}{v}$$

Equation Triangles: Some students find equation triangles helpful. In order to make a triangle use the format “y=mx” (no fraction) so in this case $d=vt$



To use the “triangle” cover the unknown (what you are solving for) and the triangle tells you whether to multiply or divide the remaining values
ie., put your finger over t so $t = d/v$