I can use vectors to show displacement, velocity, and acceleration. ***325-5***

I can use math to show the connections between, displacement, velocity, and time. ***325-2***

Vector Quantities

Some terminology to know:

vector quantity: an amount that has both magnitude and direction [Ex. 34 m/s (west)]

position: the distance and direction of an object from a reference point

displacement: a change in position of an object in a given direction

A common vector quantity is displacement. It is shown with an $\overrightarrow{\text{arrow}}$ above the term. Displacement would look like $\vec{d}$

For example, a baseball player may run a certain distance to catch a fly ball.

If we knew the distance covered, we could write his displacement. The notation for this would be

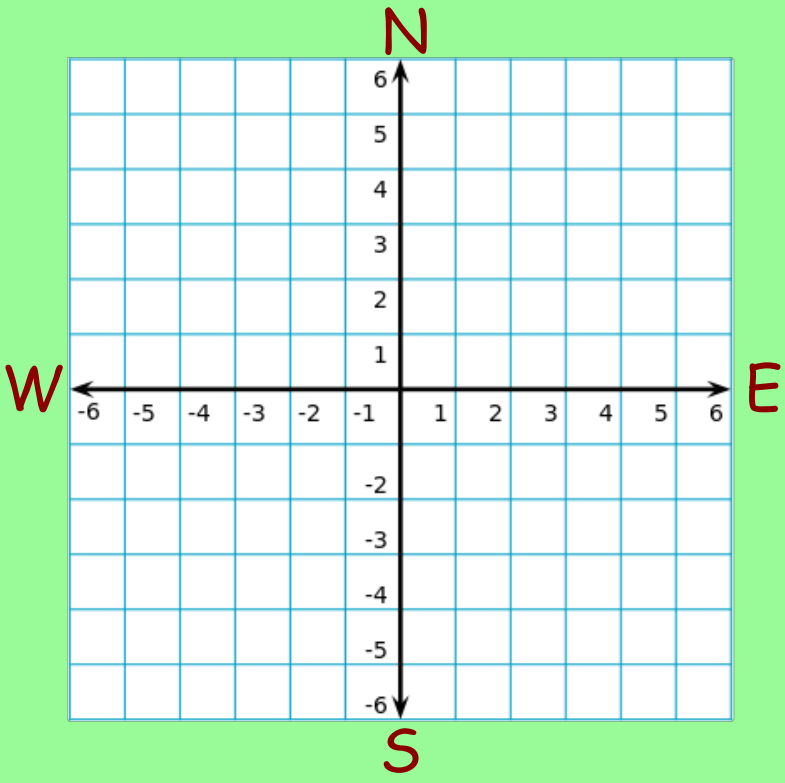
$\vec{d}$ = 10 m [right]

A triangle (Δ) is placed in front of displacement ($\vec{d}$) to show change between 2 displacements. ($\Delta\vec{d}$)

Example:

A curling rock leaves a curler's hand at a point 9.2m from the starting point and travels southward [S]. What is its displacement from its original point of release after it has slid to a point 32.0m from the same edge?

Because vectors imply a direction, they indicate when a value should be a negative or positive.



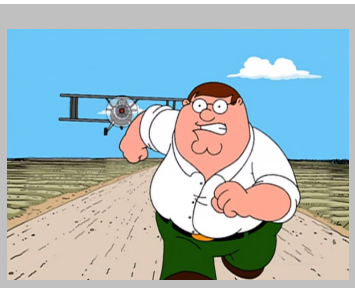
Usually we imply that east and north are positive while south and west are negative.

Vectors can also be drawn to scale!

Example:

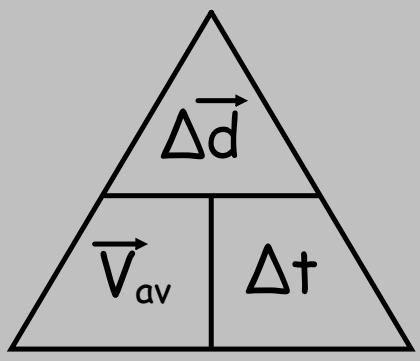
Two players are playing badminton. One player serves the birdie a distance of 4.2m [E]. It is returned by the other player a distance of 7.1m [W]. What is the displacement of the birdie?

Average Velocity



Average velocity is different then average speed because velocity is a *vector* quantity meaning it has a magnitude (ex: 23 m/s) AND a direction (ex: west).

$$\vec{v}_{av} = \frac{\Delta \vec{d}}{\Delta t}$$



When calculating average speed, we use the total distance traveled.

When finding the average velocity, use the displacement.

Example:

(*1st 30 seconds*)

The world's fastest coconut tree climber (2017) is George "Jonny" Iona. It takes him only 5.62 seconds to climb barefoot 8.00 meters up a coconut tree.

Calculate Jonny's average velocity for this motion, assuming that the climb was vertically upward.