



Average Speed

Presented by Kesler Science





What two things do you need to know in order to calculate speed?

Type your answer here

Average Speed

Speed

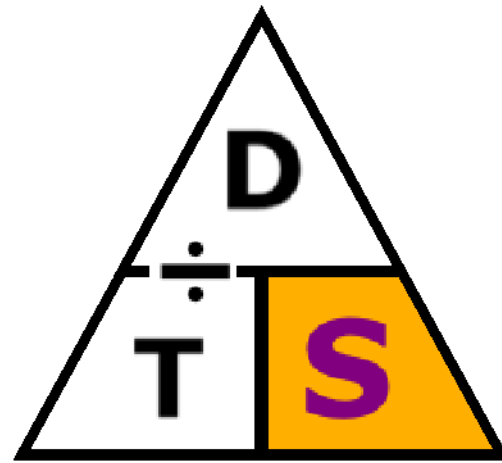
Speed is the change in distance over a specific amount of time.

Speed Formula

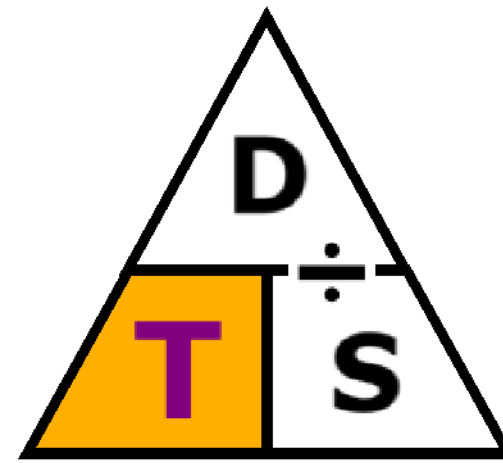
Speed = distance
divided by time

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

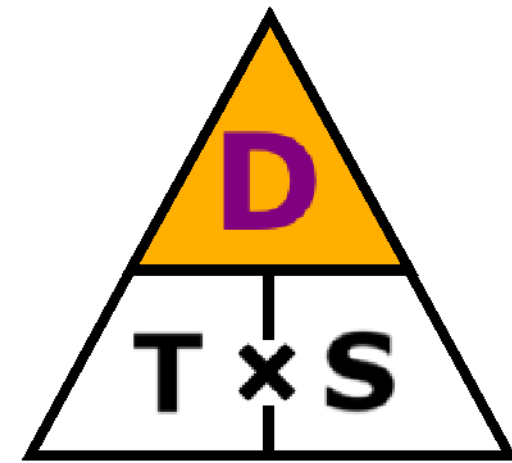
Average Speed



$$S = D \div T$$



$$T = D \div S$$



$$D = S \times T$$

Examples:

- Miles per hour, mi/hr, or mph
- Meters per second, or m/s
- Kilometers per hour, or km/h

Average Speed

Speed Units

Measured in units of distance and time.

Give a real life example of something that is measured in speed units.

Type your answer here



Distance divided by time

$$d/t = s$$

$$60\text{ft}/0.5\text{sec} = 120\text{ft/sec}$$

Average Speed

Speed Problem:

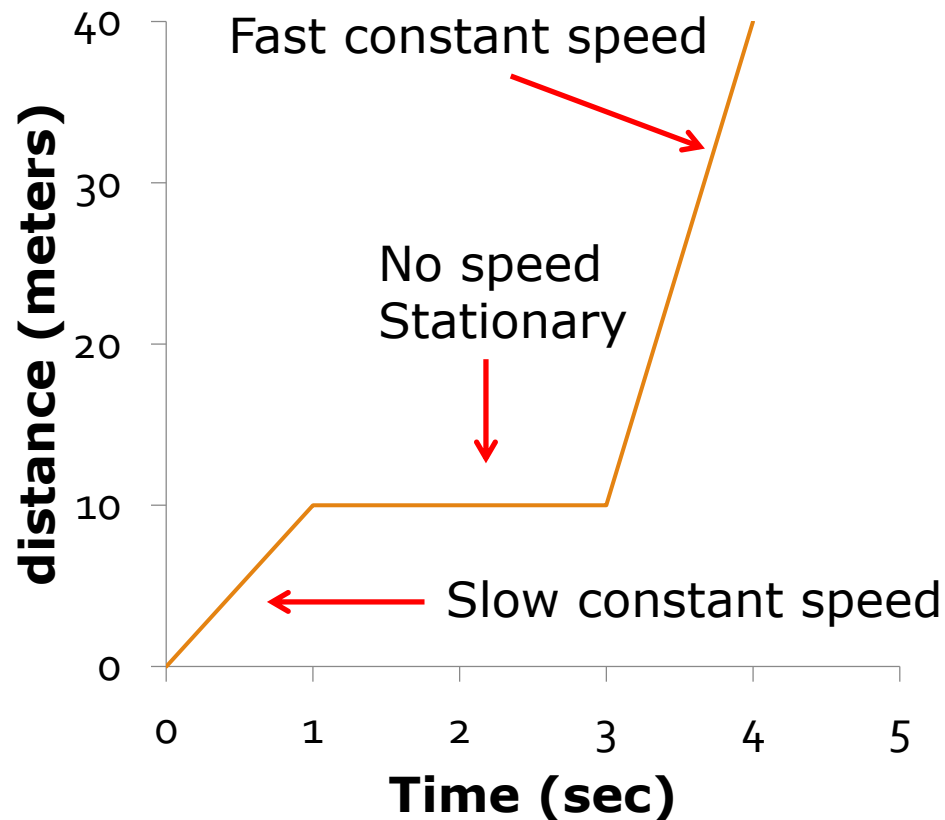
A baseball is thrown a distance of 60 ft. in 0.5 seconds. What is the speed of the baseball?

Speed on a Distance-Time Graph

- Constant speed – straight diagonal line
- The steeper the line the greater the speed
- No speed – straight horizontal line

Average Speed

Distance vs. Time



Average Speed

Average Speed

An average of all speeds over a given time.



What is the unit for speed?

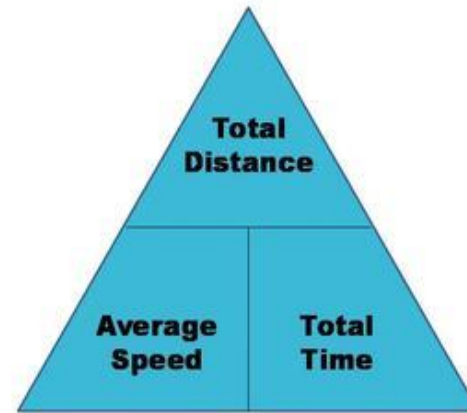
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Average Speed

Average Speed Formula

- Average speed = the total distance traveled divided by the total time taken
- Average speed = total distance / total time

THE SPEED TRIANGLE



Average Speed =

Total Distance

Total Time

Average Speed

average speed = total distance divided by total time

$$\frac{d \text{ total}}{t \text{ total}} = \text{avg. speed}$$

$$\frac{400\text{m}}{8\text{h}} = 50 \text{ m/h}$$

Average Speed Practice Problem:

While on vacation,
Jose traveled 400
miles in 8 hours.

What was his
average speed?



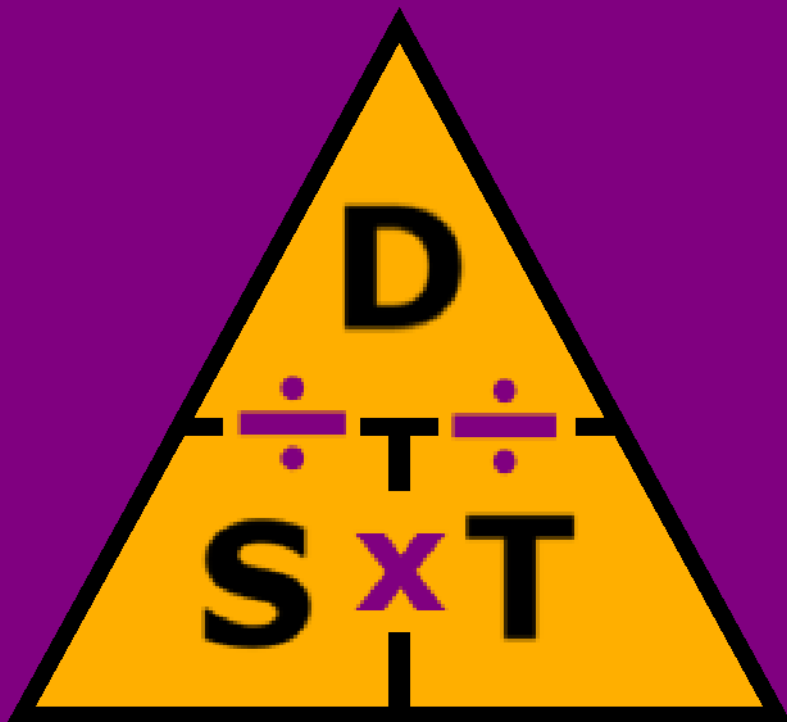
What do you need to know in order to find velocity?

Type your answer here

Average Speed

Velocity

Velocity is speed in a given direction.



What do you notice about the equations to calculate speed and velocity?

Type your answer here

Average Speed

Velocity Formula

Same as speed with a direction added.

Speed = distance divided by time

$$Speed = \frac{Distance}{Time}$$

Examples:

- Miles per hour, north or mi/hr north
- Meters per second, south or m/s south

Average Speed

Velocity Units

Measured in units of distance, time, and direction

Give a real life example of something that is measured in velocity units.

Type your answer here



Velocity Practice Problem

Jane and her mother take a road trip from Houston, TX to San Francisco, CA. It takes them 25 hours to make the 1400 mile trip.

What was their velocity?

Average Speed

Distance divided by time

$$\mathbf{d/t = s}$$

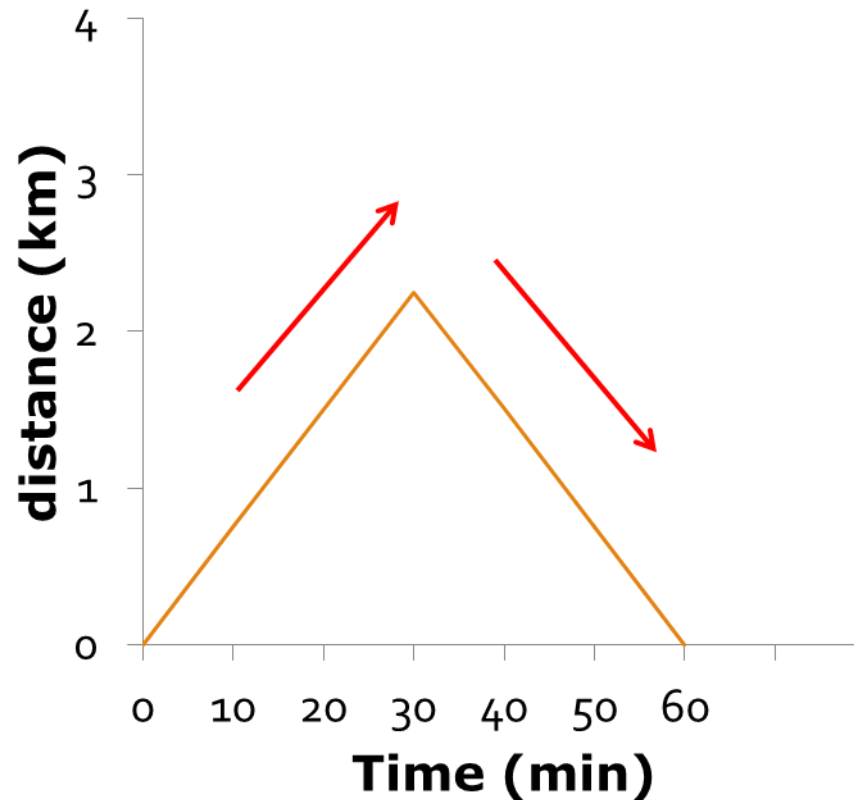
$$1400 \text{ mi} / 25 \text{ hr} = 56 \text{ mph } \underline{\text{west}}$$

Velocity on a Distance Time Graph

- Diagonal line going up indicates velocity in one direction
- Diagonal line going down indicates velocity in another direction

Average Speed

Distance vs. Time



Using the graph, how can you tell when the velocity has changed direction?

Type your answer here

Average Speed

Acceleration

- Change in speed or velocity over a specific amount of time.
- Speeding up, slowing down, or a change in direction.



In science, does acceleration happen when an object is slowing down?

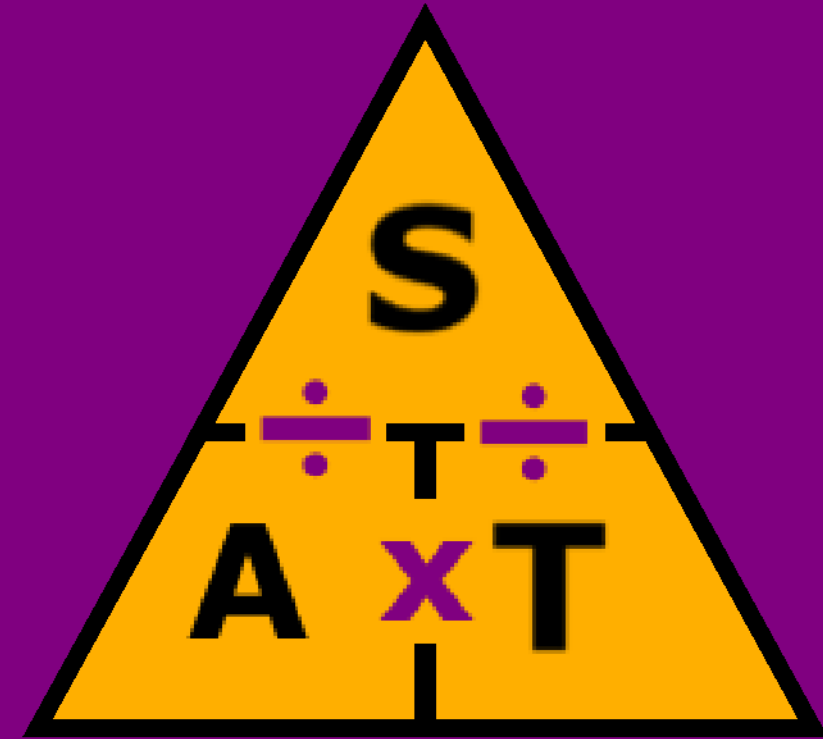
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Average Speed

Acceleration Formula

Acceleration = Speed divided by time

$$\text{Acceleration} = \frac{\text{Speed}}{\text{Time}}$$



Average Speed

Acceleration Units

- Measured in units of speed or velocity per time.

Give a real life example of something that is measured in acceleration units.

Type your answer here

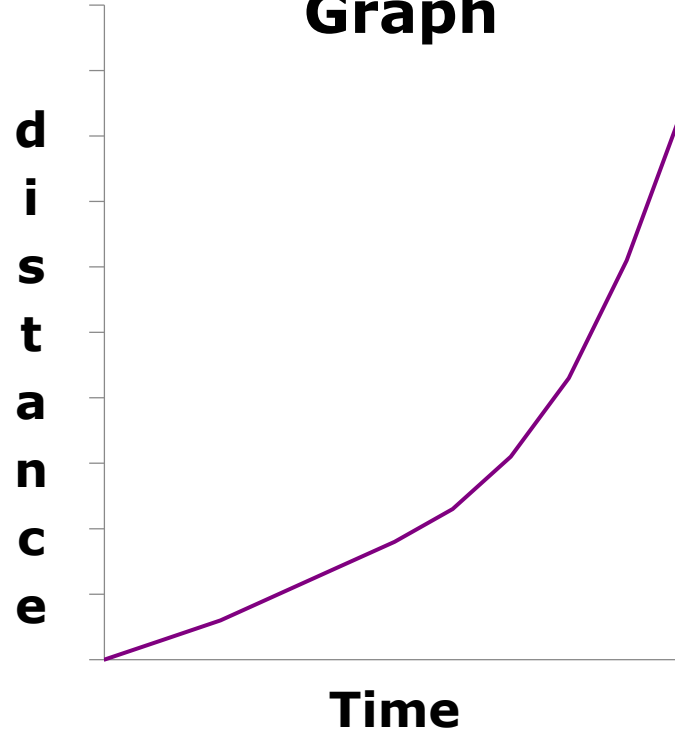


Examples:

- Miles per hour per hour, or mi/hr², or m/hr/hr
- Meters per second per second, or m/s², or m/s/s

Average Speed

**Distance vs. Time
Graph**



Using the graph, how
can you tell acceleration
is happening?

Type your answer here

Acceleration on a Distance Time Graph

- Constant acceleration - curved line
- Increased acceleration curves upward
- Decreased acceleration curves downward