

Use these notes to study from as we begin our unit on Motion

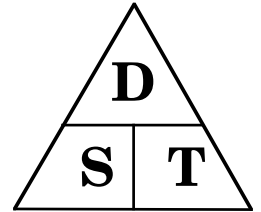
Motion: a change in position, measured by distance and time.

Frame of reference: the point from which movement is determined.

- * To measure movement, some point must be considered as nonmoving.
- * Earth is the most common frame of reference, however:

Speed: the distance traveled by a moving object per unit of time.

- * To calculate speed, use the equation , Speed = distance / time
- * Speed only gives distance and time.



Average speed: the speed of moving objects is not always constant:

- * Average speed = total distance / total time

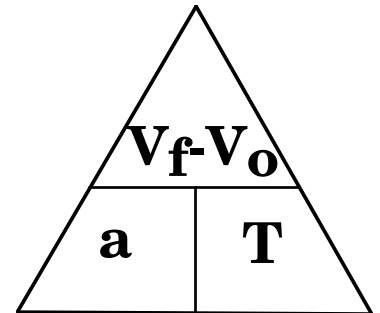
Velocity: speed in a given direction.

- * Velocity gives distance, time, and the direction of travel.

Acceleration: The rate of change in velocity.

- * To calculate acceleration, use the equation:
Acceleration = (Final Velocity) - (Original Velocity) / Time
 $\Delta V / \text{Time}$; ΔV is read as "delta V".

In science the Greek letter Δ (delta), is used to represent a change in something, in this case a change in velocity.

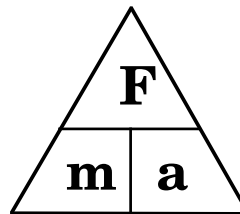


Deceleration:

- * A term commonly used to mean a decrease in speed.

Force: any push or pull.

- * Forces give energy to objects.
- * Forces cause a change in motion.
- * Force (F) is in Newtons (N)
- * Mass (m) is in kilograms (kg)
- * Acceleration (a) is in meters/sec/sec, (abbreviated as m/s/s or as m/sec^2)
- * Therefore, one Newton of force is equal to 1 kilogram being accelerated to 1 meter per second per second. In other words, it can make one kilogram keep going another meter per second faster with each additional second.



Friction: a force that opposes motion.

Gravity: the force of attraction between all objects in the universe.

- * Gravity is the weakest of the known natural forces, only becoming obvious when massive objects like stars and planets are involved.

Free fall - an object falling under the influence of gravity.

* Near the surface of the earth all objects are accelerated by gravity at a rate of 9.8 m/s/s

Weight: the effect of gravity on an objects mass

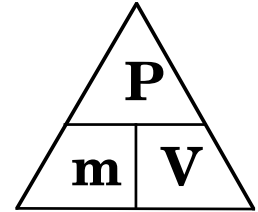
Momentum: the product of the mass of an object and its velocity.

* All moving objects have momentum.

* To calculate momentum, use the equation:

Momentum = Mass x Velocity

* *Since the letter "m" is already used to represent mass, scientists have decided to use the letter "p" to represent momentum.*



The Three Laws of Motion by Sir Isaac Newton explain all aspects of motion.

1. Newton's First Law

describes motion produced by balanced forces.

* An object at rest will remain at rest, and a moving object will remain at a constant velocity, *and in a straight line* unless unbalanced forces act on it.

*

Newton was first to use the term inertia to describe the tendency of objects to remain in motion or stay at rest. Inertia comes from the Latin word iners, which means "lazy".

2. Newton's Second Law

describes motion produced by unbalanced forces.

* This law is best stated using the equation:

Force = mass X acceleration (*refer to previous information about force*)

* Acceleration is always in the direction of the unbalanced force.

* The units of force are "Newtons".

* 1 N = 1 kg X 1 m/s/s

3. Newton's Third Law

explains why forces act in pairs.

* For every action, there is an equal and opposite reaction.

* Forces always act in pairs.

Note:

Most of the notes have been taken from the following source:

<http://www.middleschoolscience.com/motionnotes.htm>

The information in *italics* and all of the triangle formulas have been added by Mr. R