

Name _____ Homeroom _____ Date _____

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 - $\text{Speed} = \text{distance} / \text{time}$
- Speed only gives distance and time.

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

- $\text{Average speed} = \text{total distance} / \text{total time}$

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: $\text{Acceleration} = (\text{Final Velocity}) - (\text{Original Velocity}) / \text{Time}$

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.

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**

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 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:**

$$\text{Force} = \text{mass} \times \text{acceleration}$$

- Acceleration is always in the direction of the unbalanced force.
- The units of force are "Newtons".
- $1 \text{ N} = 1 \text{ kg} \times 1 \text{ m/s/s}$

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:

Notes have been taken from the following source: Physical Science Class

<http://pc65.frontier.osrhe.edu/hs/science/hps3.htm>

