

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**

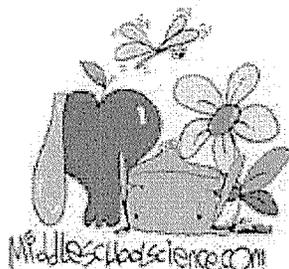
**The Three Laws of Motion by Sir Isaac Newton explain all aspects of motion.**

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:**  
**Force = mass X 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.

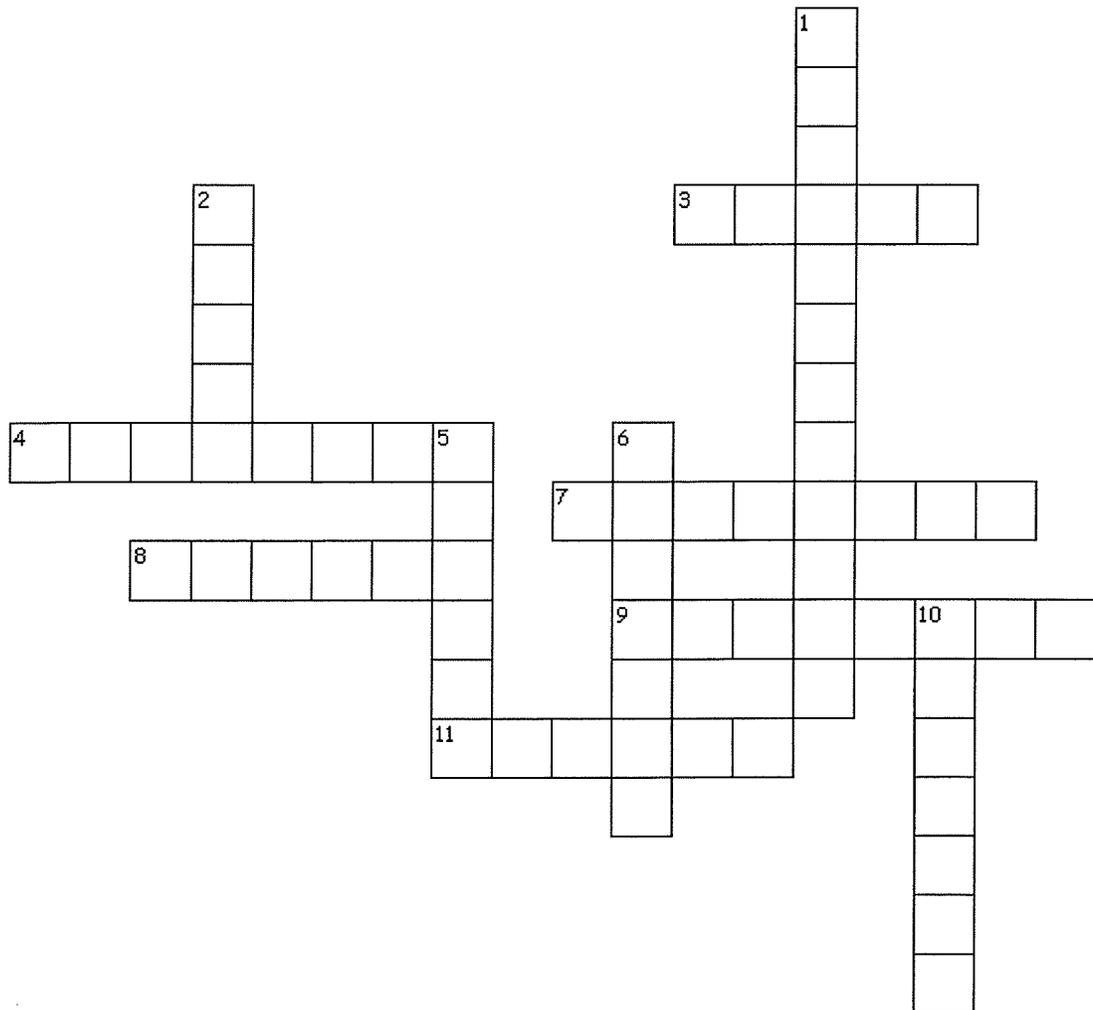
**Note:**

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

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



# Motion Crossword Puzzle



### Across

3. the rate at which an object moves
4. mass of an object times its velocity
7. a force that is opposite to the direction of motion
8. the measure of the force of gravity on an object
9. speed in a given direction
11. a unit that measures force

### Down

1. the rate of change in velocity
2. a push or a pull
5. a change in position in a certain amount of time
6. acceleration is 9.8 meters/sec/sec
10. the tendency of an object to remain in motion or at rest

# Motion Double Puzzle

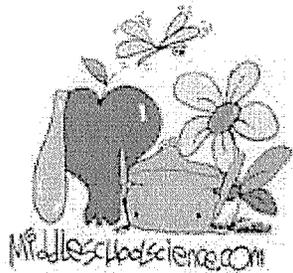
What is Sir Issac Newton Famous For?

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Unscramble each of the clue words.  
 Take the letters that appear in  boxes and unscramble them for the final message.



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