

Name: _____ Date: _____

Physical Science Notes 10
Newton's Second Law

- Imagine throwing a ball.

Force

- If you throw it lightly, it will have a low velocity.
- If you throw it very hard, it will have a high velocity.
- The strength of the force that you threw the ball determines the acceleration of the ball.

Mass

- If you threw a light ball with a strong force, it will have a higher velocity.
- If you threw a heavier ball with the same force, it will have a lower velocity.
- The mass of the object also determines the acceleration of the ball.

Newton's Second Law

- Newton stated that:

- The net force acting on an object causes the object to accelerate in the direction of the net force.
- The acceleration of the object is determined by the mass of the object and the size of the net force.

$$\text{acceleration} = \frac{\text{net force}}{\text{mass}},$$

$$a = \frac{F}{m}$$

- When we use this formula, we are usually trying to find how strong a force was on an object, so we can rewrite the formula as:

$$F = ma$$

Force Units

- Force uses a unit called the Newton (N). The Newton is really a bunch of units put together and we call it a Newton to simplify it.

$$F = m \cdot a$$

$$F = \text{kg} \cdot \frac{\text{m}}{\text{s}^2}$$

$$F = \frac{\text{kg} \cdot \text{m}}{\text{s}^2} = \text{N}$$

- This means that whenever we calculate force, we must use the following units:

- Kilogram (mass)
- meters (distance)
- seconds (time)

- If our units are not in these forms, then we need to convert the units.

- Practice:

- Mass = 0.06kg
- Acceleration = 5,500m/s²
- Force = 330 N

$$F = ma$$

$$F = (0.06\text{kg})(5500\text{m/s}^2)$$

$$F = 330\text{N}$$

$$330\text{N}$$