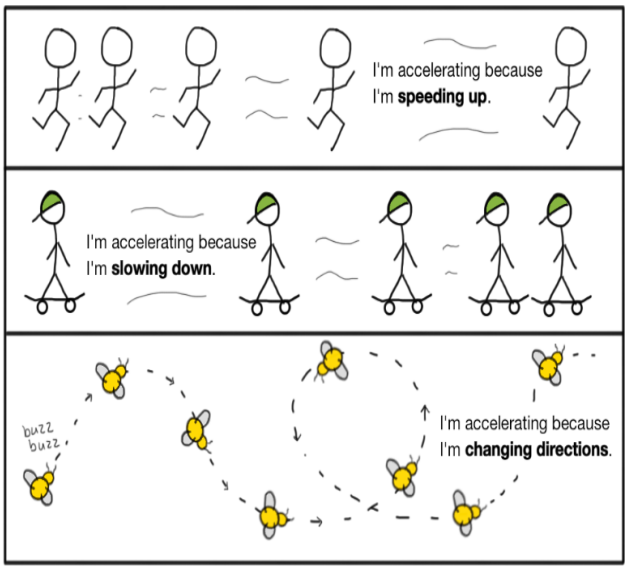
Unit 5 Learning Targets

Human Manipulation of Matter & ENERGY

1. I can discuss Newton's 3 laws as relates to the motion of the world around me, relatively speaking of course.

- ✓ 1st law: Inertia (tendency of an object to resist change)
- ✓ 2nd Law: Force = Mass multiplied by Acceleration: F = ma
- ✓ 3rd Law: For every action there is an equal & opposite reaction.

2. I can compare and contrast moving objects based on mathematical and graphical data/evidence.



- ✓ **Speed** = distance divided by time

$$s = \frac{d}{t} \qquad \text{ex: } 8 \text{ m/s}$$

- ✓ **Velocity** = distance divided by time (direction)

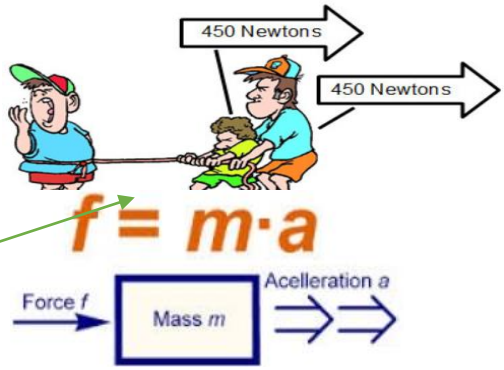
$$V = \frac{d}{t} \qquad \text{ex: } 8 \text{ m/s South}$$

- ✓ Acceleration = (Final Velocity – Initial Velocity) divided by time

$$a = \frac{V_f - V_i}{t} \qquad \text{ex: } 8 \text{ m/s}^2 \text{ or } -8\text{m/s}^2$$

- ✓ Displacement vs. Distance traveled.

3. A force is required for acceleration (Newton's 2nd law)



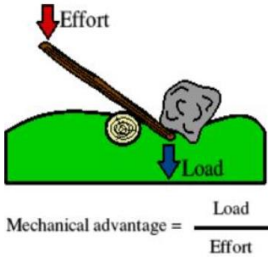
- ✓ All Forces measure in Newtons (kg m/s²)
- ✓ A **Force** is a push or a pull capable of changing the velocity of an object.
- ✓ I understand the origin of motion is due to NET force.
  - ➢ Net force of ZERO = **NO MOTION**
  - ➢ Analyze all forces to predict acceleration
- ✓ I can use the formula for F = ma

4. DO 

- ✓ Work, measured in Joules (Newton meters) is applying a force throughout a distance, if there is no distance traversed, then you did no work.
- ✓ Work is force multiplied by distance; W = Fd
- ✓ I can predict the amount of work necessary for task based on required distances or forces.

$$W = Fd$$

5. Why use a machine if it gives you no advantage?



- ✓ Mechanical advantage is the mathematical calculation of the advantage you review by using something other than what you were born with to accomplish a task.

$$\text{Mechanical Advantage} = \frac{\text{effort distance } (d_e)}{\text{resistance distance } (d_r)} \text{ or } \frac{\text{resistance force } (F_r)}{\text{effort force } (F_e)}$$