Introduction to Newton’s Laws Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Newton’s 1st Law of Motion

* An object at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_tends to stay at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and an object in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tends to stay in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ unless acted upon by an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ force.
  + This is called the Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The tendency of an object to resist change.
* Examples:
  + The stapler is at rest. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_thrown in outer space will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forever in its current \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at its current velocity.
* Which has greater inertia? Circle one.
  + A bicycle or van? A plane or a car? A table or a chair?

Newton’s 2nd Law of Motion  
Net Force = mass x acceleration  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Force is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ quantity- it has \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Units for FORCE
  + Units of mass is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (kg)
  + Units of acceleration is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (m/s²)
  + F = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Kgm/s2 = N = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Force is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (N) which is the same as kgm/s²
* Examples:
  + How much force is required to accelerate a 3 kg bowling ball by 2 m/s²?
    - F=ma
    - F= (\_\_\_\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
    - F= \_\_\_\_\_\_\_\_\_\_\_kgm/s² = \_\_\_\_\_\_\_\_\_\_\_\_\_ N
  + How much force is required to accelerate a 5 kg box by 3 m/s²?
    - F=ma
    - F=(\_\_\_\_\_\_\_\_\_\_\_\_\_kg)( \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m/s²)
    - F= \_\_\_\_\_\_\_\_\_\_\_\_\_\_ N
  + A 35 N force is being exerted on a 8 kg barrel. What is the acceleration of the barrel?
    - F=ma
    - \_\_\_\_\_\_\_\_\_\_N = (\_\_\_\_\_\_\_\_\_\_kg)(a)
    - Solve for a
    - a = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m/s²
  + A 70 N force is accelerating a cart at 12 m/s². What is the mass of the cart?
    - F=ma
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_N = (m)(\_\_\_\_\_\_\_\_\_\_\_\_\_\_m/s²)
    - Solve for m
    - m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg
* Mass Vs. Weight
  + Mass: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - SI Unit for mass: \_\_\_\_\_\_\_\_\_\_\_\_
  + Weight: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - SI Unit for weight: \_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - FIND YOUR WEIGHT (in Newtons) on Earth.
      * Convert your weight to mass.
      * 2.2 lbs = 1.0 kg
    - Example:

230 lbs/2.2lbs = 104.5 kg

F = ma

F = (104.5 kg)(9.8 m/s²)

F = 1,024 N

* + - Now find your weight in Newtons:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lbs/2.2lbs = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kg

F = ma

F = (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg)(9.8 m/s²)

F = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ N

* + - FIND YOUR WEIGHT ON THE SUN (in Newtons)
      * 2.2 lbs = 1.0 kg  
        Example:
    - Convert your weight to mass.

230 lbs/2.2lbs = 104.5 kg

F = ma

Mass = 104.5 kg

Gravity on the sun = 274.13 m/s²

F = (104.5 kg)( 274.13 m/s²)

F = 28,646.56 N

Find your weight on the sun:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lbs/2.2lbs = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg

F = ma

Mass = ­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg

Gravity on the sun = 274.13 m/s²

F = (­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg)( 274.13 m/s²)

F = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_