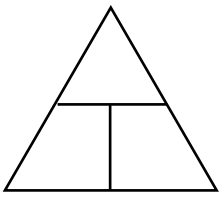
May the Force Be With You

Show What You Know

1. A _____ is a push or pull. Force is measured in _____.
2. Force can cause objects to move, _____ moving, _____ speed or change _____ .
3. A variety of forces are always affecting the motion of objects around you but three mainly:
    a. _____ force—when one object pushes or pulls by touching it, one applies this type of force to the second.
    b. _____ --the force of attraction between two masses
    c. _____ --a force that resists motion between two surfaces that are pressed together
4. Force is a _____ which means it has both size and direction. In order to get something to go in a direction you want it to go…you must apply the right amount of force and aim the force in the right direction.
5. You can predict the changes in an object's motion by considering all the size and the direction of all the forces acting on the object. The overall combined forces are referred to as _____ _____. If it is zero, then the object is _____ and are predicted to behave as if no force was acted upon it at all. Only when these are _____ can the object be predicted to change motion.
6. English scientist, Sir Isaac Newton, studied the effects of forces on objects in the mid-1600s. He formulated _____ laws of _____ describe the motion of all common objects.
7. When working with these laws, it is important to review that mass and _____ are not equivalent. Mass is the amount of _____ in a given substance. Weight is a measure of the **force** due to _____ acting on a mass. *(therefore weight is measured in Newtons.)*
8. Newton's **first law** states: objects at _____ remain at rest, objects in _____ remain in motion with same velocity, unless acted upon by an **unbalanced** force. Also known as the law of _____ --the resistance of an object to change in the speed or the direction of its motion.
9. Newton's **second law** state: Force = mass × acceleration (F = ma). The _____ (acceleration) of an object increases with increased force and decreases with increased mass. Also, the direction in which the object accelerates is the _____ as the direction of the force. Typical units for F= N, m=kg and a= m/s^2
10. This formula can be used to calculate for acceleration and mass. How will you remember the three different formulas?



11. Newton's third law of motion: every time one object exerts a force on another object, the second object exerts a force that is equal in _____ and opposite in _____ back on the first object. Referred to as action/reaction sometimes.

Practice.

Describe what kind of force(s) are at play to cause the motions listed below. Answer with contact, friction and/or gravity in complete sentences for #1—5.

1) Toddler takes a step, loses balances and falls on rear-end—

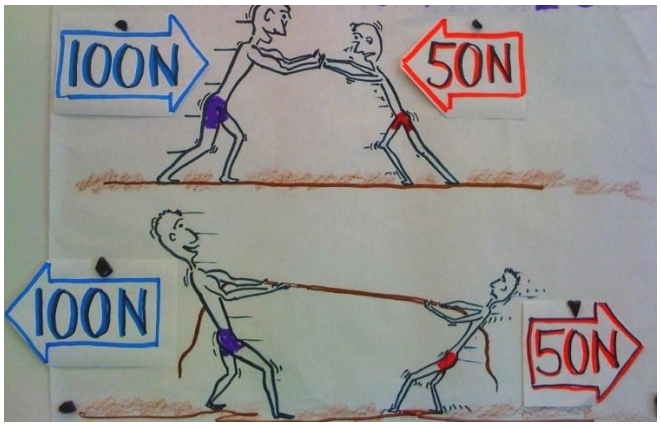
2) Moving your hair out of your eyes—

3) Pen rolls off the desk and onto the floor—

4) Walking then coming to a stop—

5) Pulling out a chair—

6) What kind of forces (balanced or unbalanced) is pictured below? Draw your own version of the opposite.

Type of force:	Type of force:
 What will happen as a result?	

7) Sophia, whose mass is 52 kg, experienced a net force of 1800 N at the bottom of a roller coaster loop during her school's physics field trip to the local amusement park. Determine Sophia's acceleration at this location.

8) What magnitude of net force is required to give a 0.104 kg model rocket an acceleration of 45.9 m/s^2 on takeoff?

9) If a net force of 130 N is applied to a man resting on the edge of a pool, and he entered the pool with a splash at an acceleration of 2.2 m/s^2, what was his mass?

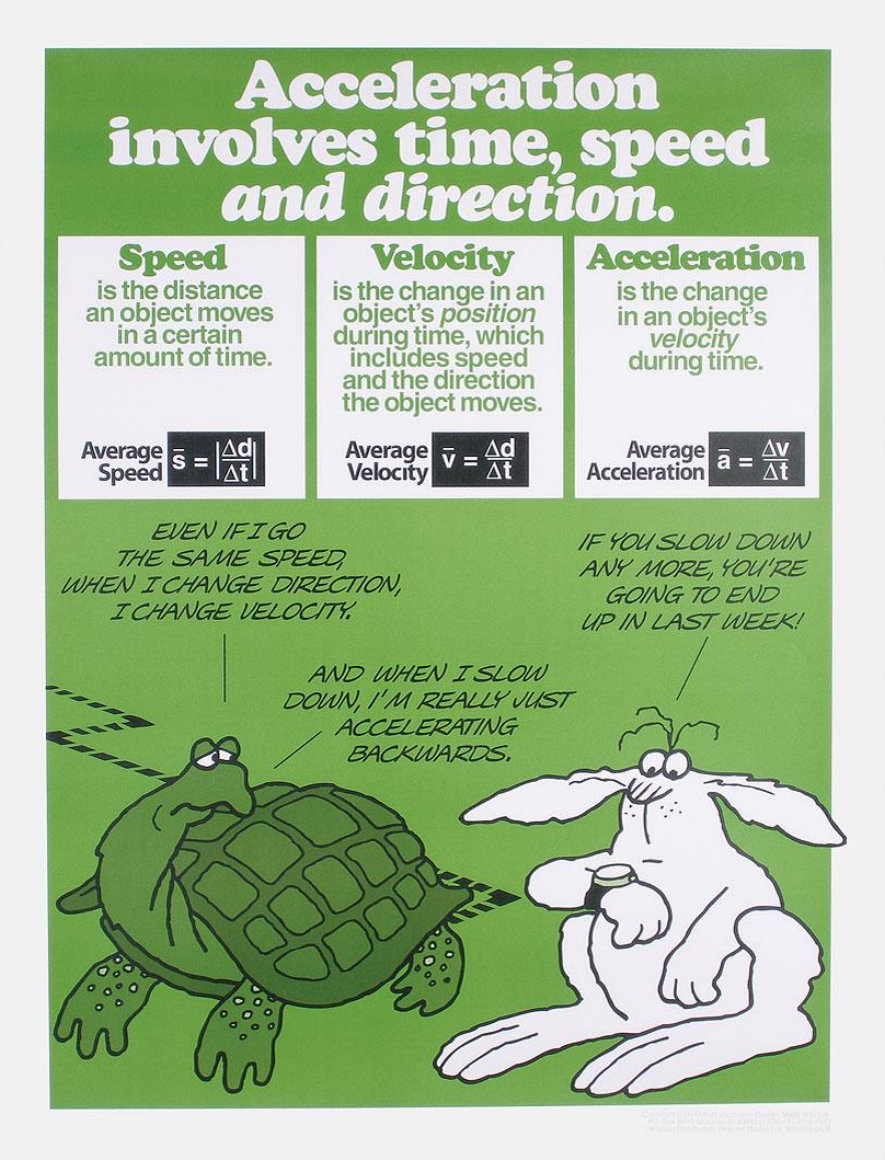
10) Describe the significance of a seatbelt as it applies to Newton's first law.

11) How does understanding Newton's third law help to find the humor in the comic below?

Nice to know ☺

- Acceleration is the change in velocity per unit of time. An object moving with constant velocity has no acceleration. A decrease in velocity is negative acceleration or deceleration. A distance-time graph for acceleration is always a curve. Objects moving with circular motion are constantly accelerating because direction (and hence velocity) is constantly changing.

- Velocity may have a positive or a negative value depending on the direction of the change in position, whereas speed always has a positive value and is non-directional.



- When you measure the mass of an object you can determine its inertia. It is harder to change the motion of something with a greater mass.