



Name: _____

May the Force Be With You

"Remember, A Jedi's strength flows from the Force." Correct, Master Yoda, you are. Nothing flows, nothing moves, nothing changes without force. Speaking about Force of other kind, perhaps Yoda is. However, the ability of his Force to alter the galaxy in some measurable way by making things move makes it very much like the force we will study.



Much of what we understand about force today is the result of the work of Sir Isaac Newton (1643-1727). As legend has it, Newton was intrigued by a falling apple and wondered what made the apple fall to Earth. He wondered further what made anything, from the smallest grain of sand to the largest planet, move at all. Out of his inquiry he formulated 3 ideas that have since become known as Newton's Laws of Motion.

Newton's Laws of Motion

A body at rest will stay at rest and a body in motion will stay in motion unless a force acts upon it.	Force = Mass x Acceleration $F = m \times a$	For every action there is an equal and opposite reaction
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A force is defined as a push or a pull that causes motion.

Nothing is moved, nothing is changed on the planet, in the galaxy or the universe without a force acting upon it. There are many kinds of forces in the universe and they are divided into 2 categories.

SOME TYPES OF FORCES

Contact Forces	Action-at-a-Distance Forces
<ul style="list-style-type: none"> <input type="checkbox"/> Frictional Force: The force exerted by a surface as an object moves across it <input type="checkbox"/> Applied Force: A force which is applied to an object by a person or another object. <input type="checkbox"/> Air Resistance Force: A special type of frictional force which acts upon objects as they travel through the air. <input type="checkbox"/> Tension Force: The force which is transmitted through a string, rope, cable or wire when it is pulled tight by forces acting from opposite ends. <input type="checkbox"/> Spring Force: The force exerted by a compressed or stretched spring upon any object which is attached to it. <input type="checkbox"/> Normal Force: The support force exerted upon an object which is in contact with another stable object. 	<ul style="list-style-type: none"> <input type="checkbox"/> Gravitational Force: The force with which the earth, moon, or other massively large object attracts another object towards itself. <input type="checkbox"/> Electromagnetic Force: Later Einstein <input type="checkbox"/> Nuclear Force: The force inside every atom that holds the atom together.

Today in science we will be measuring force using a new device, the spring scale, and a new unit of measurement for force called, not surprisingly, the Newton.

Materials

- Spring Scales
- Various Weighable Things
- String
- Scissors
- Digital Electronic Scale
- Rolling Chairs
- Newton's Cradle
- Ball Track
- Laboratory Stands with Clamps

STATION 1: Hanging Around

Procedure

1. Using a Spring Scale, measure the force, in Newtons(N) of 3 objects.
2. Use the digital electronic scale to measure the mass of each of your objects.
3. Record each in the table below.



Object	MASS (g)	FORCE or WEIGHT (N)

STATION 2: Spheres of Fun

Procedure

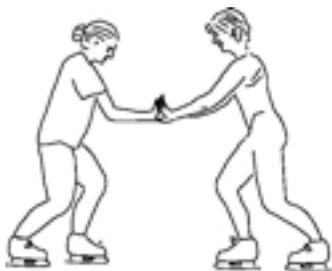
1. In the Newton's Cradle, Gently lift one end sphere and release.
2. Repeat Step 1 but lift 2 end spheres this time.
3. Repeat step 1 but lift 3 end spheres this time.
4. What did you observe in 1 to 3 above?



5. On the ball track, align the spheres so they are in contact with each other.
6. Separate one sphere and gently roll it towards the others.
7. Repeat step 6 with 2 spheres.
8. Repeat step 6 with 3 spheres
9. What did you observe in 6 to 8 above?
10. Which of Newton's Laws of Motion would you apply to explain what you have observed in 'Spheres of Fun'? Why would you choose that law/those laws?

STATION 3: Roll Me Away

Procedure



1. Sit in one rolling chair and have your partner sit in the second rolling chair facing you.
2. Place the palms of your hands in the palms of your partners hands.
3. Gently push away from your partner.
4. Repeat steps 1-3 but have your partner push away from you.
5. Repeats steps 1-3 but this time push away from each other at the same time on the count of 3.
6. What did you observe in 1-5 above?
7. Which of Newton's Laws of Motion would you apply to explain what you have observed in 'Roll Me Away'? Why would you choose that law/those laws?

With which of Newton's Laws is soccer guy becoming intimately acquainted?

