



Glue this side into your notebook



May the Force Be With You

You now know how motion can be described but what causes it? Why don't you fall out of your chair normally but if someone pushes you, you do? Why do skateboards stop if you just coast on them down the sidewalk? What makes it different if you are going down a hill? What allows athletes to move when they run? How is this different than if they were trying to run on ice instead? Can things have force on other things even if they aren't touching? We'll begin to explore these concepts with this mini-lab and use this to help us learn about motion.

Part One – What do you know about forces?

1. Do you know any forces? List them.
2. Can you come up with a definition of a force?

Part Two – Gravity

1. Hold a ball of paper in your hand. Let go of it. Describe what you observed about its motion.

2. Why did it fall?

3. Now sketch the paper ball and draw an arrow showing the force that pulled it down to Earth.



4. Now, hold that same paper ball in the palm of your hand. Describe what you observed about its motion.

5. Why didn't it fall?

6. Now, sketch the paper ball again and draw arrows showing the two forces that affected the motion of the object.



7. If each arrow represents a force, what could you summarize about forces and motion so far?

Part Four – Tug O’ Learning

1. You get to play a mini game of tug o’ war! Using the string at your table, do a one vs. one game of tug o’ war using only your thumb and pointer finger to hold the string. On the count of three, start the game and play for 5-10 seconds maximum. Describe your observations.

2. Sketch the string and draw arrows showing the forces acting on the string.

3. Now, play again, but this time have two people hold onto one side of the string versus one person on the other side. Play for 5-10 seconds maximum. Describe your observations.

4. Sketch the string and draw arrows showing the forces acting on the string (remember with vectors, bigger force = bigger arrows!).

5. Now, predict what would happen if the one person let go of their side just leaving the two people on one side. Describe what would happen. Draw a sketch with an arrow showing the force on the string.

Part Five – Measuring Force

Now we’re going to get some evidence about forces using something called a spring scale. Spring scales are measured in Newtons, which is a unit of measurement to measure force.

1. Repeat the first tug o’ war from Part 3. Be careful not to pull too hard. Write the measurements of Newtons on each spring scale and describe the motion of the scales overall.

Summary

1. What do you think “balanced forces” means? Give an example from the lab that shows this.

2. What do you think “unbalanced forces” means? Give an example from the lab that shows this.

3. What has to happen with the forces if an object moves?