

Name _____ Date _____ Per _____

Newton's 3rd Law of Motion Lab

Fill in the following:

Newton's 3rd Law States:

Part I - Newton's 3rd Law with Balloons:

Materials

- 1 balloon
- Meter stick
- Metric tape measure
- 1 straw
- 5m of string
- 2 or 3 2-inch pieces of masking tape

Hypothesis

Trial # Lg. Balloon	Circumference (cm)	Distance (cm) or (m)?	Avg. Distance Lg. Balloon (cm) or (m)?
1			
2			
Trial # Sm. Balloon	Circumference (cm)	Distance (cm) or (m)?	Avg. Distance Sm. Balloon (cm) or (m)?
1			
2			

1. Blow up balloon to its maximum size without popping - hold onto end (don't tie off)
2. Measure the circumference of the balloon to the nearest tenth of a cm and record in data table for trial #1
3. Slide the 5m piece of string through the straw while holding straw in the vertical position to create a track for the balloon
4. Attach the straw to the balloon - Put the straw on top of the balloon and use 2 or 3 pieces of masking tape to secure it.
5. Now, it's time to let your balloon fly. One lab partner needs to pull the balloon to one side of the string, and another lab partner will hold the opposite end. Let the balloon open and watch it fly on the track.
6. Measure the distance traveled using the meter stick and record this in your data table.
7. **Repeat 1-6 for a 2nd trial**, record second measurement for trial #2
8. **Balloon #2** - Repeat step 1-7 for the second balloon - make it about half as big.

9. Find the average distance traveled for each balloon

Part II - Newton's 3rd Law with Marbles:

- Materials:
2 Meter sticks
5 Marbles
Ruler

Hypothesis

# of Marbles	Distance Traveled Trial 1	Distance Traveled Trial 2	Average Distance (cm or m)	Observations
1				
2				
3				
4				

1. Place one marble (marble #1) in the track at the 20cm mark for the “**collision**” point
2. Using a second marble (marble #2), place it at the **1cm** mark of the track as the **starting point** and **gently** flick the marble into marble #1
3. Record the distance marble #1 traveled and record observations - how did the marbles move?
4. REPEAT STEPS 1-3 FOR A SECOND TRIAL
5. Find the average distance traveled for the two trials and record in data table
6. Now place two marbles in the track at the 20 cm “collision” point
7. Repeat steps 1-5
8. Continue doing this with 3 marbles in the track and then 4

Note - Be sure you agree on the force of the “flick.” It should remain constant for all trials.

Part III - Newton's 3rd Law with Canisters

Materials - Baking Powder, water, graduated cylinder, pan, tape measure

Hypothesis

1. **Put on goggles and an apron**
2. Fill one film canister with 15 mL water and put the cap on
3. Lay capped canister it on its side so the cap is facing the black line going down the middle of the tray
4. Add 15 mL of water to a second canister
5. Add 1 (heaping) tsp of baking soda to the second canister
6. **QUICKLY snap the cap on** and lay it on its side on the other side of the black line, with the cap **facing and touching** the other canister
7. Using the tape measure, measure how far each canister went from the line and record your answer below
8. Rinse out pan and canisters and return them to the station

Distance canisters moved:

Trial # 1 Canister with just water _____ Canister with Baking Powder _____

Trial # 2 Canister with just water _____ Canister with Baking Powder _____

(What are the units?)

Conclusion Questions:

Part I Balloon

1. Was your hypothesis supported or not supported? Provide evidence to back up your claim.

2. **Explain** and **prove** how this experiment demonstrates Newton's 3rd Law of Motion. Use data and observations **from both the large and small balloon** to support your answer

Part II Marbles

1. Was your hypothesis supported or not supported? Provide evidence to back up your claim.

2. **Explain** and **prove** how this experiment demonstrates Newton's 3rd Law of Motion using your data and observations as evidence from each scenario - 1, 2, 3, & 4 marbles.

3. After observing the marbles, explain what you think would happen if
a.) a car was sitting at a red light and another car collided into the back of it.

b.) If the driver of the car at the red light could see that a car was going to collide from behind, do you think the car at the red light would absorb more energy if the driver kept their foot on the brake, or if they removed their foot from the brake?

c.) How would the collision be different if two cars were traveling the same speed and collided head on into each other?

Part III Baking Powder and Water Canisters

1. Was your hypothesis supported or not supported? Provide evidence to back up your claim.

2. **Explain** and **prove** how this experiment demonstrates Newton's 3rd Law of Motion using your data and observations as evidence.

Come up with your own real life example that would demonstrate Newton's Third Law of Motion. Use diagrams or pictures to illustrate your example: