**Balloon Rockets** Name:

 Date:

 Period:

**Objective:** Demonstrate Newton’s 3rd Law of Motion

**Materials:** Balloon, straw, tape, long piece of string, short piece of string, pennies, meter stick

**Procedures Part 1:**

1. Make a rocket path by threading a string through a straw. Run the string across the classroom horizontally and have two students hold the ends.
2. Blow 1 breath into the balloon (it should be small). Using the small piece of string, measure the circumference of the balloon and record in the data table.
3. Tape the balloon to the straw so the opening of the balloon is facing backwards.
4. Release the balloon so it moves along the string and measure the distance traveled. Record in data table.
5. Repeat steps 2-4 but change the number of breaths so the balloon gets larger.

**Hypothesis:** How will changing the amount of air in the rocket affect the distance the rocket travels?

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**Data Part 1:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Trial** | **Circumference of balloon (cm)** | **Distance traveled (cm)** | **Observations** |
| 1 breath |  |  |  |
| 2 breaths |  |  |  |
| 3 breaths |  |  |  |

**Procedures Part 2:**

1. Set up your rocket the same as part 1 but use 3 breaths every time.
2. Instead of changing the number of breaths, we will change the mass of the rocket. Tape 1 penny onto the rocket.
3. Measure the mass of the balloon plus the penny on a triple beam balance. Record mass in the data table.
4. Release the balloon so it moves along the string and measure the distance traveled. Record in the data table.
5. Repeat steps 2-3 but increase the number of washers taped onto the rocket.

**Hypothesis:** How will changing the mass affect the distance the rocket travels?

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**Data Part 2:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Trial** | **Mass of balloon rocket (g)** | **Distance traveled (cm)** | **Observations** |
| 1 penny |  |  |  |
| 2 pennies |  |  |  |
| 3 pennies |  |  |  |

**Conclusions:**

1. Compare and contrast the differences traveled when the amount of air was changed. What is the relationship between the number of breaths and the distance traveled? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Compare and contrast the distances traveled when the mass of the rocket was changed. What is the relationship between the mass of the rocket and the distance traveled? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Explain all the forces are acting on the balloon rocket. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Use Newton’s 3rd law of motion to explain why the balloon rockets moved down the string. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Use Newton’s 2nd law of motion to explain why the mass of the rocket affected the distance the rocket traveled. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_