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| **Teachers:** Ms. Blair, Ms. Dion, Ms. Lopez, Ms. Guillory, Ms. Bradshaw |
| **Date: November 17, 2015** |
| **Subject / grade level: Science/ 8th Grade** |
| **Materials:*** **one balloon per group**
* **straws**
* **fishing line**
* **lab sheet**
* **construction paper**
* **cut out- word document**
* **glue**
* **markers**
* **scissors**
* **colored pencils**
* **masking tape**
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| **TEKS:****(6) Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:**  **( C) Investigate and describe applications of Newton’s law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth’s tectonic activities, and rocket launches.** |
| **ENGAGEMENT (7-10 minutes)**1. Rocket video- National Geographic

[How Rockets Work](https://www.youtube.com/watch?v=C1TuxJRszVo)* Students will watch video and discuss how Newton’s laws of motion connect with rockets
* Newton’s Laws:
1. An object at rest tends to stay at rest and an object in motion tends to stay in motion with the same speed and in the same direction unless acted upon by an outside force.
2. The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object. F=ma
3. For every action, there is an equal and opposite reaction.
4. Students will explore Newton’s laws in more detail in the balloon lab.
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| **EXPLORATION (15-20 minutes)**Divide into groups of four: **Procedure for Balloon Lab*** One student will be in charge of blowing up the balloon, do not tie the end.
* Two students will hold each end of the 5 meters of fishing line and stand apart far enough that the balloon may travel down the fishing line.
* One student will be responsible for timing the balloon to see how long it takes to travel across the fishing line.
* Feed the straw through the fishing line so that it may move freely.
* Place a piece of masking tape across the top of the straw and attach the balloon to the masking tape (make sure the balloon is not tied)
* Blow up the balloon.
* Hold the end of the balloon so that no air may escape until the timer says go!
* Release the balloon and measure how quickly it travels from its start position to its ending position.
* Record the data and measurements used
* Repeat five times, blowing the balloon up to different sizes each time, collect data, and compare.
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| **EXPLANATION (10-15 minutes)**1. Powtoon over Newton’s Laws of motion:

Newton’s Laws of Motion by Ebradshaw<https://www.youtube.com/watch?v=cHTc402B3oA> Questions to be asked during the viewing of the Powtoon:* **What is Newton’s first law?**
* **What are some examples of the first law?**
* **What is Newton’s second law?**
* **What are some examples of the second law?**
* **What is Newton’s third law?**
* **What are some examples of the third law?**
* **Are the any instances where these laws are seen at the same time?**
1. Begin foldable with groups:

Materials for the foldable include-Large construction paper-grid paper for the graph-title prompts-glue stick-scissors-direction sheetStudents will create a tri-fold foldable to display the data that they collect during the experiment. This foldable serves as an example of a scientific board used in a science fair. This provides great practice for the students in gaining experience with science fair displays. **Balloon Rocket Tri-fold** Create foldable to display your data:1. Fold the construction paper into three sections like below:2. Cut out the grid and glue it into the center of the foldable.3. On the left flap you need:a. Questions- a minimum of three questions you want answered by the experiment.b. Hypothesis- Using an “if” and “then” statement set up your hypothesis using at least one of Newton’s Laws.4. On the middle flap you need:a. A title for the experimentb. Your datai. Display in a bar graphii. Your graph should have a titleiii. Your graph should have a keyc. Procedures and Materialsi. List out at least 4 steps you did in the experiment.ii. List out your materials5. On the right flap you need:a. Observations- List at least three things you noticed during the experimentb. Conclusion- Using what you know about Newton’s Laws and your observations form a conclusion answering your questions. **EXAMPLE:**

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|  Questions 1.2.3.   Hypothesis |  TitleGraph

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 Procedures/ Materials1.2.3.4. |  Observations 1.2.3.   Conclusion |

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| **ELABORATION (5-10 minutes)**1. Group discussion over lab
* Discuss if the distance traveled by the balloon was affected by the different size balloons for each trial. If so, how?
1. Higher order thinking questions- elaborate on reasons that certain things happen.
* How does this lab relate to the motion of a rocket?
* Why do you think the balloon produces thrust and travels the opposite direction?
* Does gravity affect the motion of a balloon? If so how, or why not?
* Would there be any changes if the lab required the balloon to travel vertically instead of horizontally? Why or why not?
* Would it make a difference if weight was added to the balloon? Why or why not?
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| **EVALUATION (10 minutes)**1. Complete foldable
2. Ticket out the door:
* **Students will write on an index card or piece of paper the three w’s:**
	+ **What did I learn?**
	+ **Why is it important?**
	+ **What questions do I have?**
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