Grade Level: 4th

Title of Lesson: Rocket Ballons

Unit Title: Force, Motion and Simple Machines

Performance Standard(s) Covered:

1. **S4CS5**: Students will communicate scientific ideas and activities clearly.
    a. Write instructions that others can follow in carrying out a scientific procedure.
    b. Make sketches to aid in explaining scientific procedures or ideas.
2. **S4P3**: Students will demonstrate the relationship between the application of a force and the resulting change in position and motion on an object.
    a. Identify simple machines and explain their uses (lever, pulley, wedge, inclined plane, screw, wheel and axle.)
    b. Using different sized objects observe how force affects speed and motion.
    c. Explain what happens to the speed or direction of an object when a greater force than the initial one is applied.
    d. Demonstrate the effect of gravitational force on the motion of an object.

Essential Question:

- How can forces be used to make objects move, change direction, or stop?
- How is the motion of an object related to the size of the object and the amount of force that is applied to the object?

Objective: Students will observe how force and friction affects speed and motion.

Key Words and Terms: *force, motion, speed, friction, position, direction, mass*

Abstract (limit 100 characters): This lesson will demonstrate the process of a forward motion called thrust, as well as friction. Students will form two separate groups, each assigned to two different types of string; thread and yarn. Students in each group will create a balloon rocket that they will inflate and release on the string assigned to their group to see how far and fast their balloon travels. In the balloon experiment, thrust comes from the energy of the balloon forcing the air out. Different sizes and shapes of balloon will create more or less thrust. Friction will come from the different types of string. There will be more friction on the thread, making the rockets slower and travel less far.

Materials needed *(for each individual student)*:

- 1 balloon
- 1 thick piece of string (yarn)
- 1 thin piece of string (thread)

- 1 plastic straw
- Tape
- Paper and pencil

Safety Concerns: Students must be watched carefully to make sure they don't swallow the balloons or blow them up too much and pop them in their faces.

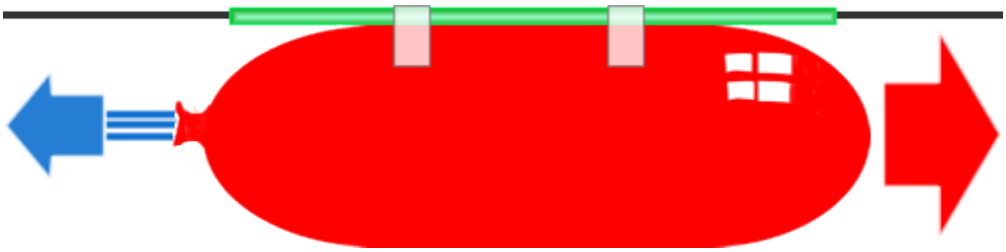
Directions:

1. Give each student a balloon to blow up.

2. Have each student draw a picture of their balloon with arrows representing the direction that air would move out of the balloon if they were to suddenly release the balloon.

3. Have the students test their predictions by counting to three and letting go of their balloons to see where they go/how the air moves out of them. Then have them draw on their paper what actually happened when they released the balloon.

4. Have each student blow up their balloons again (give them new balloons if they fly out of control and students can't tell which is theirs) without tying the balloon closed. Instruct/help students tape a straw on the top side of the balloon (see diagram).



5. Tie one of each types of string, thick and thin, to the backs of two separate chairs.

6. Have students form two lines behind the chairs.

7. Have the two students in the front of the two lines thread their sting through the straws attached to their balloons and hold their string tight .

8. Then, count to three and have the students release their balloons at the same time. Have the students observe the "rockets" as they race down the string. The one on the thinner string should be faster and go farther because there is less friction on that string, while the one on the yarn will be a bit slower and may not make it to the end because there is more friction.

9. After each student has participated in the "race," have them record their results and make an educated guess as to why one was faster than the other.

10. Ask for educated guesses from each group before explaining.

References:

http://www.focus.uga.edu/fourthgrade/documents/4-PSBalloonracing.pdf

http://www.sciencebob.com/experiments/balloonrocket.php

What I would do differently…

I really can't say that I would change much about my lesson because my class enjoyed it so much and seemed to really digest the material. The one thing I might consider doing differently allowing all of the students to release their balloons to begin with. Next time I would probably just demonstrate with a balloon myself in front of the class.