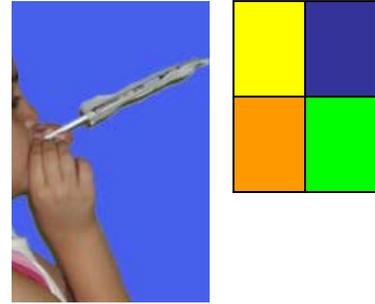




Civil Air Patrol's ACE Program

Straw Rockets Kindergarten Academic Lesson #6



Topics: counting, graphing, motion (math, science)

Lesson Reference: [NASA's 3...2...1..Liftoff!
How to Make a Soda-Straw Rocket](#)

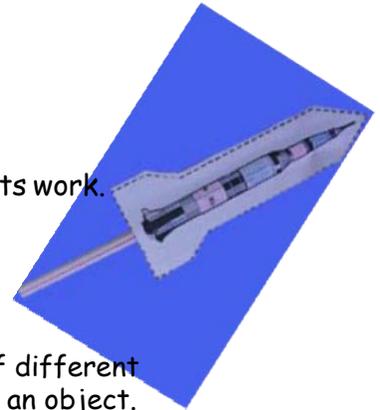
Length of Lesson: 30 minutes

Objectives:

- Students will provide a basic explanation for how their straw rockets work.
- Students will practice hitting a target.
- Students will count, record data, and create a graph.

Next Generation Science Standards:

- K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- Disciplinary Core Ideas
- PS2.A: Forces and Motion
- Pushes and pulls can have different strengths and directions.
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- PS3.C: Relationship Between Energy and Forces
- A bigger push or pull makes things speed up or slow down more quickly.



CCSS ELA:

- W.K.7 Participate in shared research and writing projects.

CCSS Math:

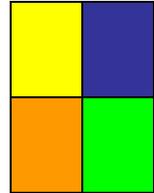
- MP.2 Reason abstractly and quantitatively.
 - K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

Background Information:

Sir Isaac Newton (a scientist and mathematician in England in the 1600s) described rocket science principles in his three laws of motion. His third law of motion states that every action has an equal and opposite reaction. This law can be applied to rockets by a rocket expelling fuel or propellant out of its engine causing the rocket to move in the opposite direction. The rocket pushes the propellant out, and the propellant then pushes the rocket in the opposite direction. The propellant comes out of the engine. This is the action. The rocket lifts off the launch pad in the opposite direction. This is the reaction.

Materials:

- rocket pattern (one per student)
- straw (one per student)
- crayons
- scissors
- assembled targets (one per group of 4-5 students; see "note" below)
- glue stick or regular glue
- tape
- "Rocket Chart" copies

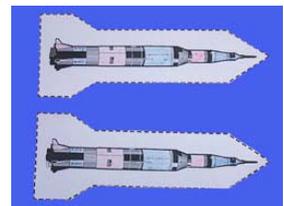


NOTE: To assemble a target, join 4 different colored pieces of construction paper together using tape. Have a sufficient number of target areas set up in the classroom prior to beginning the lesson. Consider making large targets by using butcher paper, or attach multiple pieces of construction paper to make a larger target. Also, set up "toe" lines by placing a piece of masking tape on the ground several feet in front of each target. This will let students know where to stand to launch their rockets.

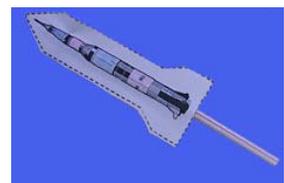
Prior to making the "Rocket Chart" copies, write the colors being used on the targets on the graph portion of the worksheet.

Lesson Presentation:

1. Show students a picture or video clip of a rocket launch (video clip available at ["Saturn V rocket blasting off, carrying Apollo 11"](#)). (You may use the rocket picture from academic lesson #2, "Things that Fly.") Have students express in words what happens when a rocket launches. What do they see and hear?
2. Ask students why a rocket goes up. Explain that stuff (gases) being pushed out of the bottom of a rocket causes it to move upward, in the opposite direction of the smoke and flames coming out of the other end of the rocket.
3. Ask students what rockets do. Explain that they take people and equipment to space.
4. Tell students that they will make a rocket today. It will not have smoke and flames coming out of it to make it move, but it will move because of something else. Tell students you will talk more about how their rocket works later.
5. Distribute materials (rocket pattern and straw) to students. (Students should have scissors, glue stick or regular glue, and crayons at their desks.)



6. Help students assemble their rocket by providing the following instructions:
 - 1) Color the rocket and cut out the rocket pattern following along the black dotted lines.
 - 2) Glue the rocket together along the edges of the rocket, but do NOT glue the bottom edges together!
 - 3) Press down firmly along the edges of the rocket to make a tight seal so that air cannot escape around the edges.



7. Tell students to write their name on their rocket, and put it to the side so that the glue can dry.
8. While the glue is drying, demonstrate how the rocket works by inserting the straw through the bottom end of your rocket and giving a forceful blow through the straw.
9. Ask students why they think the rocket launched. Explain that it is because of something we cannot see. Provide students clues such as, "You can't see it. It is all around us." Confirm that it is air. When you blow air into the rocket, it doesn't just stay there. The air slams into the front of the rocket which helps move it forward, but also, the air that was blown into the rocket travels quickly out of the rocket. So, the force of air made their rocket move.
10. Tell students that you want to see if you can hit the target hanging on the wall. Ask students to watch closely to tell you which color your rocket hits or comes closest to hitting. Launch your rocket and confirm correct color.
11. Tell students that you want them to practice launching their rocket at the target, but you want them to keep track of which color their rocket hits or comes closest to hitting.
12. Distribute the "Rocket Chart" sheet and instruct students to write their name on their paper. Tell students to select 4 crayons that match the colors of the target. (or you may already have the crayons available at the target areas) Tell students that each time they launch their rocket, they should color one of the squares on their paper the same color that their rocket hit (or came closest to hitting). Tell students that just like they helped watch your rocket to make sure you knew which color your rocket hit, they can be helpers in their group by watching to see what color their classmate's rocket hits. Tell students that at NO time are they to launch their rocket at anyone. Also, tell them no one is to launch their rocket until you give them a signal.
13. Divide students into small groups of 4 or 5 members per group, and assign them a target area.
14. Provide the signal for the first student in line at the target to launch their rocket and color the first square on their rocket sheet. Then, give the signal for the next person in line to do the same. Continue this process until each student has had an opportunity to launch his/her rocket 10 times. NOTE - if students have trouble with their rockets, check for air leaks around the sides. If they did not seal well with the glue, tape the edges shut and continue with the activity.
15. Have students return to their seats.

16. If time permits, help students use their individual colored boxes to complete the graph. (Students should indicate the number of times their rocket hit each color listed on the graph by coloring the correct number of boxes for each color. Each colored box on the graph will represent one hit. For example, if a student's rocket hit the yellow target 5 times, he/she should color the first 5 boxes above the word "yellow," making sure to stay in the correct row.)

Summarization:

Ask students how a real rocket works. Ask students how their rocket works. Ask students to name a reason that rockets are used. Tell students that the picture on their rocket today is actually a picture of the kind of rocket that was used to help take Americans to the moon in 1969 and the early 1970s. The name of the very powerful rocket is the Saturn V. (pronounced Saturn 5) *If possible, buddy up with an older class that is using the Rocketry STEM Kit and go out to observe their launch.

Character Connection: Remind students that just like rockets can soar into the sky, or sail across the room like they did today, they also need their good character to keep them flying high. Being nice, helping others, and following directions are all good ways to keep one soaring in the right direction!

Assessment:

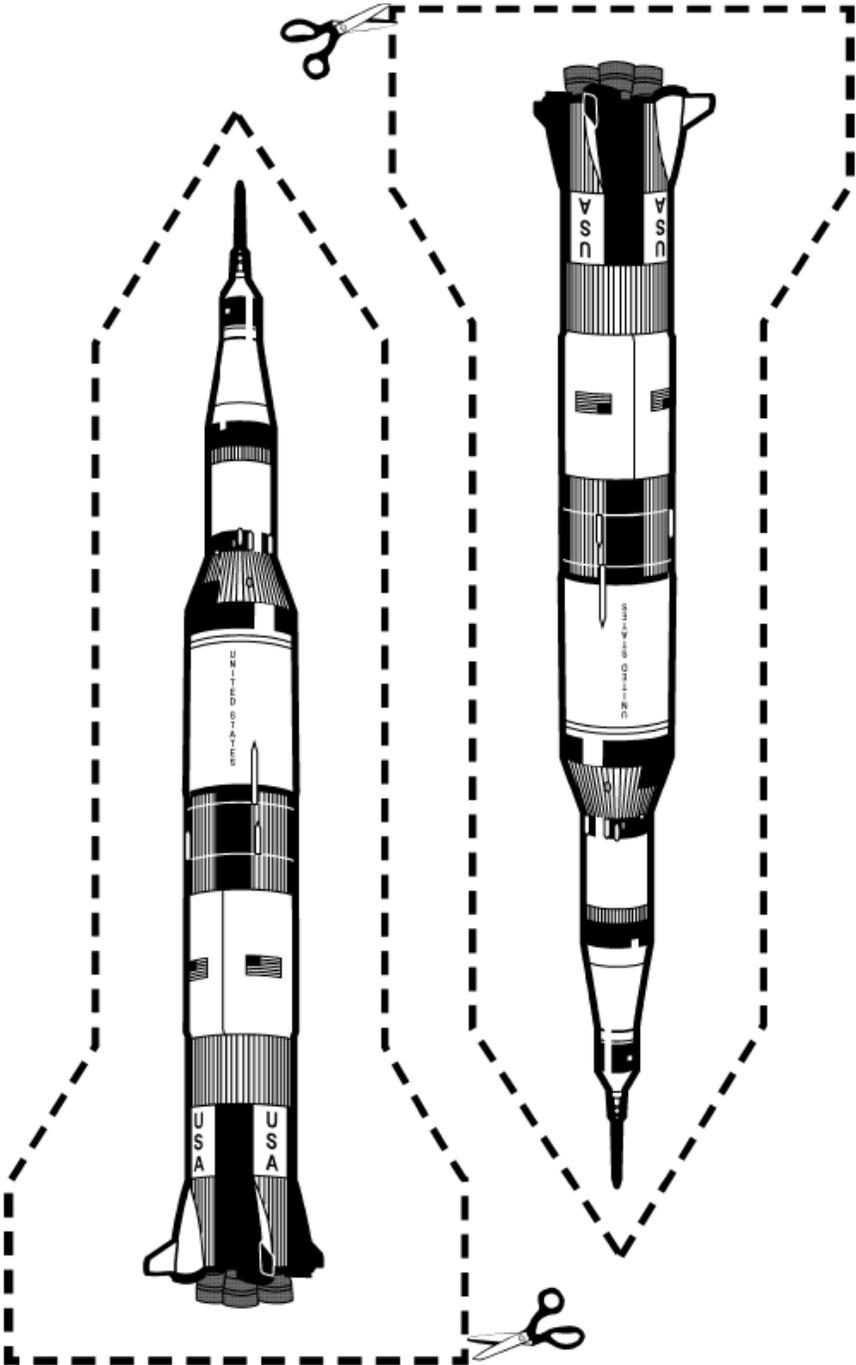
- teacher observation
- completed graph sheet

Additional activity ideas to enrich and extend the primary lesson (optional):

- Have a contest to see whose rocket can sail the farthest across the room.
- Conduct an experiment to see if rockets fly farther when launched horizontally (across the room) or vertically (up into the air). Have students lie on their backs and launch their rockets. (Have students wear safety goggles to avoid the rocket falling back down into their eyes.) Discuss how Earth's gravity likes to pull things down to the ground, and it takes a lot more power to travel straight up, trying to escape Earth's gravity.
- Use construction paper, geometric figures, and streamers to create a rocket. (See picture below.)
- For a quick explanation of Newton's Laws of Motion, watch the video, ["Rocket Science in 120: Newton's Laws."](#)



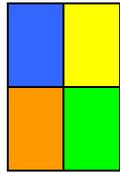
STRAW ROCKET PATTERN



Source: [Nasa Straw Rocket Pattern](#)

Name _____

Rocket Chart



1. Launch your rocket toward the target.
2. Color the first box below the same color as the color that your rocket hit. If your rocket did not hit a color, use the color that it came closest to hitting.
3. Launch your rocket 9 more times so that each of the 10 boxes below has a color.

1	2	3	4	5	6	7	8	9	10
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Teachers: Help students use their colored boxes above to complete the graph below.

10	9	8	7	6	5	4	3	2	1			

Colors

of hits

