

Straw Rockets



Teacher Copy

Lesson Focus

This lesson focuses on the “push” (force) needed to move the straw rocket through the air and allows students to adjust their “push” to get the rocket through obstacles. This relates to three of the four forces of flight (thrust, drag, and gravity) with a specific focus on thrust.

Grade Levels

K - 5

Objectives

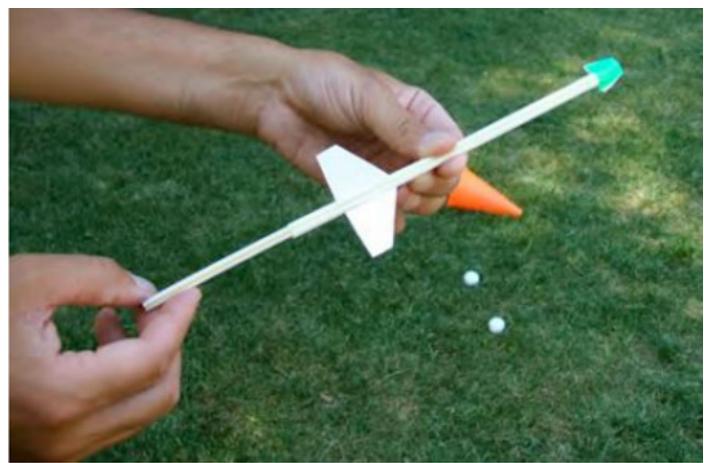
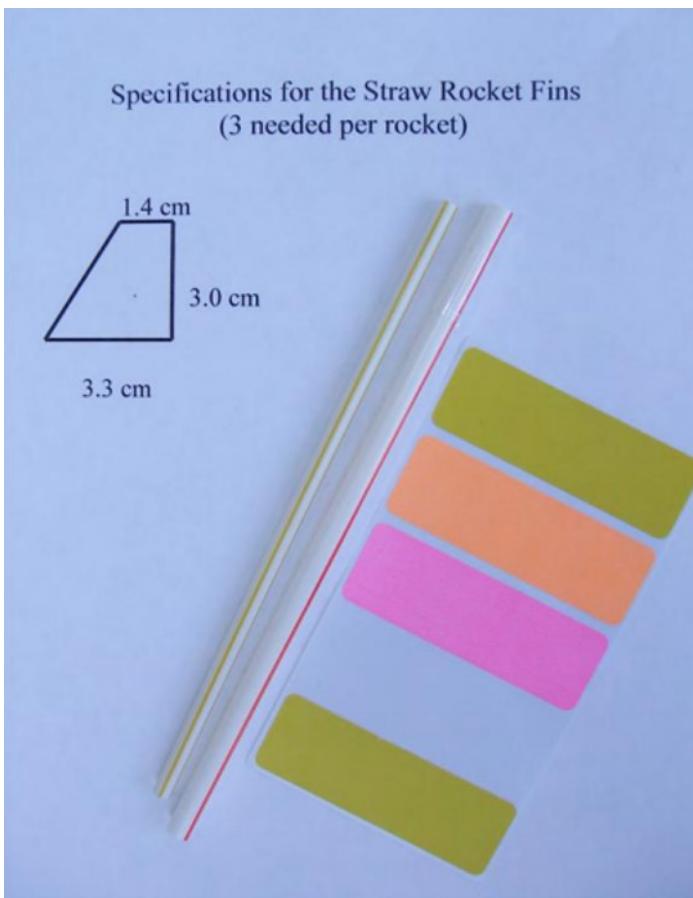
During this lesson students will:

- Build their own straw rocket
- Test flight performance
- Record observations
- Adjust design
- Communicate results

Materials

(Materials for a group of 20 students)

1. 5 rolls of tape
2. 20 pairs of two different sizes of drinking straws
3. Sheet of label stickers (or use tape)
4. 20 simple fin, body, and nose cone patterns (see photo below)
5. Blunt scissors
6. Hoops or cardboard cutouts to use as targets
7. Tape measure or marked lines in testing area for students to measure their flights



Pre-Lab Questions

1. Give some examples of fluids. (Create definition) Add “air” to fluids.
2. Discuss the four forces of flight that keep aircraft flying: lift, gravity, thrust, and drag. This activity focuses on different amounts of thrust and how it affects how far the rocket will travel.

Procedure

1. Wrap a label sticker or a 7.5 cm piece of tape over one end of the larger straw to close off the opening.
2. Carefully cut out three fins.
3. Using two pieces of tape approximately 1.2 cm long, tape each fin about 2.5 cm from the back opening of the straw.
4. Place the smaller straw into the larger straw rocket and blow into the smaller straw.
5. If the straw does not fly level, add tape near the front of the glider or just behind the fins.
6. Use a small breath and measure the distance the rocket traveled.
7. Use a big breath and measure the distance the rocket traveled.

Data

Sample Data Table: The Effect of Air “Push” on a Straw Rocket

| Trial | Small breath | Big breath | Distance traveled (cm) | Observations |
|-------|--------------|------------|------------------------|--------------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

Questions to Discuss

1. Did the small breath or the big breath make the rocket travel farther?
2. Can you think of one thing that would make your rocket travel farther?
3. Why is air a fluid? (*has mass, takes up space, and flows*)
4. Can you think of other fluids?

Alignment to Curriculum Frameworks

Next Generation Science Standards Grades K-2 and 3-5

Motion and Stability: Forces and Interactions

- **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.
- **K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

- **3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- **3-PS2-2.** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Disciplinary Core Ideas:

- **PS2.A.** Pushes and pulls can have different strengths and directions.
- **PS2.A.** Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- **PS3.C.** A bigger push or pull makes things speed up or slow down more quickly.
- **PS2.A.** Each force acts upon one particular object and has both strength and direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object.

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute students' ideas about causes.
- Events have causes that generate observable patterns.
- Cause and effect relationships are routinely identified, tested, and used to explain change.

Common Core State Standards – ELA

- **SL.K.7.** Participate in shared research and writing projects.

Common Core State Standards – Math

- **K.MD.A.1.** Describe measurable attributes of objects such as length or weight. Describe several measurable attributes of a single object.
- **K.CC.A.** Know number names and the count sequence.

