

ACTIVITY 6

LAUNCH TIME

Objective

Students construct and launch paper rockets, and use graphs and nonstandard measurement to show how far the rockets travel.

Standards

Mathematics, Technology

Materials

- 2-piece straw rocket (Figure 8, page 80), 1 set per student
- Plastic straws, 1 per student
- Glue sticks or glue
- Drawing of International Space Station (ISS) (Figure 1, page 73), colored
- Bulletin board paper, approximately 3 meters long
- Crayons and markers
- Markers or small photograph of each student
- Interlocking cubes, assorted colors
- Chart paper, 2 pieces

Educator Information

- Three class periods are required for the completion of this activity.
- This activity may need additional adult supervision for rocket construction. Construction of the rockets may work best in a small group environment.
- For each student, copy 2-piece straw rocket pattern.
- Review information on using rockets to construct the ISS.
- Be prepared to demonstrate how to make and launch a paper rocket. Color and cut out the 2-piece rocket. Place the two pieces together with the drawings on the outside. Carefully seal the edges with glue, leaving the bottom edge open. Make sure no air can escape. Insert the straw into the bottom edge and blow into the straw to launch the rocket. Use one short, strong breath to launch the rocket.
- It is important that students carefully seal the edges of the rocket with glue. Students need to leave the bottom edge of the rocket open and unsealed. Adults may need to assist with the application of glue.



- Select an open area to launch the rockets. Plan to carry straws, student rockets, and markers or individual photographs of students to the rocket launch area.
- Color and cut out the ISS drawing. Glue the ISS drawing at the end of the bulletin board paper.
- Draw a line to divide a piece of chart paper into two columns. Label one column with the title, *Name*, and the second with the title, *Distance*. For non-readers, use drawings instead of words to label the columns.

Procedure

First Class Period:

1. Remind students that constructing the ISS requires more than 40 rocket launches. Rockets also carry supplies and people to and from the station.
2. Demonstrate how to make and launch the paper rocket.
3. Demonstrate how to insert the straw into the opening at the bottom of the rocket. Begin a countdown, “10,9,8,7,6,5...” Demonstrate how to use a short, strong breath to blow into the straw and launch the rocket.
4. Have each student construct a paper rocket, color, and decorate it. Instruct students to write their name on the rocket.
5. Each student cuts out the 2–piece rocket and places the two pieces together, colored sides facing out.
6. Carefully apply glue to make sure no air escapes. To insert straw, leave bottom edge of the rocket unsealed. Adult supervision may be required. Younger students may need assistance in using glue to seal the edges. Let the rocket dry.
7. Collect rockets and save for the next class period.

Second Class Period:

1. Take the class to the selected location to launch the rockets. A room or area with open floor space is preferable.
2. Talk about safety rules during a real rocket launch. People must avoid being close to a rocket when it launches. Have students develop safety rules for the launch of their paper rockets. Be sure to talk about eye protection.
3. Lay the long piece of bulletin board paper with the ISS drawing on the floor.
4. Explain to students that they will stand at the end of the paper and launch their rocket toward the ISS drawing. The class will practice a countdown for each launch. Demonstrate a rocket launch while the students count from 10 to 1 and then say liftoff.
5. Tell students to note the spot on the paper where the rocket lands. When they launch their rocket, they will either write their name at the spot or mark it with an individual photograph.
6. Tell students that everyone will have a turn to launch a rocket. Wait to launch until directed by the teacher.
7. Distribute rockets and straws to students.
8. A student steps to the end of the paper to launch a rocket toward the station drawing. Before launching the rocket, have students predict whether their rocket will reach the space station. Ask the class to repeat a countdown sequence before classmates launch their rockets. Students insert the straw into the rocket and blow air through the straw to launch their rocket. Remind students to use a short, strong breath. Each student has a turn.
9. If the rocket does not land on the paper, pick it up and place it on the paper at a similar distance from the launch point.



10. At the spot on the paper where the rocket lands, have each student write their name with a marker or glue a small individual photograph.
11. After each student has had an opportunity to launch a rocket and mark where it landed, explain to students that the bulletin board paper is a graph that shows how far each rocket traveled.
12. Ask the class to look at the graph and evaluate what they see. Have students generate sentences to describe what the graph shows them. Use comparison words such as *longer* and *shorter*, and *closer* and *farther*, in the sentences. Sentence examples include: *Patrick's rocket is closest to the ISS; Laura's rocket traveled a longer distance than John's rocket.* Write the sentences on the bulletin board paper graph or chart paper.
13. Save the bulletin board paper graph and sentences for the next class period.

Third Class Period:

1. Students can measure how far their rockets traveled using nonstandard measurement. Explain to students that they will use interlocking cubes to measure how far their rocket traveled.
2. Lay the bulletin board paper graph with the distances marked on the floor.
3. Ask students to sort interlocking cubes by color. Count 10 interlocking cubes of one color and connect them. For example, make sets of *10 blue, 10 green, 10 yellow.* On the floor, connect the sets of 10 cubes alternating different colored groups of 10. Repeat this process until the class has enough sets of 10 interlocking cubes to reach from one end of the paper to the other. The cubes should stretch from the end where the rockets launch to the end where the ISS drawing is located.

4. Let each student take turns finding the spot on the paper where their rocket landed. Have the student count interlocking cubes by 10's and 1's to see how far the rocket traveled. For example, *a rocket traveled a distance of 106 interlocking cubes.* Encourage students to state the unit of measurement.
5. On the chart paper, record the name of each student in the *Name* column. Then record the number of interlocking cubes the rocket traveled in the *Distance* column.
6. After each student's information has been recorded, have students look at the chart to make comparisons and draw conclusions about the distance the rockets traveled. Encourage them to use comparison words and the correct unit of measurement.

Assessment

- Observe students and listen to their comments as they use the graphs and nonstandard measurement to describe how far their rocket traveled.

Enrichment

- Have students predict how far their rocket will travel. Students place an object on the floor at the point where they think the rocket will land. Launch the rocket. Ask students to compare where the rocket landed to the spot they predicted. Use comparison words.
- Have students discuss ways that they could increase the distance their rocket travels. Ideas may include changing the position of the rocket or blowing differently into the straw. Repeat the activity. Compare and contrast the performance of the rocket. Use comparison words to describe the differences in rocket performance.



- To encourage practice counting by 5's, repeat this activity using interlocking cubes sorted into groups of 5. Connect the cubes in groups of 5, alternating colors, in a line on the floor. Use this line of cubes to practice nonstandard measurement and see how far the rockets travel. Encourage students to use the unit of measurement when stating how far their rocket traveled.
- Have students think of other items to use for nonstandard measurement. Examples include wooden blocks, pattern blocks, plastic links, counting rods, shoelaces, and new pencils. Have students launch their rockets again. Use another type of nonstandard measurement to measure the distance the rockets travel. Encourage students to always state the unit of measurement when describing the distance their rocket traveled.
- Another paper and straw rocket is found in the *Rockets* guide at <http://spacelink.nasa.gov/products/Rockets>. Younger students will need adult assistance to construct this rocket.
- From the *Suggested Reading* list or other sources, select books that feature descriptions and pictures of rocket launches, such as *The Space Shuttle* by Jacqueline Langille and Bobbie Kalman or *Rockets and Spaceships* by Karen Wallace. Read the books to the class or have students individually read the books. Encourage the students to find similarities and differences in their paper rocket launches and the launches described in the books.



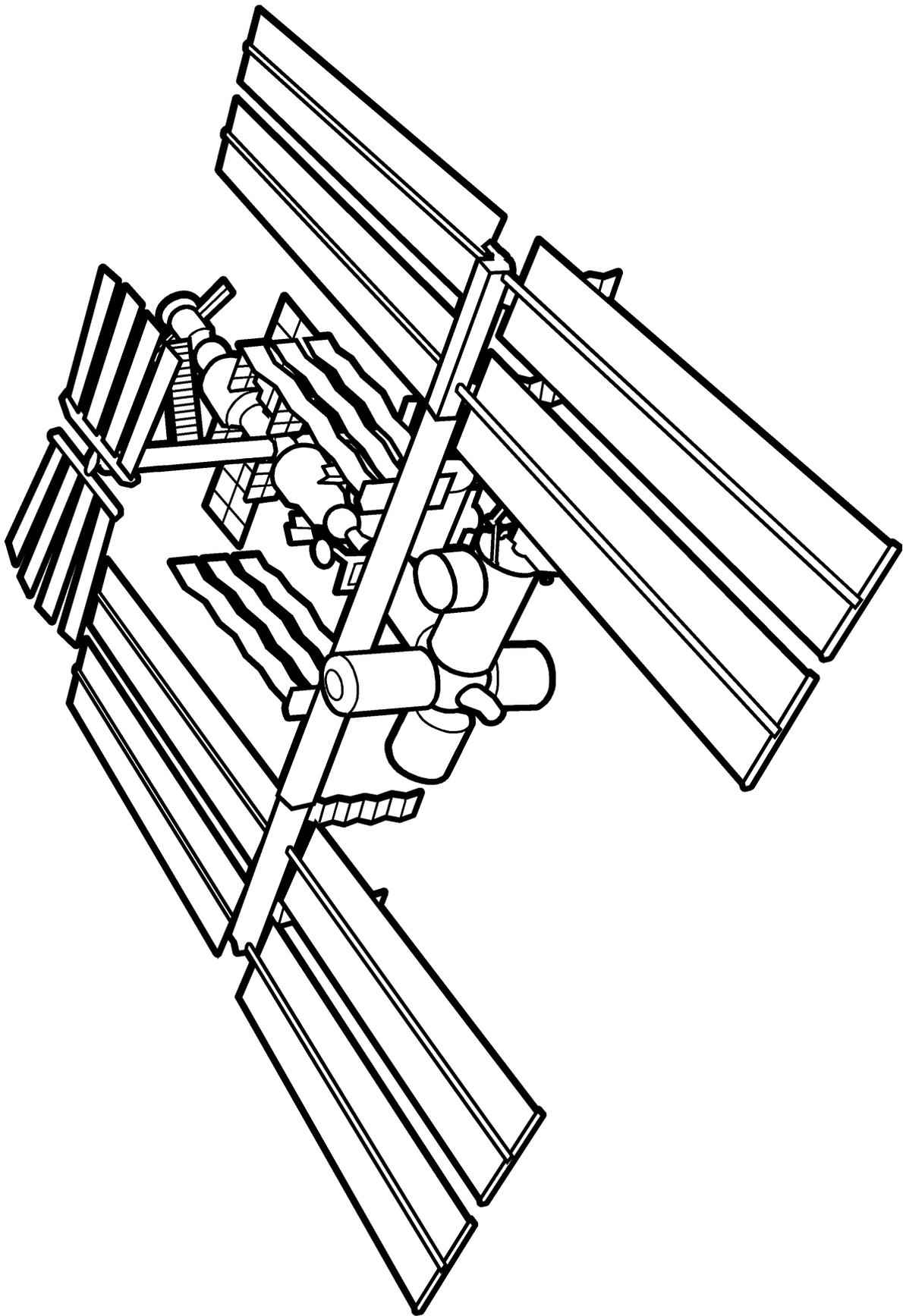


Figure 1. International Space Station (ISS)



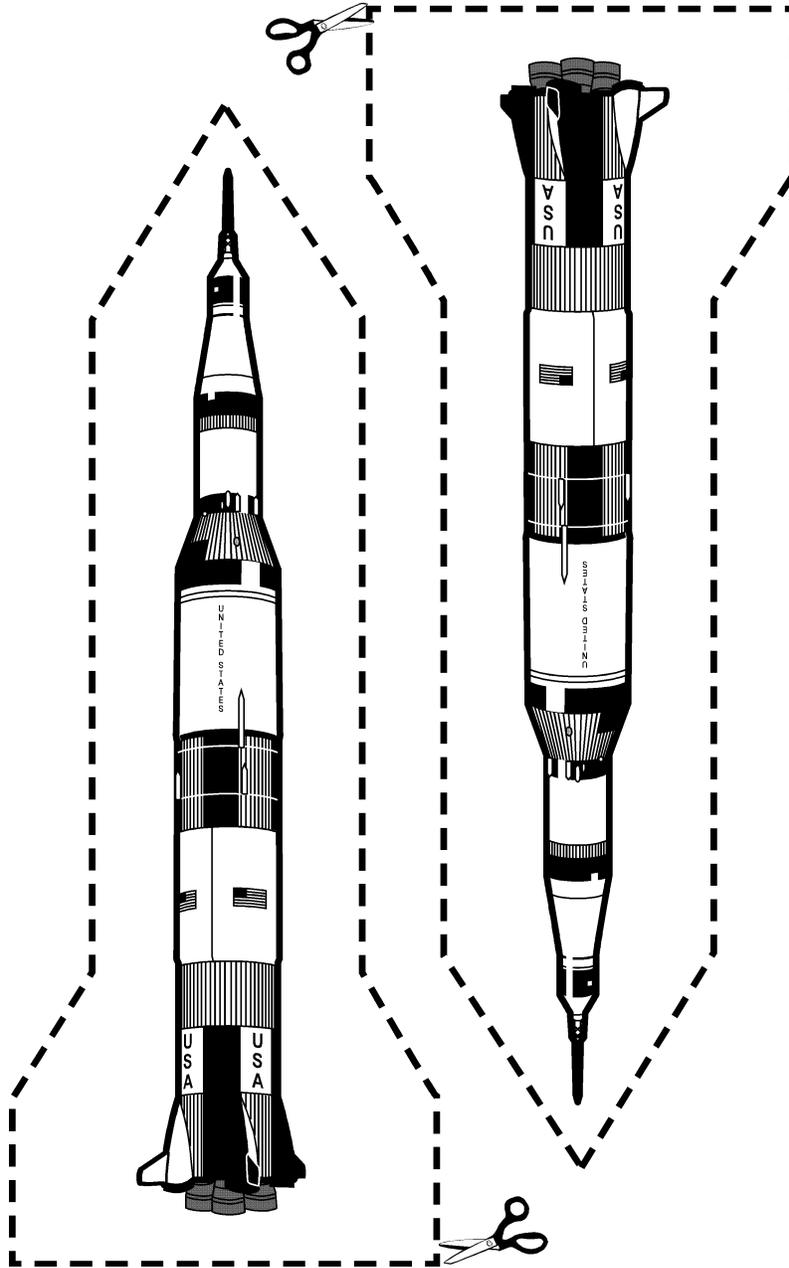


Figure 8. Straw Rocket Pattern

