



ROCKETRY

Blast Off! Build Your Own Air-Powered Rocket

Project: Design, build, and launch your own paper rocket.

Grades: K-3rd

Learning Objectives:

- Design and build a rocket.
- Explore Newton's 3rd Law of Motion (for older grades)
- Work together as a team.

Launching into Learning: Engage Your Students

I. Points to Spark Curiosity:

- ✓ Rockets to the Rescue! Let's talk about rockets! They're like giant engines that carry people (astronauts) and things (satellites) into space!
- ✓ Paper Power! Today, we'll be building rockets ourselves! We'll use paper and air power to make them fly. By testing them, we can see how to make them fly even better! This cool process of improving a design is called the Engineering Design Process.
- ✓ Rocket Show and Tell! Check out this awesome rocket I made! Can you spot the main parts? (Show your sample rocket and launcher)

II. Let's Get Technical:

Rocket Parts: Explore what makes rockets work!

1. Body (Fuselage): This is the main part, like the rocket's body, that gives it a smooth shape.
2. Cone (Nose): This pointy tip helps air flow smoothly around the rocket.
3. Fins: These keep the rocket stable as it flies, just like a feather on a dart!

III. Rocket Science:

Explore the science behind rockets! This includes forces like thrust (pushing up), drag (slowing down), lift (helping it rise), and gravity (pulling it down). There's even a cool science rule called Newton's 3rd Law that explains how rockets work!

MATERIALS INCLUDED:

- ✓ Color paper
- ✓ Fins & Cones
- ✓ Tape
- ✓ Rocket Roller

CLASSROOM MATERIALS

- ✓ Scissors
- ✓ Crayons/markers

IV. Brainstorm the Design:

- What are some ways you can change a rocket? (Kids can change: the length of the body, weight; the weight and shape of the nosecone; the number and position of fins; the amount of air pressure.
- How will adding weight to cone or having fins affect how it flies? (Adding weight to cone or placing fins near the back can help it fly straighter.)
- When you launch your rocket, how does the launch angle affect where it lands? Launching a rocket straight up sends it high but not far; straight out makes it fall quickly to the floor.

V. Vocabulary:

BODY/FUSELAGE: The largest part of the rocket that PROJECT gives it a streamlined shape to lower drag. It's where the engine is located.

CONE: The “nose” of the rocket has a shape that causes the air to flow smoothly around the rocket. It's where the astronauts sit or where NASA stows the satellites or equipment it sends into space.

FINS: The fins provide stability during the flight. Thrust or wind can cause instabilities and rocket wobbles or change directions while in flight.

- Placing fins near the back can help it fly straighter.

Preparation Steps:

1. Cut out the fins and cones for the rocket.
2. Lay out all the materials listed in the instructions.
3. Distribute one sheet of paper to each student.
4. Pair students into groups of two; each pair will share one PVC pipe.

VI. Step-by-Step Assembly Instructions:

1. Form the Fuselage: Roll the paper snugly (but not too tightly) around the PVC pipe. This will be the body or fuselage of the rocket.
2. Seal the Seam: Use tape to secure the paper to itself along the length of the seam. Do not tape the paper to the PVC pipe. Ensure the seam is completely sealed and airtight.
3. Remove the Fuselage: Gently slide the fuselage off the PVC pipe. Check that it slides off easily, indicating it will fit on the launch tube later if you have a launcher.
4. Seal the Top and Attach the Nose Cone: Use tape to close off the top of the rocket. Then, neatly attach the nose cone to the top, ensuring no air can escape.
5. Attach the Fins: Shape and tape the fins onto the rocket.
6. Troubleshoot: If a student's rocket sticks to the PVC pipe, it means the fuselage is too narrow or the rocket has been taped to the pipe. Assist them in widening or releasing the fuselage.

If Rocket Launcher is available:

- ✓ Once the rockets are decorated and assembled, move the class to an outdoor area for launch if a rocket launcher is available.
- ✓ Students may decorate their rockets as they choose.
- ✓ Encourage students to create their own versions of the rocket.

Note: Ensure all safety precautions are followed during the rocket launch.