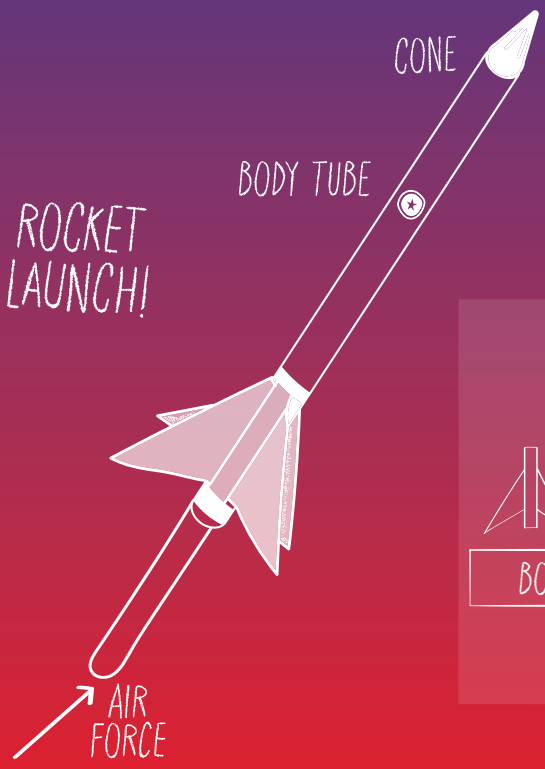
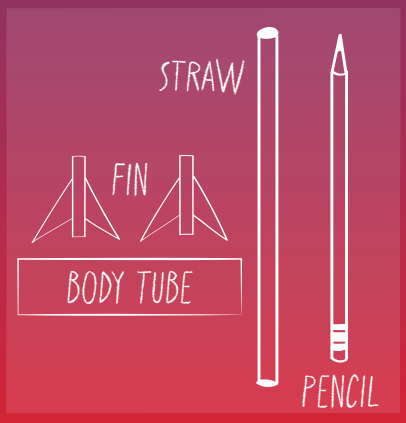
DREAM. BUILD. BECOME.

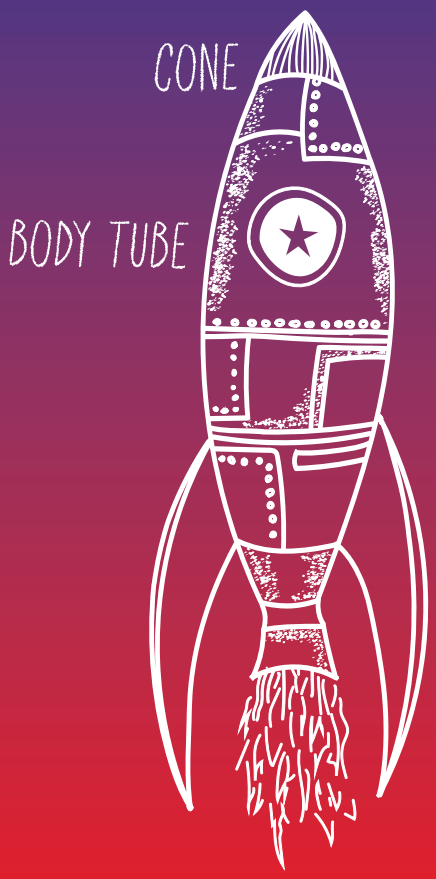
ACE METAL FOUNDATIONS

By IACMI

It's Rocket Science







It's Rocket Science!

Prior Knowledge

To participate successfully in this activity, students should have experience following simple, multi-step directions. Students should be able to use classroom tools, such as scissors and tape. Students may need to utilize some fine-motor skills, such as rolling paper around an object.

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Lesson Overview

In this activity, students explore how different materials affect how well something works. Students build and launch two simple straw rockets using the same design but different materials, paper and aluminum foil.

Students first build and test a paper rocket, observing how easy it is to build, how it holds its shape, and how it performs when launched. They then build a second rocket using aluminum foil and repeat the process. As students test both rockets, they notice differences in how each material behaves during building and how the rockets hold up after launching.

Through discussion and reflection, students compare the two rockets and consider why one material may work better than another. Students learn that the best material is not always the one that looks the most exciting, but the one that does its job well, helping them understand how engineers choose materials when they design and build real world objects.

Vocabulary

Material: What something is made of

Design: A plan for how something is built

Fin: A flat surface that helps guide motion and keep an object moving in a straight direction

Test: To try something out to see how it works

Figure 1: Rocket launch into space.

Figure 2: A shark's dorsal fin, acting like a stabilizer, helping the shark stay balanced while swimming.

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The Foundations of Choosing the Best Material for the Job

People build things to do specific jobs. A rocket needs to stay together, keep its shape, and work more than once. The material it is made from helps it do that job.

A rocket may look simple from the outside, but launching one takes careful design, strong materials, and parts that all work together.

Real rockets have to survive a lot. They need a strong body to hold their shape, a sealed fuel system so gases don't escape where they shouldn't, and fins or guidance systems to help them move in the right direction. During launch, rockets also face heat, shaking, pressure, and powerful forces as they lift off the ground.

That means every material has a job to do. Your straw rocket is much simpler than a real rocket, but it has some of the same design challenges. It needs to hold its shape, stay sealed, move through the air, and maybe even work more than once.

And one of the most important choices in any design is the material.

Different materials have different characteristics. Some materials are easy to shape and stay strong. Other materials may look shiny or exciting, but they can bend, wrinkle, or break more easily.

When engineers design and build things, they do not choose materials just because of how they look. They test materials to see how well they work. If something bends or breaks, that helps engineers learn what material is better for the job.

In this activity, you will build two rockets the same way but use different materials. By building, launching, and comparing your rockets, you will learn that choosing the right material helps a design work better.

Figure 3: A rocket passing Earths atmosphere and entering space.

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Materials

Materials Supplied in Kit

Per Student

- 1 straw
- 1 sheet of aluminum foil

Shared

- Tape Rolls

Materials Supplied by Teacher

- Scissors
- Pencil
- Rocket template printout

Activity Directions

Step 1: Build the paper rocket body

- Cut out the rocket template
- Wrap the rectangular portion of the rocket template around a pencil to form a tube.
- Use tape to keep the tube's shape
- Twist the top of the paper tube into a point and tape it so that air cannot escape

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Activity Directions Continued

Step 2: Form the paper rocket fins

- Cut out the rocket fins from the template
- Tape one fin to each side of the rocket body near the bottom
- Carefully slide the paper rocket off the pencil

Step 3: Build the aluminum foil rocket

- Using the same steps as before, create a second rocket made of aluminum foil instead of paper
- Keep the design the same so only the material is different

Step 4: Test the rocket

- Slide the paper rocket onto a straw
- Blow through the straw to launch the rocket
- Repeat the test with the aluminum foil rocket
- Observe how each rocket launches, holds its shape, and works after being used

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Discussion Prompts or Reflection

- Which rocket was easier to build?
- Did one rocket keep its shape better than the other rocket after launch?
- Which material helped the rocket do its job better?
- Why does picking the right material matter?

Variations and Enrichment

- Variation and extension can be introduced to this activity by adding a gamified extension. Place an empty box in one area of the room, and challenge students to attempt to launch their rocket into the box from a distance
- Encourage students to launch their rockets multiple times and observe when it bends, wrinkles, or breaks to encourage the idea that the most durable material is the best material
- Encourage students to color and design their rockets before cutting out the template to personalize their rocket

Foundation Exploration

- **Builders** choose materials like wood, bricks, and metal to make sure buildings stay strong and safe
- **Car makers** design and build cars work to test materials to make sure that cars are strong and safe to use
- **Toy designers** think about the materials they will use to design toys that are fun to use, and do not break easily
- **Rocket designers** test different materials to help rockets stay strong and work safely