Build a Paper Rocket!

In February of 2008 Leland flew aboard the Space Shuttle Atlantis for his first space mission, launching with two attached solid rocket boosters. The instructions below guide you through building a simple Paper Rocket.

Leland launched into space for the first time in February 2008 aboard the Space Shuttle Atlantis. His mission was made possible by decades of research and experimentation in aeronautics, rocket design, and fuel systems. NASA and other private, commercial companies are constantly improving the design of rockets and vehicles used for space travel, missions to the International Space Station, and maybe one day, the journey to Mars.

In this activity you will construct a simple design to demonstrate how a rocket flies through the atmosphere. Basic concepts such as stability and control are introduced as you design and launch your rocket.

The size of the rocket as well as the size, number and design of the fins can greatly impact stability and distance achieved. A rocket with no fins is much more difficult to control than a rocket with fins. The placement and size of the fins is critical to achieve adequate stability while not adding too much weight.

Materials and Tools

- Scrap bond paper
- Cellophane tape
- Scissors
- Sharpened fat pencil
- Milkshake straw (slightly thinner

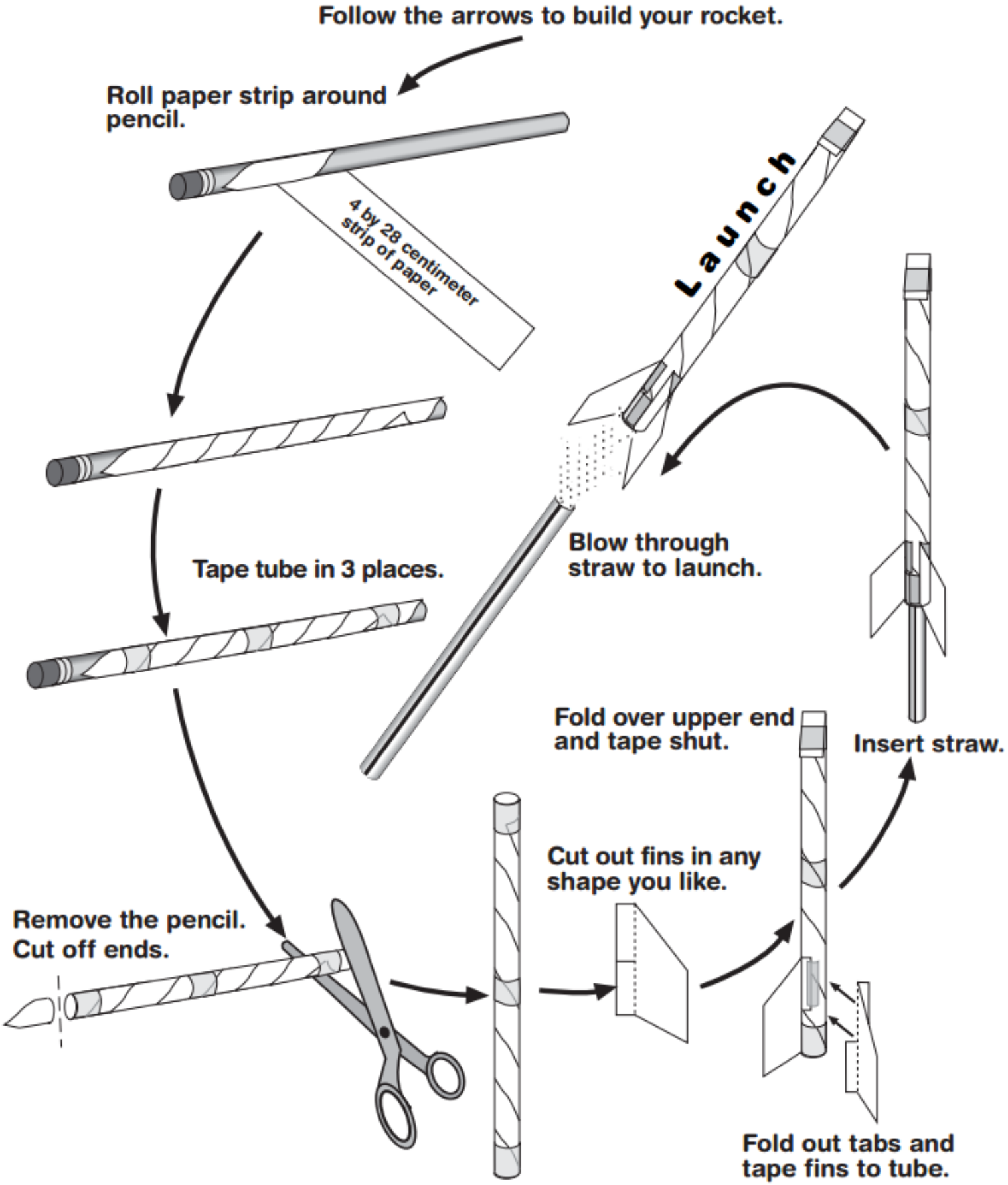
- Eye protection
- Standard or metric ruler
- Masking tape or altitude trackers
- Pictures of the Sun and planets

Notes as you begin:

- Safety first! Always wear proper fitting goggles for experiments. The rockets are projectiles so wear eye protection.
- When launching rockets, it is important that others stand back. Use a Countdown to help inform everyone as to lift off!
- Collect a variety of decorative materials or decals before construction so you can customize the rockets.
- Be sure to conduct your experiment in a large area with enough space to allow for the rockets to fly.
- Once you create and launch your first paper rocket, think about how to modify or improve your design and try it again!
- Be sure to measure how far your rocket travels with each launch and track your data!

Procedure:

Build a paper rocket according to the diagram instructions provided. To test and fly the rockets choose a large open space or hallway. Don't forget to use a measuring device (mark off measured sections with tape or lay out measuring sticks) so you can track the distance.


Follow the arrows to build your rocket.
Roll paper strip around pencil.
4 by 28 centimeter strip of paper
Launch
Tape tube in 3 places.
Blow through straw to launch.
Fold over upper end and tape shut.
Insert straw.
Remove the pencil. Cut off ends.
Cut out fins in any shape you like.
Fold out tabs and tape fins to tube.

Design your own:

Once you construct and test your initial paper rocket you can modify the design to improve distance or stability and compare results. Think about the factors that might impact speed or the distance your rocket can travel. Though it is a simple paper rocket, how can you modify the design to conduct an experiment that tests for individual variables?

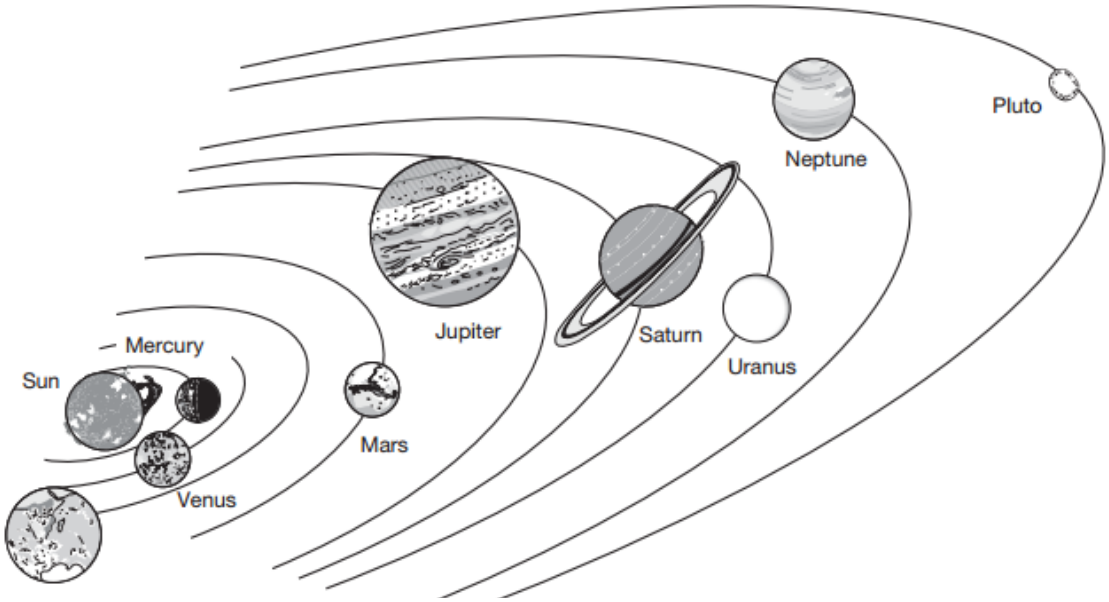
- Can you change the shape or size of the fins?
- What happens if your rocket is larger (fatter than a pencil) or longer?
- What happens if you use a thicker or heavier paper to make your rocket?
- How many trips can your rocket sustain without damage?

Ideas for extra fun!

Use the planetary target system (images provided) as a way to measure distance and think about inter-planetary travel and what it might be like to launch from Earth into the solar system.

Research to discover how far each planet is from the Sun and from Earth and create your system to scale according to the chart provided. Learn about the different planet's atmospheres and the difficulties humans may face when traveling through space.

Planetary system chart:



Enlarge the planet images and color them to create your solar system, or sketch copies on separate paper. Place these pictures on the floor according to the Planetary System Chart. Make the planets to scale. Earth's diameter is given as one (1) and all the other bodies are given as multiples of one to show its relative size to Earth. (If the Earth is one, then the Sun is 108 times larger than the Earth, and so on.)