

Rocket blast

6 Week STEM Clubs



Aim

Children are introduced to the challenges facing rocket engineers regarding how to ensure stability in flight, the effects of launch angles and the need to test and model design ideas

Introduction

Some of the smallest and lightest rockets are called sounding rockets and these carry scientific instruments into space along a parabolic trajectory.

Their overall time in space is brief, typically 5-20 minutes before then falling back to Earth, but during that time they can focus on making observations on a wide range of issues like the Earth's atmosphere or even observations of distant galaxies. Part of the role of a rocket engineer is to improve these rockets and make incremental changes that increase performance and stability and improve upon existing rocket designs.

Equipment

- Pencil
- Scissors
- Paper
- Straws
- Glue
- Sticky tape
- Tape measure

Instructions to make your mini rockets

- 1 Wrap a thin strip of paper around the length of a pencil
- 2 Use sticky tape to hold the paper tube together
- 3 Fold the tip of the rocket over and secure with sticky tape
- 4 Attach additional modifications such as fins to the model
- 5 Gently remove the pencil and you should have a hollow paper rocket shape
- 6 Choose an area that is away from other people and designate it as the group launch area
- 7 Slide your hollow paper rocket onto the end of straw
- 8 Launch your rocket by blowing hard into the straw
- 9 Use the tape measure to record the distance travelled and log your results

Activity



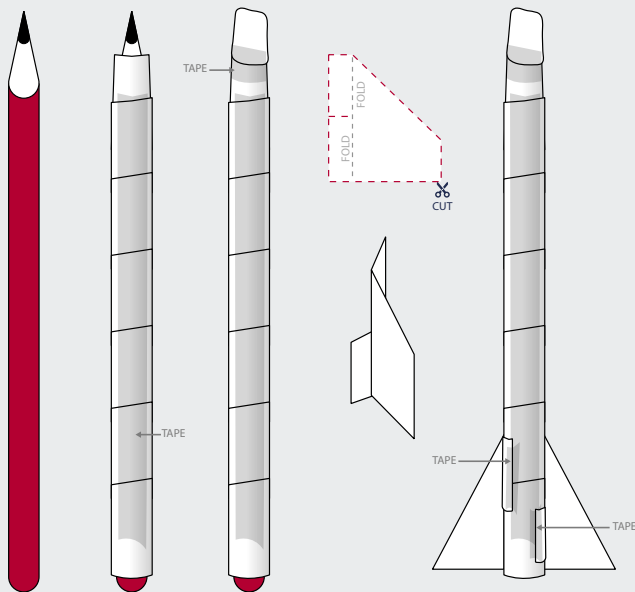
Useful links

- NASA's sounding rockets <https://tinyurl.com/f0jn60id>
- NASA's sounding rockets <https://tinyurl.com/bjx1ljrd>

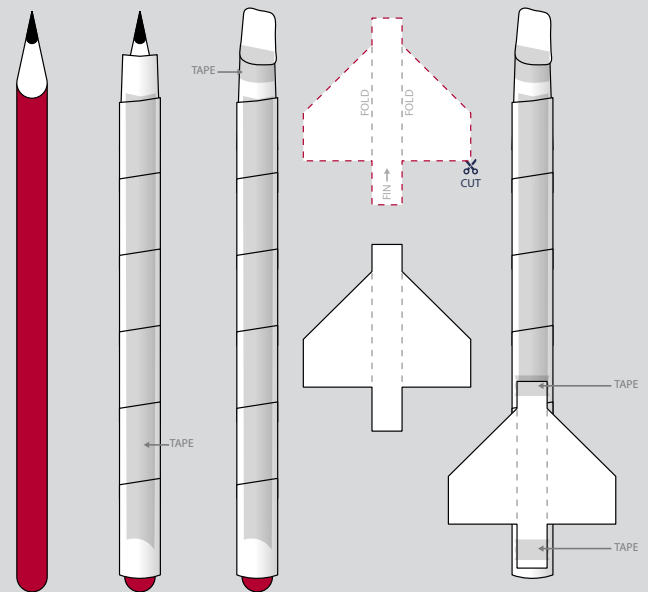


In association with

Fin option 1



Fin option 2

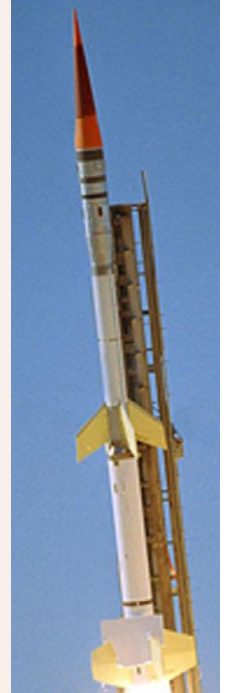


... or make your own design!

Instructions

You are a rocket engineer and are going to investigate several designs by using mini rockets – which are a good way to try out your ideas. Look at the questions below and plan investigations with your mini rockets to find some answers. Remember the need to experiment: (i.e.) *test, fail, evaluate and redesign* – this is part of engineering. Also, make sketches of your designs and add notes in order to record your investigations.

- 1 How does the location of the fins on the rocket, either tip of base, affect its flight?
- 2 How can fins make the rocket turn in flight?
- 3 Are fins necessary for flight stability?
- 4 Do fins have to be straight?
- 5 How does the size of fins affect flight stability?
- 6 What's the best shape for a fin?
- 7 How many fins are best?
- 8 How does the launch angle affect the distance travelled?
- 9 Also, try different weights of paper!



Activity



Next steps

- Make a presentation explaining the areas that you have investigated and the conclusions you have made
- Think about the engineering process: *test, fail, evaluate and redesign* and make a *Top-Tips Advice sheet* for a new team; What advice would you give (ie) is it better to change lots of things together to quickly find answers or perhaps, for each test, change one thing only. Give reasons and examples