

Aeronautical Engineering

In this activity students act as aeronautical engineers and experiment with aerodynamic design as they build and launch rockets.

We will be using a paper tube and straw in the rockets we make today, but it is up to you to design the rest of the rocket structure so that it flies the furthest possible distance. Before you begin to design your rocket consider the following:

1. What design might make one rocket fly further than another?
2. How might the rocket affect the distance it flies? How might you include this opinion in your design?
3. How many fins do you think a rocket needs to stabilise it?
4. What size should these fins be? What shape should they be?
5. Does the size of the nose (tip of the rocket) have an impact on the aerodynamic qualities of the rocket?
6. What would happen if you placed the rocket fins near the rocket's nose?

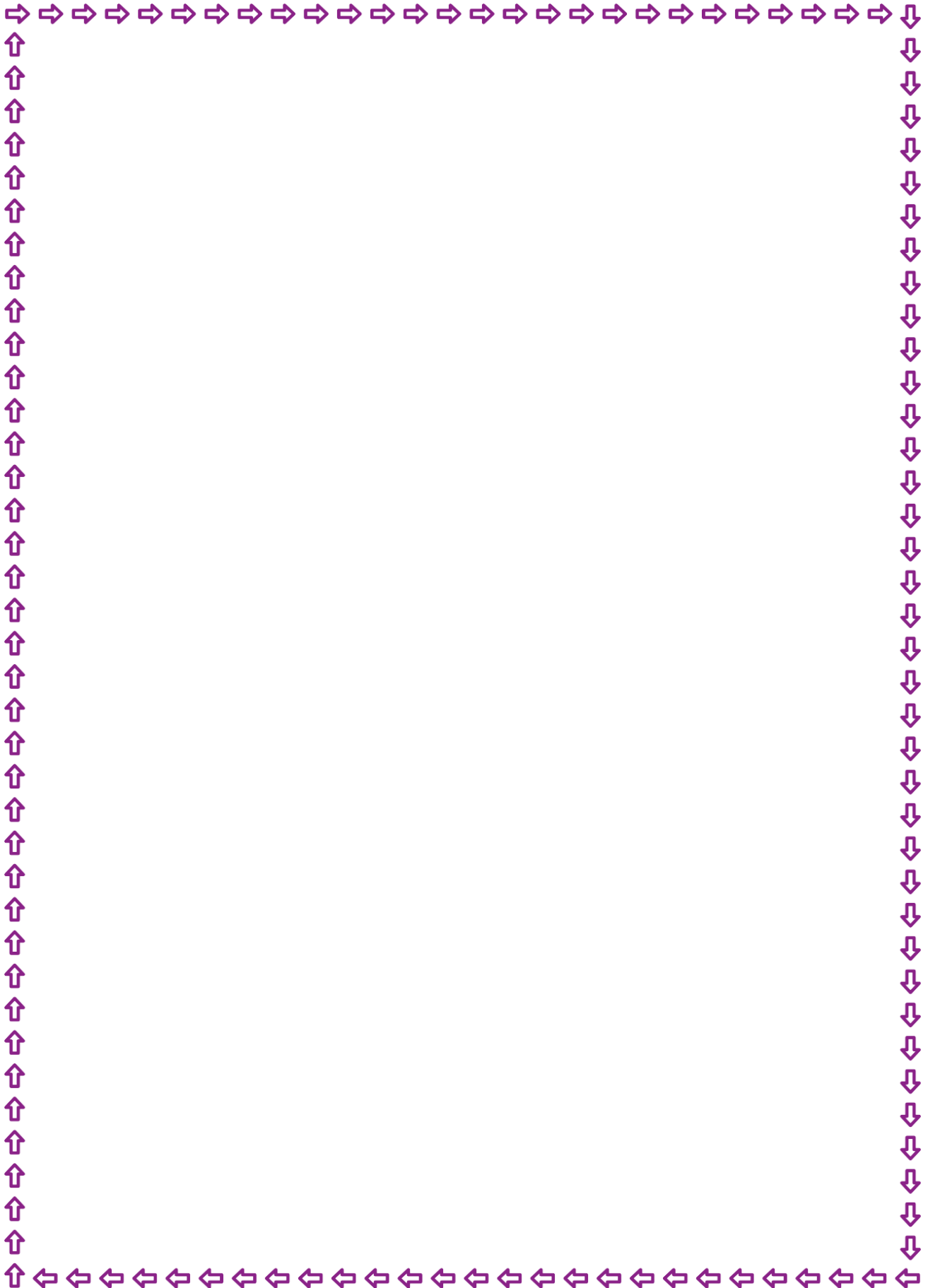
Like a team of engineers you should remember to:

- Design
- Plan
- Evaluate

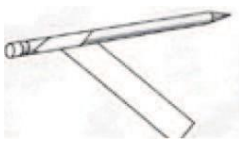
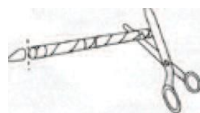


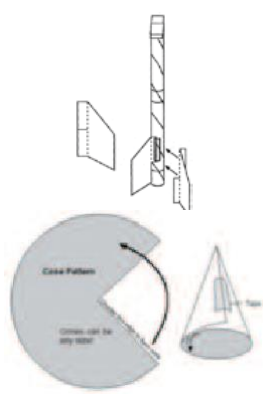


Materials Needed:

- A4 paper sheets
- 2 straws
- 1 scissors
- 1 roll Cello tape
- Long ruler
- Pencil

Rocket Building Sketches



Assemble your Rocket

<p>1. Cut a strip, 5cm wide from the long side of an A4 sheet. You should measure 5cm using the ruler and mark the page before cutting with a pencil.</p>		<p>Be careful when holding and using the scissors!</p>
<p>2. Starting at one end of the pencil, hold the strip of paper at an angle of approximately 45° to the pencil and tightly roll the paper strip around the pencil until you get to the other end.</p>		<p>Don't forget to take out the pencil.</p>
<p>3. Cut off both ends of the tube to make a straight edge on both sides.</p>		
<p>4. To make sure the paper does not move, tape the tube at each end and at the middle of the rocket.</p>		
<p>5. Fold the upper end firmly and tape it.</p>		
<p>6. Make the rocket's nose* and attach the fins you have designed.</p>		<p>* One possible way of making a nose cone is to draw and cut out a circle, then remove a segment from the circle. Overlap the straight edges and tape down.</p>
<p>7. You are nearly ready to launch your rocket. Place the straw in your paper rocket and blow through the straw to launch your rocket.</p>		<p>Personalise your rocket, by adding your name and design features.</p>
<p>8. Take your rocket to your launch pad How far will it go?</p>		<p>Safety first! Be careful not to point your rocket at anyone.</p>

Rocket Test Report

Launch your rocket three times and record the details of each flight.

Launch 1

How far did it fly? (Don't forget your units of measurement!)

Notes of interest about your design. What might you change in your model?

Launch 2

How far did it fly? (Don't forget your units of measurement!)

Notes of interest about your design. What might you change in your model?

Launch 3

How far did it fly? (Don't forget your units of measurement!)

Notes of interest about your design.

The Solar System

Average distance from Earth to the other planets in the Solar System:

Earth to Venus	41,400,000km
Earth to Mars	78,340,000km
Earth to Mercury	91,691,000km
Earth to Jupiter	628,720,000km
Earth to Saturn	1,275,000,000km
Earth to Uranus	2,723,950,000km
Earth to Neptune	4,351,400,000km

To put the above distances in perspective, travelling by road the distance from Malin Head, Co. Donegal, most northerly point in Ireland to Mizen Head, Co. Cork, the most southerly point in Ireland is 555km!

Another activity may be included here to map these distances to scale using local landmarks or well-known distances such as journey between two local towns is 10 km. How many times would that journey have to be completed to equal the distance between Earth and Mars, etc.

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Why not try to further improve your rocket design?

Review the Smart Futures website to find relevant career stories. This is the career story of design engineer in the European Space Agency: <http://www.smartfutures.ie/who-works-stem/neil-murrey-propulsion-design-engineer-european-space-agency>

Watch 'Ambition' a film from the European Space Agency starring Aiden Gillen: http://www.esa.int/spaceinvideos/Videos/2014/10/Ambition_the_film