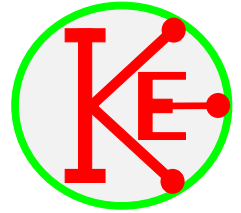


7 Rockets



EQUIPMENT

- 50cm lengths of 15mm plastic pipe
- Rocket sheet template
- Sellotape
- Scissors
- Metre ruler or tape measure
- Plasticine, Blu-Tack to add weight if necessary.

RISKS

Remind children to stand behind the rockets as they are launched.

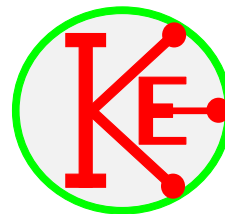
Do not let children swap straws.

Remind children not to over-exert when blowing the rockets.

Emphasise danger to eyes.

SESSION

- 1). Show space shuttle launch.
Discuss different parts of the space shuttle and what is happening during the launch.
Discuss the energy involved and the dangers to the crew.
- 2). Demonstrate principle of a rocket using a balloon.
Air is expelled from the rear of the balloon, balloon is pushed forwards
Maybe mention Newton's laws?)
- 3). Introduce air rockets - demonstrate.
- 4). Demonstrate how to make a paper rocket.



NAME:

Air Rocket Investigation.

Background

These rockets are launched by filling the rocket body with high pressure air through a pipe. As the rocket slides along the pipe, it continues to fill with air.

Immediately after clearing the end of the pipe, air inside the rocket expands backward out the lower end. The action-reaction effect (Newton's third law) adds thrust to the already moving rocket. If the rocket is well-designed and constructed, flights of more than 100 meters are possible.

The primary determining factor for performance is drag or friction with the air.

Rockets with very big floppy fins have a great amount of drag, and flights are usually short. Very squat nose cones also increase drag.

The idea is to design a rocket that is streamlined so that it slices cleanly through the air.

Your task is to produce the air rocket with the longest range.

Discussion.

There are many factors affecting the flight of the rocket including:-

- the length of the rocket, A5, A4, A3?
- tight or loose fitting onto the launch tube?
- the mass of the rocket, how many turns of paper are used?
- the position of the centre of mass of the rocket, adding mass to the nose cone?
- the position of and type of fins fitted to the rocket?
- the launch pressure, very high initial speeds could lead to high drag forces.

Too much pressure and your rocket could explode on take off!

- the launch angle?

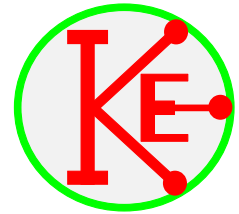
Safety

Do a risk assessment to minimise dangers to yourself and others.

Consider:-

- paper cuts,
- cuts from scissors
- shrapnel from exploding rockets
- injury from being hit by a rocket.

Constructing the Rocket



- 1). Roll a cylinder of paper around the pipe.
Keep the pipe inside the rocket until it is completely finished
Glue the seam with paper glue and ensure that it is sealed.
The paper tube needs to move freely over the pipe.
If it doesn't then you may need to remake this section.
- 2). The nose cone is made from a circle of paper. Fold the circle in half, then into quarters and then into eighths. Open the base of the cone so that there are three pieces of paper on one side and five on the other. Glue the paper to hold it in this shape.
- 3). Carefully apply glue all around the sides of the top 5-8mm of the paper body tube. Withdraw the pipe so that the top 10mm of the tube is not supported. Push the nose cone onto this end of the paper tube and hold it in place until the glue has taken effect.
- 4). Cut rocket fins and glue them to the lower end of the body tube. Use paper glue. Ensure that the glue is dry.
- 5). Put your name/team name onto the side of the rocket and colour it.
The rocket is ready for launch.
- 6). Test your rocket with a low pressure launch by blowing air through the pipe.
Take care when launching as the rocket can cause harm and damage.
- 8). Consider how to improve the performance of your rocket – remake, redesign as necessary to ensure that you can achieve the longest range.
Describe your improvements below.

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