

Paper Rockets

Description:

Each team will build and launch a paper rocket using the materials provided.

Number of Participants: 2

Approximate Time: up to 50 minutes to build, 10 min to test

The Competition:

Each participant will have up to 50 minutes to build a rocket and practice launching it by placing a straw inside and blowing into it. When ready, teams will proceed to the official launch area for the competition. Each member will launch their own rocket trying to land as close as possible to the designated marker. Measurements will be taken from the center of the target to the nose of the rocket. Each **team** may take up to five attempts within five minutes. The last attempt for each competitor is the one scored. For example, the first competitor's first launch may be close and choose to count that launch. This leaves the second competitor four attempts. If a competitor takes a second or third shot and the final shot is farther away from a previous shot the final shot is scored. The following materials will be used to construct and launch rockets:

- Large plastic drinking straws (same size as a pencil) – two per team
- Sharpened pencils (same size as straws) – two per team
- Paper (8.5x11 inches) - two sheets per team
- Transparent tape - one roll per team
- A ruler – one per team
- Scissors – one per team

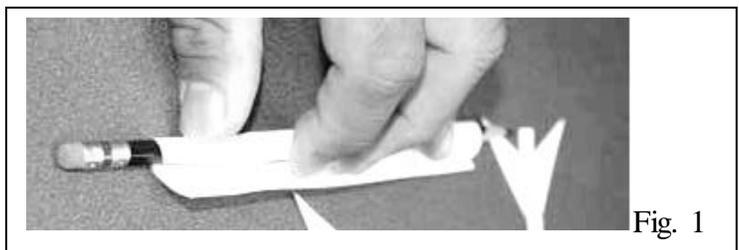
Both rockets must be launched during the competition.

Scoring:

1. After the **final** rocket launch the distance will be measured in centimeters from the center of the target to the nose of the rocket where it comes to rest. That distance will become the participant's score. The target will be placed 3 to 8 meters from the launch site.
2. Each team member will have their final launch measured. The team score will be the sum of the distances measured for each launch. ($d_1 + d_2 = d_{TEAM} = \text{Team Score}$)
3. The lowest score will be the winner.

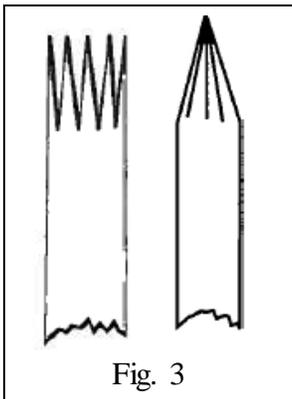
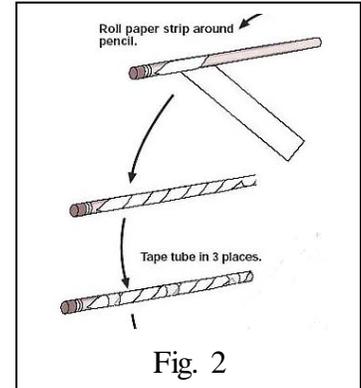
Rocket Building Suggestions:

There are several ways to construct a straw-launched paper rocket. The main part of the rocket should be formed by rolling a piece of paper around a pencil. This can be accomplished in two ways:



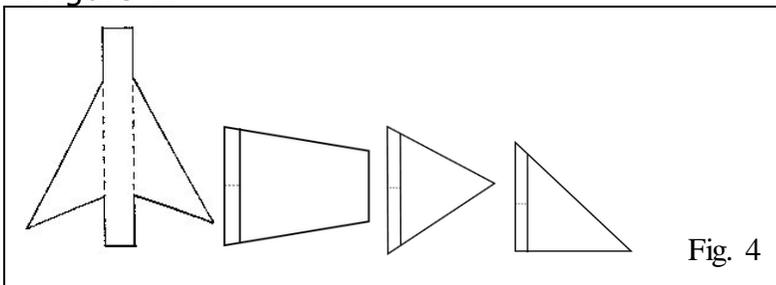
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1. Cut a strip of paper 8.5 inches long and 1-2 inches wide. Roll the paper strip lengthwise around the pencil to form a tube. Tape the paper so that the tube slides easily off the pencil but is not too loose. See fig. 1
2. Cut a strip of paper 8.5 inches long and 1-2 inches wide. Roll the paper in a spiral around the pencil to form a tube. Tape around the tube in different places to hold shape but allowing it to slide off easily without being too loose. See fig. 2



The nose cone can be formed in different ways as well. The easiest is to flatten the tip, bend it over, and tape it in place. A more conical shape can be achieved by cutting tiny wedges out of the end of your paper tube with a scissors and then bending the wedges still attached to the tube to a point. These are then taped in place. See figure 3. You may also make a small cone from your remaining paper pieces and tape it over the end of the paper tube.

The final addition to your rocket are fins. These will be cut from your remaining paper pieces and taped to the rocket. Fins may be any shape, size, or number you would like. Some fin examples are shown in figure 4.



Build and test rockets of different lengths, with different fins, different nose cones, and different fin positions in practice to perfect your best design. Then replicate that design on competition day.

Resources:

Detailed plans with activities from NASA:

http://www.nasa.gov/pdf/153413main_Rockets_3_2_1_Puff.pdf

<http://quest.arc.nasa.gov/space/teachers/rockets/act5ws1.html>

Other plans:

http://www.kidsciencechallenge.com/pdfs/2009activities/KSC_Soda_Straw_Rocket-Mars_2009a.pdf

<http://www.mordenart.com/images/captain-cal-make-your-own-rocket.pdf>