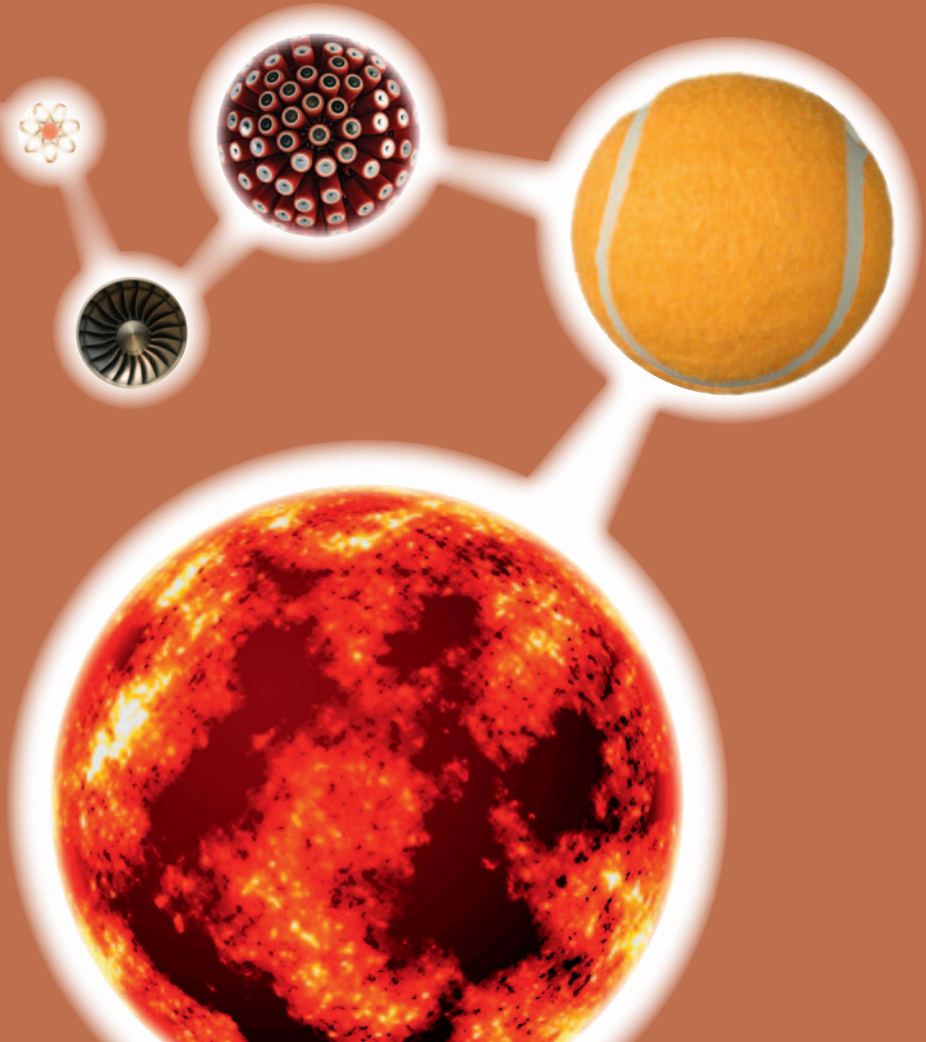


'Let's get Practical'
– How Science Works

Whirlygig Challenge



Apparatus:

A supply of A5 sized paper; white and blue [or other colour]. Each two-man "crew" will require 10 sheets of white and two of blue.

Pairs of scissors [two pairs per crew]

Pencils

Rulers

Reference: Gateway Physics Module P3g
'investigate the factors affecting the speed of a falling whirligig'

can also be used with Twenty First Century Science Suite Physics Module P4 'Explaining motion'

This takes the form of a competition. Pairs [or 3s?] of students are given a supply of A5 plain paper, and tasked with making a whirligig [fig. 1] to enter a competition. They have, say, 20 minutes to develop their 'gig' and will be given two competition flights each. The contest is to determine the longest distance travelled, measured horizontally from vertically below the launch point. A small prize could be awarded for the winners. It teaches students to work collaboratively and with regard to a well defined specification and competition rules. A selection of gigs is shown in fig.2. The best flight was obtained from the one in the front, with a pointed nose and narrow body.

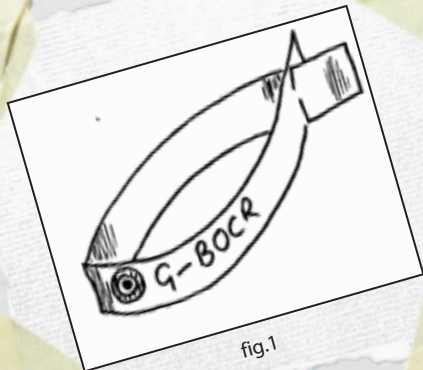


fig.1

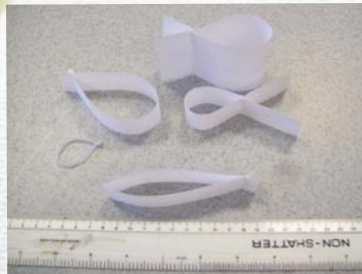
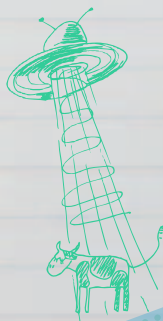
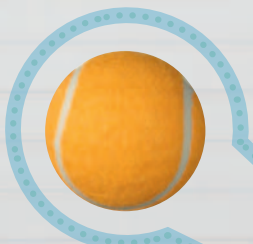


fig.2

The brief is this:

Your challenge is to design a whirligig. The contest will be won by the team whose 'gig' travels the longest distance, measured horizontally from the floor directly below the launch point.

- 1 You have 10 sheets of white A5 paper; two sheets of blue A5 paper; pairs of scissors; pencils and rulers. No further supplies of paper will be made available to crews.
- 2 You can use no other apparatus or materials in the construction of your 'gig'.
- 3 Each 'gig' has to be made entirely from paper only which must be taken from a single sheet of A5.
- 4 Each has to be made to the same basic design as demonstrated to you, in other words only one identifiable 'tail' and one identifiable 'nose'.
- 5 Competition 'gigs' must be made from blue paper only. Any white 'gigs' will be disqualified.
- 6 The launch point will be three metres (or whatever is agreed locally) from the floor and flights will take place indoors away from open windows and other sources of draughts.
- 7 You may have as many experimental flights as you like during development, but in competition only two flights are allowed.
- 8 The SAME 'gig' must be used for both flights in the competition. (If it suffers damage during the first then repairs are permissible and the second launch is allowed.)
- 9 The flights will be measured for distance travelled. Each 'gig' is launched by simply dropping horizontally from thumb and forefinger and without any thrust being applied at launch. The launch point is 3m above the floor, higher if possible, as any gig will take a fraction of a second to begin spinning.
- 10 The development time limit is 20 minutes after which time all finished 'gigs' must be placed on a common work bench away from the crews. All flights must be carried out immediately after completion. Lots are drawn to decide the order in which crews will fly.
- 11 Before flights all gigs must be available for visual inspection only by all crews.
- 12 In all disputes the teacher's decision will be final.



Extensions:

- 1 A different category of competition could be "time of flight" rather than distance travelled.
- 2 Two different designs could be permitted for a competition which includes both categories, as the design for distance could be different to that for time of flight.
- 3 A "free-form" class could be introduced for individual designs. Perhaps giving crews 10 sheets of A5 paper, three paperclips and a piece of blu-tak the size of an acorn. This part would test crews' ingenuity rather than their ability to conform to a strict specification.
- 4 If the flights are filmed they could be loaded onto YouTube for a wider competition with more substantial prizes.
- 5 Each team produces a poster (or alternative format presentation such as power point, video etc) detailing their design process. Focus on how the design optimises the forces acting on the 'gig'. The class peer marks the presentations.