

The BP Challenge

encouraging hands-on learning



BP Classroom Challenge 1, 2004



Meteorite Hit!

The Scenario

The New Zealand space mission has just pulled out of the atmosphere and is cruising away from Earth on its mission into deep space.

The crew hears a thud! A meteorite has punctured the outer shield protecting them from the intense energy of the sun. A replacement cover must be improvised immediately! Even paper would do!

It is too dangerous to 'space-walk' or even put so much as a hand outside, but fortunately an exit port is right alongside the damaged area. A protective screen, made from materials to hand, must be rigged up inside the cabin, pushed out the exit port and somehow increased in size outside the exit port to cover the widest possible area.

Your Challenge

- Using only the materials provided, construct a shield that can be pushed through the 40 cm diameter exit port, then increased in size to cover a continuous area.
- You will have 20 min for construction then up to a maximum of 45 seconds to demonstrate how well the device works.

You will be provided with

- 30 sheets (may include half sheets) of newspaper
- 2 one metre lengths of dowel
- 20 metres of white cotton string
- 15 m roll sellotape
- 2 round balloons in deflated state
- 1 aluminium can
- 50 cm bendable wire

Demonstrate how well it works

(Run in heats, six teams at a time)

- Two judges will hold the 'exit port' at chest height. Although it may be the side of a spacecraft, it will look like a sheet of board

with a 40cm hole in it. On "Go" you may demonstrate how well your device works. To be safe, no body part may extend beyond the spacecraft wall.

Your performance is judged on:

Engineering Merit

(Engineer judge who will view the structure before it is 'deployed')

- An elegant and creative design, robustly and neatly constructed that looks as if it will definitely work. (4 pts)
- A planned design, robustly constructed that looks as if it is likely to work. (3 pts)
- A structure that shows some evidence of a plan, which if luck is on their side, could work. (2 pts)
- A structure has been made. (1 pt)

Extending the Shield

- The device is pushed out completely safely, successfully and smoothly deployed within 20 seconds, to produce a neat-looking cover. (4 pts)
- The device is pushed out with only a minor breach to safety and deployed within 30 seconds. The mechanism basically worked. (3 pts)
- The device is pushed out from inside the spacecraft, and an increase in size was achieved. (2 pts)
- The device is pushed out through the exit port. (1 pt)

The Size of Shield

- A large completely continuous cover; smallest dimension 1.5 m. (4 pts)
- A cover with no more than 3 small holes; smallest dimension 1m. (3 pts)
- A fairly continuous cover at least 1 square metre in area. (2 pts)
- A shield that provides some cover larger than the exit port. (1 pt)

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BP Classroom Challenge 2, 2004



Put the Rubbish in the Bin

The Setting

- The School Playground

The Scenario

Keeping the school environment litter free is an on-going problem in many schools. Increasingly, school communities are becoming more aware of minimizing the amount of rubbish that needs to be dumped in land fills.

One result of this awareness is the introduction of a method of sorting materials that can be recycled and organic materials that can be composted from other rubbish.

This challenge involves the students in the design and production of a rubbish receptacle that enables rubbish to be sorted and also incorporates features to protect the rubbish from the rain, wind and vermin.

The Task

- To research possible designs for a rubbish receptacle that enables rubbish to be sorted into items that can be recycled, composted and dumped. The final design has to also be rain, wind and vermin proof.

Process

- Brainstorm ideas from the whole class. Consider:
 - Size and shape of container
 - Suitable material to construct the receptacle
 - How to protect the contents from the weather and animals while still providing access for emptying
 - Making sure that the appearance of the final product does not detract from the school environment
 - Design and construct a range of designs
 - Carry out field trials

Materials

- You may like to consider using some of the following:
 - Aluminium
 - Plastic
 - Concrete blocks or bricks

Conditions

- Whole class research and collect possible solutions.
- Small groups design and construct a variety of designs
- The design must allow the different types of rubbish to be deposited at the same time but not necessarily into the same opening
- The receptacle must have three separate compartments inside that can be emptied individually
- The opening should be able to be securely fastened and have some way of preventing rain and wind entering into the container.
- Extension Idea: Build a worm bin to recycle organic materials.

Judging Criteria

- Effectiveness of the fastenings
- Weather proofing
- Appearance
- Ease of use
- Appropriate use of materials

BP CHALLENGE SUPPORT

We are pleased to support your school and classroom BP Challenges with certificates and small prizes. Please let us know the dates of your regional and district BP Challenges so we can publish them in the Calendar.

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