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INTRODUCTION

Science education has changed in recent times. It is generally no longer accepted that science is just learning established theories, testing hypotheses and using the skill of observation and measurement. The effect of rapid technological advancement in society today has meant that science has developed into a wider discipline that encompasses pure science, technology and the effect of both of these on society.

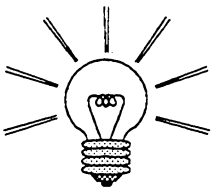
Science can be understood to include all the processes used by people such as observing, inferring, experimenting, and the outcomes of these processes such as facts, theories, predictions and laws. Technology, however, is essentially the production of objects, which includes the design, manufacture, maintenance and improvement of these items.

The activities in this book encourage students to explore the relationship between science and technology, and experience how the two terms are interwoven and interdependent on many levels.

Many people believe that technology stemmed from science. However, there are also a number of differences. Consider this example: which came first – the boomerang or the knowledge of how it flies through the air? Technology is multifaceted, and many of its aspects are investigated though these exercises.

The activities in this book enable students to distinguish between science and technology but also to understand how they are related. Relevant and topical issues such as computer crime, the arms race and cloning are addressed in such a way that students can work through them and think of possible solutions. Students should be encouraged to listen to other people's viewpoints and accept that there is always more than one solution to a problem.

The exercises are designed to be easy for students to perform, and they are practical tasks that require very little specialised equipment. Most of the materials required can be found at home, the local supermarket or hardware store. The activities are designed to provide students with 'hands-on' experiences where each student can be actively involved in the lesson.



TEACHER NOTES:

BALLOON ROCKET

Age Level—Suitable for 12 to 14 years.

Aims

- To record data from a simple experiment
- To formulate an hypothesis to test
- To determine what variables will affect the outcome of the experiment
- To understand that some variables can, and should, be kept constant
- To understand how scientists conduct experiments
- To understand how technology (i.e. rocket travel) can be demonstrated

Background Information

This activity allows students to understand the process of science. Students will be made aware of the following terms in this activity:

1. *Hypothesis*: a single idea that can be tested. A hypothesis can be expressed as an "if-then" statement or as a sentence. A hypothesis is not a question. For example, a hypothesis for this activity could be "if the balloon's size is increased then the balloon will travel a greater distance" or "the largest balloon will travel the longest distance." The hypothesis would not be stated "will the size of the balloon affect the distance travelled?"
2. *Variable*: a factor that could affect the outcome of the experiment. Variables for this activity include: size and shape of the balloon, length of the straw, the texture, tautness and diameter of the line, the degree of inflation and the angle of the line to the horizontal position.
3. *Controlled variables*: these are variables that are kept constant, so that their influence on the experiment is minimal. Usually all variables, except the one you are testing, are kept constant.

Discussion can be centred on how scientists conduct experiments and how simple activities such as this can show the development of rocket technology.

Materials Needed

- Plastic straw
- Rubber balloons, assorted shapes and sizes
- Fishing line or thin string
- Masking or sticky tape
- Measuring tape—5 m

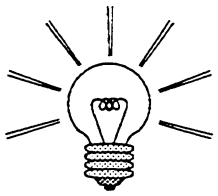
BALLOON ROCKET CONTINUED

Method

1. Place a straw over a 10 m length of fishing line or string. There will be less friction, (and therefore a faster speed) if the straw is cut in half.
2. Wrap a piece of sticky or masking tape over the straw.
3. Blow up a balloon and tape it to the straw. Hold the neck of the balloon so that the air cannot escape.
4. Have students hold each end of the fishing line so that it is kept taut.
5. Release the balloon and measure the distance that it has travelled.

Further Activities

1. Change the shape of the balloon. Many party balloon packets contain several different shapes.
2. Hold the fishing line at different angles.
3. Place some small paper wings on the sides of the balloon. Use sticky tape to hold them in place.
4. Change the degree of inflation of the balloons.



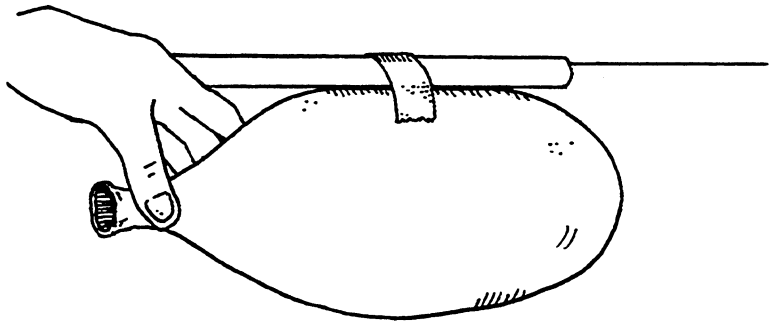
ACTIVITY WORKSHEET:

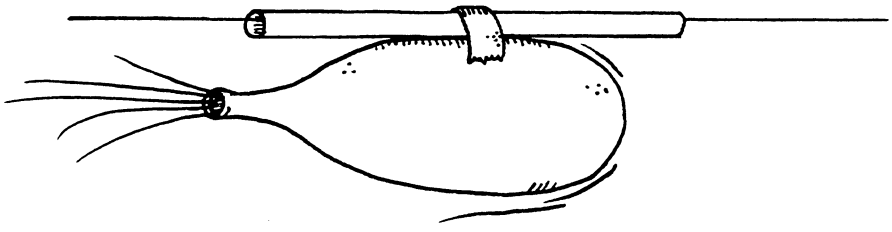
BALLOON ROCKET

You are going to determine how far a balloon will travel along a piece of fishing line. The activity is briefly set out as follows:

1. Place a straw over a long piece of fishing line or thin string.

2. Blow up a balloon and attach it to the straw with sticky tape.





3. Keep the line tight. Now let the balloon go and record how far it travels along the line.

Before you conduct this activity, you should think of all the things (factors) that would affect how far the balloon will travel. These factors are called **variables**. Some of these variables would include the size of the balloon and the degree of inflation. What other variables can you think of?