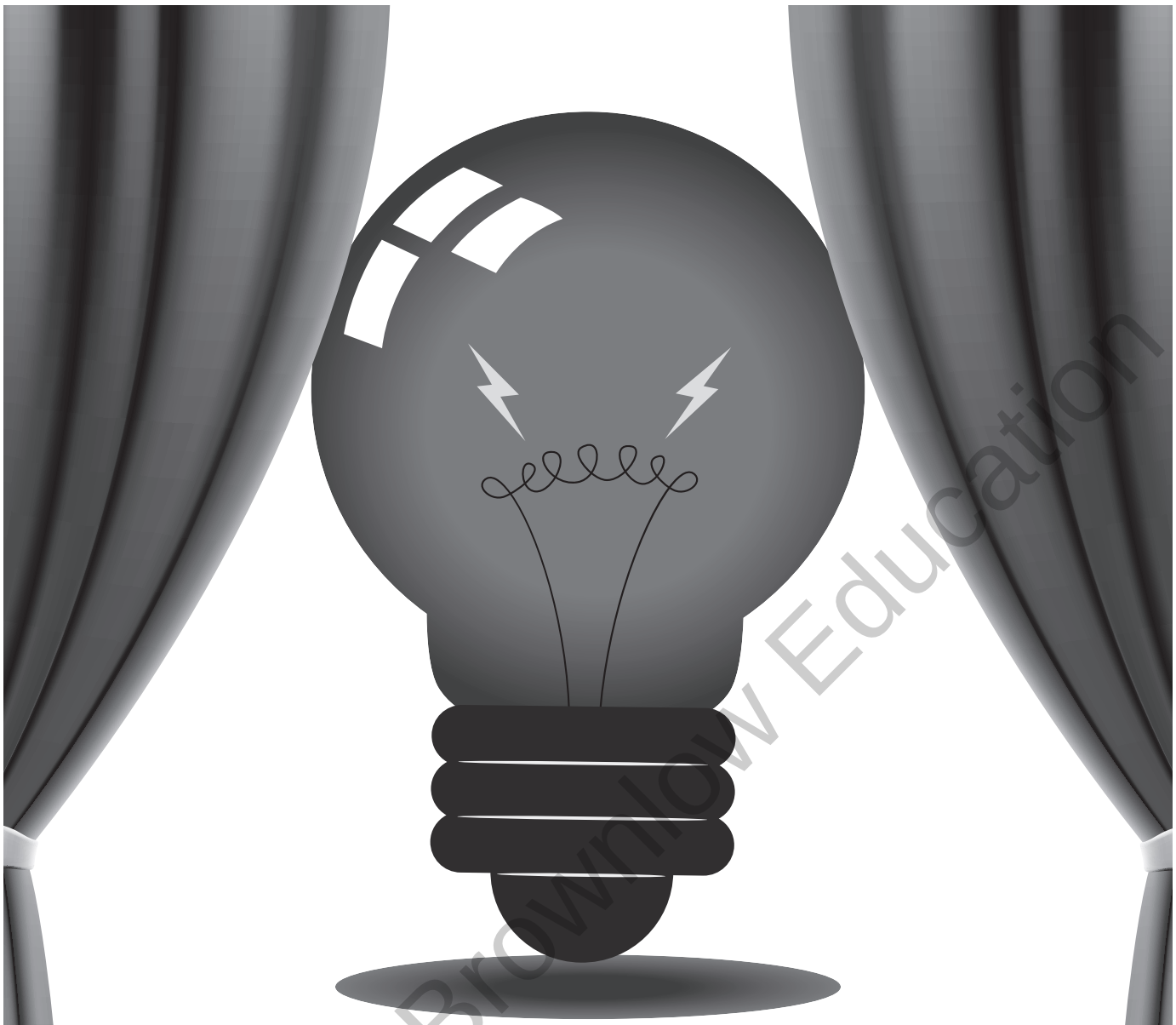

SCIENCE FAIR WARM-UP

» LEARNING THE PRACTICE OF SCIENTISTS «

Years 7–10

JOHN HAYSOM

Hawker Brownlow
EDUCATION

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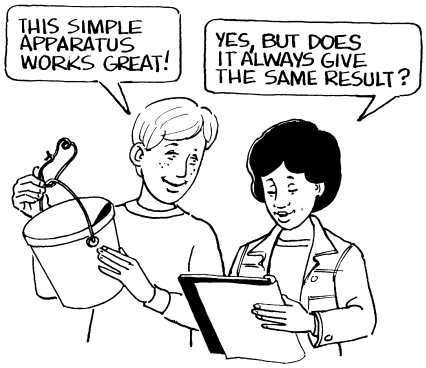

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CURRICULUM CONNECTIONS:
Science Fair Warm-up

In recent years, the Australian Federal Government has been working closely with state and territory educational offices in an effort to implement a national curriculum for all Australian schools. This Australian Curriculum sets consistent national standards, in an effort to improve learning outcomes for all students, as well as laying the foundations for future learning, growth and active participation in the community.

Effective science instruction is crucial to all students, as the skills they learn and cultivate in the science classroom are not only important tools for use in other subject areas, but also in everyday life. The Australian Curriculum: Science emphasises the need for students to apply their scientific thinking in all aspects of their studies, encouraging exploration, investigation, observation and problem solving. The curriculum also prompts students to look back at the influence science has had on their own lives, as well as society as a whole. Ultimately, the Australian Curriculum: Science is designed to provide students with the knowledge, skills and reasoning abilities to make informed decisions not only about their own lives, but about global issues and concerns.

Science Fair Warm-Up emphasises the need for students to understand where early scientific discoveries originated, linking the experiments they are conducting in the 21st century with discoveries made by prominent scientists hundreds of years ago. In this way, it fulfils an important cross-curriculum priority in the Australian Curriculum framework, placing students' science studies in an historical context:

> It is important that students learn that science and technology have grown through the gradual accumulation of knowledge over many centuries; that all sorts of people, including people like themselves, use and contribute to science. Historical studies of science and technology in the early Egyptian, Greek, Chinese, Arabic and Aboriginal and Torres Strait Islander cultures extending to modern times will help students understand the contributions of people from around the world. (ACARA 2014)

This revised Australian edition of *Science Fair Warm-Up* strongly correlates with two of the three strands – Science as a Human Endeavour and Science Inquiry Skills – of the Australian Curriculum: Science, featuring comprehensive practice in making predictions, conducting experiments and reporting results in every activity. While the concepts in certain activities in this book specifically correlate with multiple content descriptions in the physical and chemical science sub-strands, every activity is underpinned by the Science as a Human Endeavour and Science Inquiry Skills content of the Australian Curriculum: Science.

While the content in *Science Fair Warm-Up* focusses on Years 7–10, it should always be assumed that students engage in appropriate prerequisite work prior to those year levels and meaningful review and extensions subsequent to those year levels.

While it is recommended that teachers use the science activities in this book with their Australian Curriculum: Science instruction, the activities featured in *Science Fair Warm-Up* can just as easily be used with other educational frameworks at the state or institutional level. For a full overview of the Australian Curriculum please visit *http://www.australiancurriculum.edu.au/*.

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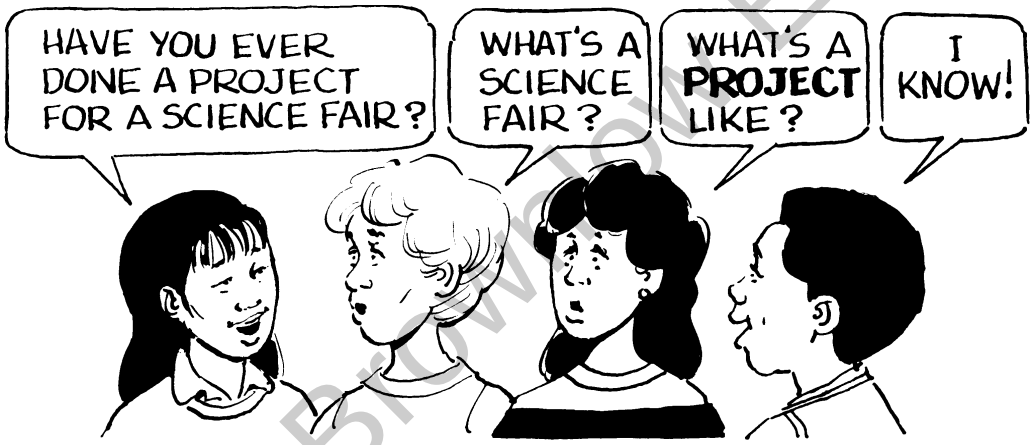
CHAPTER 1:

Starting Points

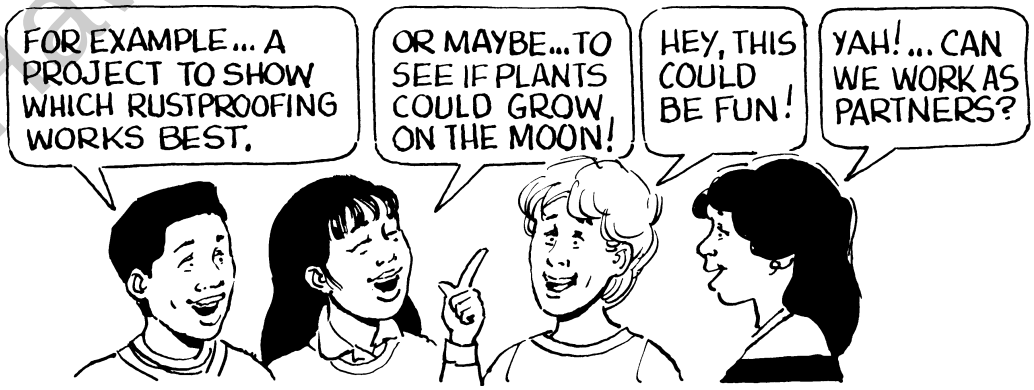
What Are Science Fairs and Projects All About?

It's not easy to tell what science fairs and science projects are all about. Do you know?



Science fair projects are about real problems that you choose to explore. The problems are challenging and fun!

The best way to find out what science fair projects are all about is to do one and then take the project to a science fair.



Getting Started

In this chapter, you will find Starting Points for projects. These Starting Points have been chosen to give you practice that will help you warm up for a real science fair. You can choose a Starting Point that interests you the most.

As you work on a project, you will meet all sorts of problems: problems with measuring, designing apparatus, devising good investigations, graphing, making sense of what you have discovered. You can get help with these problems from friends who are working on other projects, as well as from your teacher and this book.

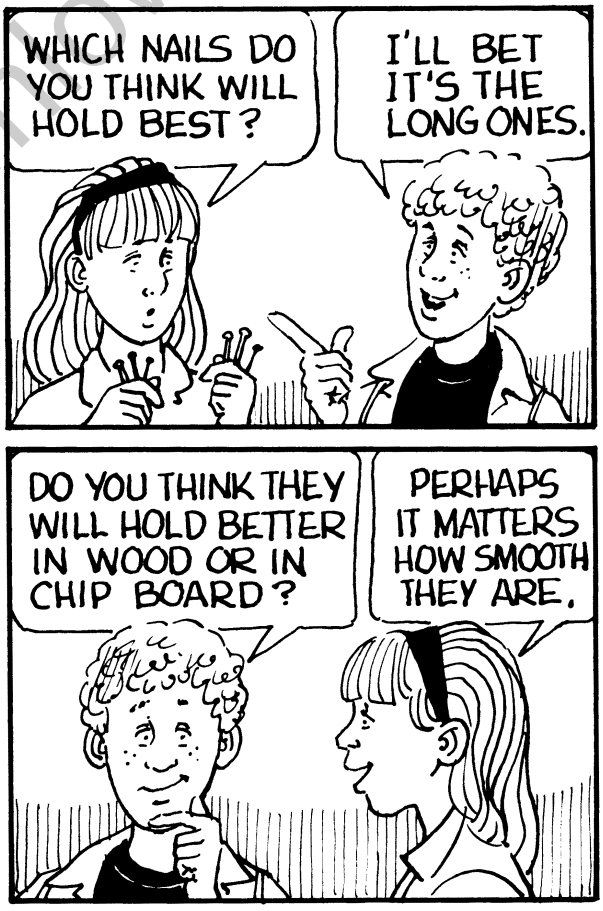
This book looks at scientific ways of dealing with these problems. Take time out from your project to work on the problems, then think about how you might improve your project. Have a look at the contents page to see where you can get help along the way.

If this is the first time you have worked on a science project, begin with the exercises marked with one or two asterisks (*). If you are experienced, you might try the exercises marked with three asterisks.

After the warm-up, you will be ready to go on your own. This book will help you choose a project that can be your own.

Let's Go

1. Review the Starting Points and choose one that interests you. Look for a partner with whom you would like to work on your project.
2. Play around with your project. Explore its scope by writing down all the questions that cross your mind. Discuss your thoughts with your friends and teacher.
3. Plan a simple experiment to find out the answer to one of your questions. Share your ideas with others.



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*STARTING POINT 1: PAPER HELICOPTERS

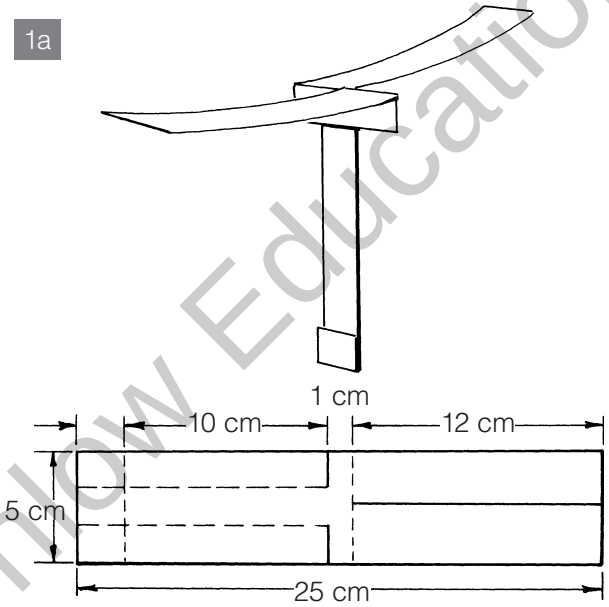
You can make a very good paper helicopter from a sheet of paper. Simply cut along the solid lines and fold along the dotted lines as shown in the diagram (1a). Can you make a truly excellent helicopter? Vary the plan in any way you'd like to improve your helicopter!

The students who first did this project won a silver medal for it at a national science fair. Their target was to see if the helicopter could be scaled up in size to carry a person. Although they failed to achieve this goal, they carried out some fine experiments.

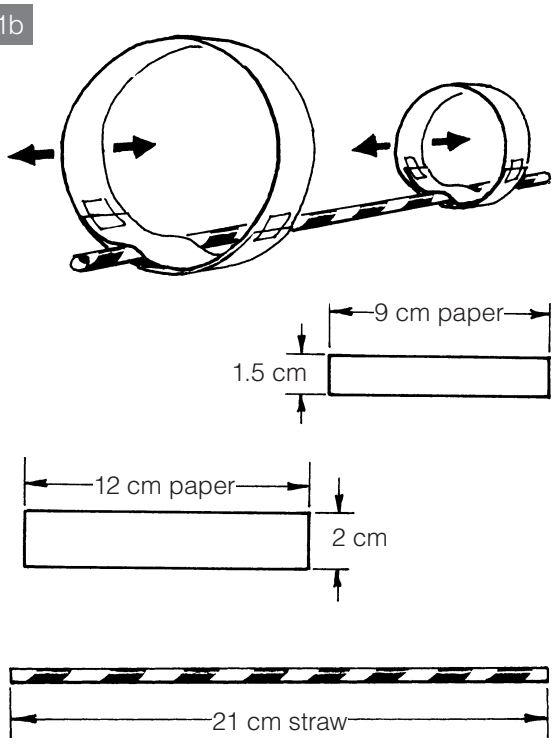
The students' first job was to find out more about how a paper helicopter worked. They changed the wing span. They investigated how much weight the helicopter could carry by adding paper clips to the bottom. Keeping their changes in mind, why not try making your own helicopter?

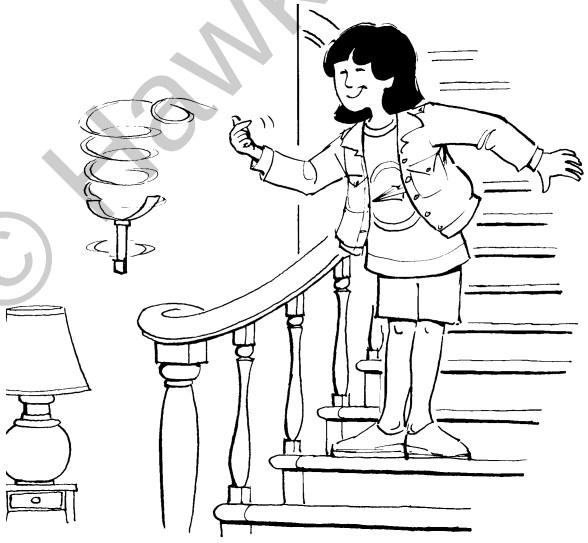
You will find all sorts of designs for other paper aeroplanes. Here is a simple one that could take you a long way (1b).

1a



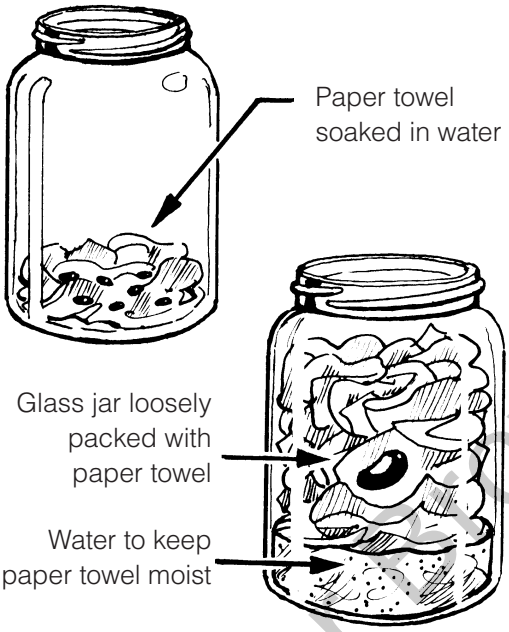
1b





*STARTING POINT 2: WHAT MAKES SEEDS GROW?

You have seen seeds grow, but have you ever taken a really close look? It is a miracle of nature! There are lots of ways to take a really close look. The diagrams show two simple ways.

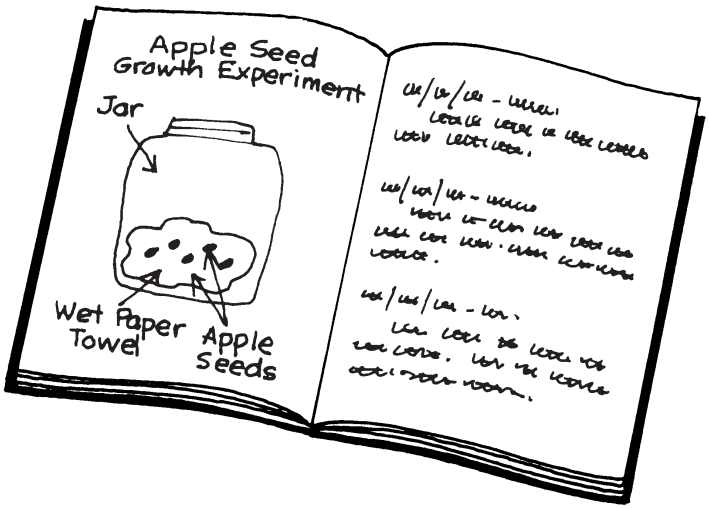


Check it out! Try radishes, beans, apple or orange seeds, tropical fruits (like an avocado), or anything else you'd like to see.

What conditions help seeds germinate? Do seeds need water? Do they need air? Do they need light? Do they need soil? Does fertiliser help?

This investigation can go in many directions. Some students wondered if acid rain would prevent the seeds from germinating. Some students wondered if "zapping" the seeds with a short burst of microwaves would get them going.

Begin by keeping a diary. Make a careful note of the growing conditions at the beginning (include a diagram). Keep a record in which you note the date, time and any changes you observe; you should do this two or three times each day. Keeping a diary or log book is recommended for not only this inquiry but for all investigative work.



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