

Teacher Notes

Themes

- Engagement
- Observation
- Creative thinking
- Scientific application

Key learning outcomes

- Science helps us understand real-world phenomena, which we can experience simply and safely with materials accessible in our local environment.
- Many concepts in science can often be creatively demonstrated by combining simple items found in our surroundings.
- Exploring ideas in science can be fun, while also challenging and requiring patience and persistence.

Key curriculum areas (years 3 to 9)

- **Science:** Science Understanding (Biological sciences, Chemical sciences, Physical sciences); Science as a Human Endeavour; Science Investigation
- **English:** Language, Literature, and Literacy
- **Mathematics:** Measurement and geometry

Publication details

More Hands-On Science,
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More Hands-On Science

Editors: David Shaw, Jasmine Fellows
and Kath Kovac

About the book

Let's get hands-on with 50 fun science activities!

The best-selling team behind *Hands-On Science* present 50 more fun DIY science activities. In *More Hands-On Science* you'll be blown away by interesting experiments, reactions, inventions and coding. It's jam-packed with fast facts and has fascinating quiz questions to test your knowledge!

With step-by-step instructions and illustrations, as well as real-world examples, these new activities use easy-to-find materials to help you discover the answers to amazing science questions. *More Hands-On Science* features topics such as motion, light, sound, chemical reactions, engineering, tech and patterns.

Discover how to make: a mini-greenhouse, reverse drums, spinning soakers, jelly lenses, rainbow torches, a superhero name generator and much more!

Recommended for

Australian children, years 3 to 9 (ages 8 to 14)



PUBLISHING

About the contributing writers

The Double Helix team is part of CSIRO Publishing and has a long-standing reputation for delivering expertly written, fascinating and fun science material for young people. Double Helix activities are designed to foster an interest in science, technology, engineering and maths (STEM).

Contributing writers: Beth Askham, Heather Catchpole, Julia Cleghorn, Simone Corletto, Jasmine Fellows, Rachel Fitzgerald, Sarah Kellett, Kath Kovac, Patrick Mahony, Mike McRae, David Shaw and Gabrielle Tramby.

Pre-reading activities

To prepare students for reading *More Hands-On Science*, ask them to share recent activities they have undertaken at home or with friends where they discovered something new or interesting. Ask them whether they think it was a safe activity, or what potential risks were involved.

Lead the students into a discussion on how they can manage their behaviour and expectations to reduce the chances of harm, or an activity failing. This can progress into them developing a risk management plan for specific activities.

Show students how to detail risks involved with a simple task, such as making toast. They can write down all of the possible ways a task can cause personal harm, damage to an environment, or fall short of expectations.

They can give a rating (such as a score of one to three) of how likely it might be, and how bad it might be, if this unwanted result occurred. Lastly, they can explain how they might prevent this outcome, such as by paying attention to instructions or using alternative materials.

Apply this risk management model to doing activities such as those in the book, perhaps by relating them to the section titled Your Safety on page 7.

Discussion questions

Science

1. The start of each section of *More Hands-On Science* features several Fast Facts and a quiz. Invite the students to find their favourite facts and quiz questions. Ask them whether any facts and answers could be incorrect, and how the book's editors might ensure they are as accurate as possible. (Pages 9, 25, 41, 51, 69, 83, 97, 109, 125, 139)
2. The word STEM stands for Science, Technology, Engineering and Mathematics, and refers to fields of research and applications that make use of skills in more than one of these disciplines. Present the words to the students, and ask them what they think each word might mean. Find definitions to share with them, and ask how activities in *More Hands-On Science* might involve each of STEM's four components. (Page 7)
3. All of the activities in *More Hands-On Science* have a section called Real-Life Science, which relates the underlying principles to an applied context. Choose an activity to do, or ask students to find one. On completing it, ask them to share their understanding and experiences of the applications in Real-Life Science, either in a home setting, or out in the world.
4. *More Hands-On Science* occasionally requires readers to accurately measure a length, mass or volume of a material. These are all based on a metric system of units. If this book were published in the USA, measurements would be presented in customary units. Discuss with students differences between the two systems, and why each might be appealing to different cultures.
5. All activities in *More Hands-On Science* aim to reuse and recycle materials wherever possible. Discuss with students how they might go about setting up an activity centre. How could they collect different tools and materials in an environmentally conscious way?

English

1. 'What to do' sections in *More Hands-On Science* activities provide careful, step-by-step instructions. They are written in a way to be informative and clear. Ask the students what kinds of literacy techniques would be most useful in writing instructions? What tense and perspective would they use?
2. Explanations for each activity give readers a basic understanding of the science behind their observations. Invite students to read through a 'What's happening?' for their favourite activity, and discuss it in their own words. They can use diagrams, gestures or even use other volunteers in their own version.

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Mathematics

1. Most of the activities in *More Hands-On Science* prescribe a list of materials for an individual to use. Find several activities that have lists of multiple items required. Ask the students to calculate how many items they might need to acquire for the entire class to engage with the activity. Remind them it's possible – and environmentally friendly – for some items to be shared.
2. The final section of *More Hands-On Science* titled Picture a Pattern is all about playing with geometries, numbers and arrangements. It opens with the words 'Patterns are everywhere in nature'. Ask students to share interesting patterns they have come across in their environment, both natural and artificial. Talk about how the patterns might have come to look as they do.

Australian curriculum links

Year level	Learning area: science	Other learning areas
Year 3	<p>Science understanding: Biological sciences</p> <ul style="list-style-type: none">• Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044) <p>Science understanding: Chemical sciences</p> <ul style="list-style-type: none">• A change of state between solid and liquid can be caused by adding or removing heat (ACSSU046) <p>Science understanding: Physical sciences</p> <ul style="list-style-type: none">• Heat can be produced in many ways and can move from one object to another (ACSSU049) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none">• Science involves making predictions and describing patterns and relationships (ACSHE050)• Science knowledge helps people to understand the effect of their actions (ACSHE051) <p>Science Inquiry Skills</p> <ul style="list-style-type: none">• With guidance, identify questions in familiar contexts that can be investigated scientifically and make predictions based on prior knowledge (AC SIS053)• With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (AC SIS054)	<p>English: Language</p> <ul style="list-style-type: none">• Understand that languages have different written and visual communication systems, different oral traditions and different ways of constructing meaning (ACELA1475)• Understand how different types of texts vary in use of language choices, depending on their purpose and context (for example, tense and types of sentences) (ACELA1478) <p>Mathematics</p> <ul style="list-style-type: none">• Measure, order and compare objects using familiar metric units of length, mass and capacity (ACMMG061)• Make models of three-dimensional objects and describe key features (ACMMG063)• Identify symmetry in the environment (ACMMG066)

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Year level	Learning area: science	Other learning areas
Year 4	<p>Science understanding: Biological sciences</p> <ul style="list-style-type: none"> Living things have life cycles (ACSSU072) <p>Science understanding: Chemical sciences</p> <ul style="list-style-type: none"> Natural and processed materials have a range of physical properties that can influence their use (ACSSU074) <p>Science understanding: Physical sciences</p> <ul style="list-style-type: none"> Forces can be exerted by one object on another through direct contact or from a distance (ACSSU076) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none"> Science involves making predictions and describing patterns and relationships (ACSHE061) Science knowledge helps people to understand the effect of their actions (ACSHE062) <p>Science Inquiry Skills</p> <ul style="list-style-type: none"> With guidance, identify questions in familiar contexts that can be investigated scientifically and make predictions based on prior knowledge (ACSI064) With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (ACSI065) 	<p>English: Language</p> <ul style="list-style-type: none"> Understand differences between the language of opinion and feeling and the language of factual reporting or recording (ACELA1489) Understand how texts vary in complexity and technicality depending on the approach to the topic, the purpose and the intended audience (ACELA1490) <p>Mathematics</p> <ul style="list-style-type: none"> Use scaled instruments to measure and compare lengths, masses, capacities and temperatures (ACMMG084) Compare objects using familiar metric units of area and volume (ACMMG290) Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies (ACMMG088) Create symmetrical patterns, pictures and shapes with and without digital technologies (ACMMG091)
Year 5	<p>Science understanding: Biological sciences</p> <ul style="list-style-type: none"> Living things have structural features and adaptations that help them to survive in their environment (ACSSU043) <p>Science understanding: Chemical sciences</p> <ul style="list-style-type: none"> Solids, liquids and gases have different observable properties and behave in different ways (ACSSU077) <p>Science understanding: Physical sciences</p> <ul style="list-style-type: none"> Light from a source forms shadows and can be absorbed, reflected and refracted (ACSSU080) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none"> Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083) <p>Science Inquiry Skills</p> <ul style="list-style-type: none"> With guidance, pose clarifying questions and make predictions about scientific investigations (ACSI231) Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (ACSI086) 	<p>English: Language</p> <ul style="list-style-type: none"> Investigate how the organisation of texts into chapters, headings, subheadings, home pages and sub pages for online texts and according to chronology or topic can be used to predict content and assist navigation (ACELA1797) <p>Mathematics</p> <ul style="list-style-type: none"> Choose appropriate units of measurement for length, area, volume, capacity and mass (ACMMG108)

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Year 6	<p>Science understanding: Biological sciences</p> <ul style="list-style-type: none">The growth and survival of living things are affected by physical conditions of their environment (ACSSU094) <p>Science understanding: Chemical sciences</p> <ul style="list-style-type: none">Changes to materials can be reversible or irreversible (ACSSU095) <p>Science understanding: Physical sciences</p> <ul style="list-style-type: none">Electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources (ACSSU097) <p>Science as a Human Endeavour</p> <ul style="list-style-type: none">Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE100) <p>Science Inquiry Skills</p> <ul style="list-style-type: none">With guidance, pose clarifying questions and make predictions about scientific investigations (AC SIS232)Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (AC SIS103)	<p>English: Language</p> <ul style="list-style-type: none">Identify and explain how analytical images like figures, tables, diagrams, maps and graphs contribute to our understanding of verbal information in factual and persuasive texts (ACELA1524) <p>Mathematics</p> <ul style="list-style-type: none">Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137)

Related books from CSIRO Publishing

Hands-On Science (2016)

The Biology of Bananas (2020)

The Chemistry of Cola (2020)

The Maths of Milkshakes (2020)

The Physics of Popcorn (2020)