

# RE-CREATE STEM WORKSHOP CURRICULUM GUIDE BOTTLE ROCKETS YEAR FOUNDATION

Curriculum Area / Strand	Sub Strand	ACARA Content Descriptors
Science Understanding	Physical sciences	The way objects move depends on a variety of factors, including their size and shape – ACSSU005
Science as a human endeavour	Nature and development of science	Science involves observing, asking questions about, and describing changes in, objects and events – ACSHE013
Science Inquiry Skills	Questioning and predicting	Pose and respond to questions about familiar objects and events – ACSIS014
	Planning and conducting	Participate in guided investigations and make observations using the senses – ACSIS011
	Processing and analysing data and information	Engage in discussions about observations and represent ideas – ACSIS233
	Communicating	Share observations and ideas – ACSIS012
Measurement and Geometry	Using units of measurement	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language – ACMMG006
Statistics and Probability	Data representation and interpretation	Answer yes/no questions to collect information and make simple inferences - ACMSP011
Design and Technologies	Knowledge and Understanding	Identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs – ACTDEK001
		Explore how technologies use forces to create movement in products – ACTDEK002
		Explore the characteristics and properties of materials and components that are used to produce designed solutions – ACTDEK004
	Process and Production Skills	Explore needs or opportunities for designing, and the technologies needed to realise designed solutions – ACTDEP005
		Generate, develop and record design ideas through describing, drawing and modelling – ACTDEP006
		Use materials, components, tools, equipment and techniques to safely make designed solutions – ACTDEP007
		Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment – ACTDEP008

## GENERAL CAPABILITIES

Numeracy	Estimating and calculating with whole numbers	This element involves students using numbers for different purposes. Students apply skills in estimating and calculating with whole numbers to solve and model everyday problems in a wide range of authentic contexts using efficient mental, written and digital strategies. They identify situations where money is used and apply their knowledge of the value of money to purchasing, budgeting and justifying the use of money. In developing and acting with numeracy, students: understand and use numbers in context; estimate and calculate.
	Recognising and using patterns and relationships	This element involves students identifying trends and describing and using a wide range of rules and relationships to continue and predict patterns. Students apply their understanding of patterns and relationships when solving problems in authentic contexts.
	Using special reasoning	This element involves students making sense of the space around them. Students visualise, identify and sort shapes and objects, describing their key features in the environment. They use symmetry, shapes and angles to solve problems in authentic contexts and interpret maps and diagrams, using scales, legends and directional language to identify and describe routes and locations. In developing and acting with numeracy, students: <ul style="list-style-type: none"> <li>• visualise 2D shapes and 3D objects</li> <li>• interpret maps and diagrams</li> </ul>
	Interpreting statistical information	This element involves students gaining familiarity with the way statistical information is represented. Students solve problems in authentic contexts that involve collecting, recording, displaying, comparing and evaluating the effectiveness of data displays of various types. They use appropriate language and numerical representations when explaining the outcomes of chance events. In developing and acting with numeracy, students: <ul style="list-style-type: none"> <li>• interpret data displays</li> <li>• interpret chance events</li> </ul>
	Using measurement	This element involves students learning about measurement of length, area, volume, capacity, time and mass. Students estimate, measure, compare and calculate using metric units when solving problems in authentic contexts.
	Science	These include practical measurement and the collection, representation and interpretation of data from investigations. Students are introduced to measurement, first using informal units then formal units.

	Mathematics	Mathematics has a central role in the development of numeracy in a manner that is more explicit and foregrounded than is the case in other learning areas. It is important that the mathematics curriculum provides the opportunity to apply mathematical understanding and skills in context, in other learning areas and in real-world contexts. A particularly important context for the application of Number and Algebra is financial mathematics. In Measurement and Geometry, there is an opportunity to apply understanding to design. The twenty-first-century world is information driven, and through Statistics and Probability students can interpret data and make informed judgements about events involving chance.
Critical and Creative Thinking	Inquiring – identifying, exploring and organising information and ideas	<p>This element involves students developing inquiry skills. Students pose questions and identify and clarify information and ideas, and then organise and process information. They use questioning to investigate and analyse ideas and issues, make sense of and assess information and ideas, and collect, compare and evaluate information from a range of sources. In developing and acting with critical and creative thinking, students:</p> <ul style="list-style-type: none"> <li>• pose questions</li> <li>• identify and clarify information and ideas</li> <li>• organise and process information.</li> </ul>
	Generating ideas, possibilities and actions	<p>This element involves students creating ideas and actions, and considering and expanding on known actions and ideas.</p> <p>Students imagine possibilities and connect ideas through considering alternatives, seeking solutions and putting ideas into action. They explore situations and generate alternatives to guide actions and experiment with and assess options and actions when seeking solutions. In developing and acting with critical and creative thinking, students:</p> <ul style="list-style-type: none"> <li>• imagine possibilities and connect ideas</li> <li>• consider alternatives</li> <li>• seek solutions and put ideas into action.</li> </ul>
	Reflecting on thinking and processes	<p>This element involves students reflecting on, adjusting and explaining their thinking and identifying the thinking behind choices, strategies and actions taken.</p> <p>Students think about thinking (metacognition), reflect on actions and processes, and transfer knowledge into new contexts to create alternatives or open up possibilities. They apply knowledge gained in one context to clarify another. In developing and acting with critical and creative thinking, students:</p> <ul style="list-style-type: none"> <li>• think about thinking (metacognition)</li> <li>• reflect on processes</li> <li>• transfer knowledge into new contexts.</li> </ul>
	Analysing, synthesising and evaluating reasoning and procedures	This element involves students analysing, synthesising and evaluating the reasoning and procedures used to find solutions, evaluate and justify results or inform courses of action.

		<p>Students identify, consider and assess the logic and reasoning behind choices. They differentiate components of decisions made and actions taken and assess ideas, methods and outcomes against criteria. In developing and acting with critical and creative thinking, students:</p> <ul style="list-style-type: none"> <li>• apply logic and reasoning</li> <li>• draw conclusions and design a course of action</li> <li>• evaluate procedures and outcomes.</li> </ul>
	Critical and Creative Thinking in the Learning Areas	<p>The imparting of knowledge (content) and the development of thinking skills are accepted today as primary purposes of education. The explicit teaching and embedding of critical and creative thinking throughout the learning areas encourages students to engage in higher order thinking. By using logic and imagination, and by reflecting on how they best tackle issues, tasks and challenges, students are increasingly able to select from a range of thinking strategies and use them selectively and spontaneously in an increasing range of learning contexts.</p> <p>Activities that foster critical and creative thinking should include both independent and collaborative tasks, and entail some sort of transition or tension between ways of thinking. They should be challenging and engaging, and contain approaches that are within the ability range of the learners, but also challenge them to think logically, reason, be open-minded, seek alternatives, tolerate ambiguity, inquire into possibilities, be innovative risk-takers and use their imagination.</p> <p>Critical and creative thinking can be encouraged simultaneously through activities that integrate reason, logic, imagination and innovation; for example, focusing on a topic in a logical, analytical way for some time, sorting out conflicting claims, weighing evidence, thinking through possible solutions, and then, following reflection and perhaps a burst of creative energy, coming up with innovative and considered responses. Critical and creative thinking are communicative processes that develop flexibility and precision. Communication is integral to each of the thinking processes. By sharing thinking, visualisation and innovation, and by giving and receiving effective feedback, students learn to value the diversity of learning and communication styles.</p> <p>Mathematics</p> <p>In the Australian Curriculum: Mathematics, students develop critical and creative thinking as they learn to generate and evaluate knowledge, ideas and possibilities, and use them when seeking solutions. Engaging students in reasoning and thinking about solutions to problems and the strategies needed to find these solutions are core parts of the Australian Curriculum: Mathematics.</p> <p>Students are encouraged to be critical thinkers when justifying their choice of a calculation strategy or identifying relevant questions during a statistical investigation. They are encouraged to look for alternative ways to approach mathematical problems; for example, identifying when a</p>

		<p>problem is similar to a previous one, drawing diagrams or simplifying a problem to control some variables.</p> <p>Science</p> <p>Science, students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, ideas and possibilities, and use them when seeking new pathways or solutions. In the science learning area, critical and creative thinking are embedded in the skills of posing questions, making predictions, speculating, solving problems through investigation, making evidence-based decisions, and analysing and evaluating evidence. Students develop understandings of concepts through active inquiry that involves planning and selecting appropriate information, evaluating sources of information to formulate conclusions and to critically reflect on their own and the collective process.</p> <p>Creative thinking enables the development of ideas that are new to the individual, and this is intrinsic to the development of scientific understanding. Scientific inquiry promotes critical and creative thinking by encouraging flexibility and open-mindedness as students speculate about their observations of the world and the ability to use and design new processes to achieve this. Students' conceptual understanding becomes more sophisticated as they actively acquire an increasingly scientific view of their world and the ability to examine it from new perspectives.</p>
Personal and Social Capability	Social awareness	<p>This element involves students recognising others' feelings and knowing how and when to assist others.</p> <p>Students learn to show respect for and understand others' perspectives, emotional states and needs. They learn to participate in positive, safe and respectful relationships, defining and accepting individual and group roles and responsibilities. Students gain an understanding of the role of advocacy in contemporary society and build their capacity to critique societal constructs and forms of discrimination, such as racism and sexism. In developing and acting with personal and social capability, students:</p> <ul style="list-style-type: none"> <li>• appreciate diverse perspectives</li> <li>• contribute to civil society</li> <li>• understand relationships.</li> </ul>
	Social management	<p>This element involves students interacting effectively and respectfully with a range of adults and peers.</p> <p>Students learn to negotiate and communicate effectively with others; work in teams, positively contribute to groups and collaboratively make decisions; resolve conflict and reach positive outcomes. They develop the ability to initiate and manage successful personal relationships, and participate in a range of social and communal activities. Social management involves building</p>

		<p>skills associated with leadership, such as mentoring and role modelling. In developing and acting with personal and social capability, students:</p> <ul style="list-style-type: none"> <li>• communicate effectively</li> <li>• work collaboratively</li> <li>• make decisions</li> <li>• negotiate and resolve conflict</li> <li>• develop leadership skills.</li> </ul>
	Personal and Social Capability in the learning areas	<p>Personal and social capability skills are addressed in all learning areas and at every stage of a student's schooling. This enables teachers to plan for the teaching of targeted skills specific to an individual's learning needs to provide access to and engagement with the learning areas. However, some of the skills and practices implicit in the development of the capability may be most explicitly addressed in specific learning areas, such as in the Australian Curriculum: Health and Physical Education. Teachers can also use the Personal and Social Capability learning continuum to plan for the teaching of targeted skills specific to an individual's learning needs.</p> <p>The learning area or subject with the highest proportion of content descriptions tagged with Personal and Social Capability is placed first in the list.</p> <p>Science</p> <p>In the Australian Curriculum: Science, students develop personal and social capability as they engage in science inquiry, learn how scientific knowledge informs and is applied in their daily lives, and explore how scientific debate provides a means of contributing to their communities. This includes developing skills in communication, initiative taking, goal setting, interacting with others and decision-making, and the capacity to work independently and collaboratively.</p> <p>The Science learning area enhances personal and social capability by expanding students' capacity to question, solve problems, explore and display curiosity. Students use their scientific knowledge to make informed choices about issues that impact their lives such as health and nutrition and environmental change, and consider the application of science to meet a range of personal and social needs.</p> <p>Mathematics</p> <p>In the Australian Curriculum: Mathematics, students develop and use personal and social capability as they apply mathematical skills in a range of personal and social contexts. This may be through activities that relate learning to their own lives and communities, such as time management, budgeting and financial management, and understanding statistics in everyday contexts.</p> <p>The Australian Curriculum: Mathematics enhances the development of students' personal and social capabilities by providing opportunities for initiative taking, decision-making,</p>

		communicating their processes and findings, and working independently and collaboratively in the mathematics classroom.
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