



## Stage 4 Integrated STEM Program

Bowral High School

*We Need to Move it, Move It!*

## *We Need to Move it, Move It*

**Teachers:**

1 Maths  
1 Science  
1 TAS teacher

**Class:** 7 STEM**Semester:** 1**Periods:** Wednesday 1, 2, & 3 Whole day teaching, Room F50

**Unit Rational:** Humans are consuming fossil fuels at an increasing rate. It is predicted by 2150 we will have no oil left for fuel sources that we currently rely upon for transport and other resources such as plastics. Transport methods need to be developed that are more efficient and use alternative power sources.

**Unit Description:** Students are to design, produce and evaluate a machine that incorporates simple machines to move a sample of “liquid waste” a distance of 5m using no fossil fuel power sources.

**Extension:** develop an automated system to load and/or unload the chemical waste

**AREA OF STUDY:** Products

**DESIGN SPECIALISATION:** Industrial Design

**TECHNOLOGIES:** Model Making Technologies

**DESIGN PROJECT:** Design, produce and evaluate a transport system to move a toxic substance from one room to another without human intervention.

**Resources :** Meccano Set

## General Capabilities: *(See Teaching and Learning Program to identify links to General Capabilities)*

Learning Across the curriculum used in this document are from the Board of Studies Teaching and Educational Standards (BOSTES) NSW  
<http://syllabus.bostes.nsw.edu.au/mathematics/mathematics-k10/learning-across-the-curriculum/>

The cross-curriculum priorities:

- Aboriginal and Torres Strait Islander histories and cultures 🖐️
- Asia and Australia's engagement with Asia 🌐
- Sustainability 🌱

The general capabilities:

- Critical and creative thinking ⚙️
- Ethical understanding ⚖️
- Information and communication technology capability 📱
- Intercultural understanding 🌐
- Literacy 📖
- Numeracy 📊
- Personal and social capability 👥

Other learning across the curriculum areas:

- Work and enterprise ⚡

### Syllabus Outcomes:

The outcomes used in this document are from the Board of Studies Teaching and Educational Standards (BOSTES) NSW.  
[http://www.boardofstudies.nsw.edu.au/syllabus\\_sc/](http://www.boardofstudies.nsw.edu.au/syllabus_sc/)

### Outcome Mapping

**Unit Description:** Students are to design, produce and evaluate a machine that incorporates simple machines to move a sample of “liquid waste” a distance of 5m using no fossil fuel power sources.

Science	TAS	Mathematics
SC4-4WS A student identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge	4.1.1 A student applies design processes that respond to needs and opportunities in each design project.	MA4-1WM A student communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols
SC4-8WS A student selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems	4.2.1 A student generates and communicates creative design ideas and solutions.	MA4-2WM A student applies appropriate mathematical techniques to solve problems
SC4-9WS A student presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations	4.3.2 A student demonstrates responsible and safe use of a range of tools, materials and techniques in each design project.	MA4-3WM A student recognises and explains mathematical relationships using reasoning
SC4-10PW A student describes the action of unbalanced forces in everyday situations	4.5.1 A student applies management processes to successfully complete design projects.	MA4-4NA A student compares, orders, and calculates with integers, applying a range of strategies to aid computation
SC4-11PW A student discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations	4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.	MA4-5NA A student operates with fractions, decimals and percentages
	4.6.1 A student applies appropriate evaluation techniques throughout each design project.	MA4-8NA A student generalises number properties to operate with algebraic expressions
		MA4-6NA A student solves financial problems involving purchasing goods

Stage 4 Technology (Mandatory)

Area of Studies: Products

Design Specialisation: Industrial Design

Technologies Specific Content: Model-Making Technologies

Outcome:	Students learn about:	Students learn to:	Teaching and learning strategies:	Evidence of Learning
<p>4.1.1 A student applies design processes that respond to needs and opportunities in each design project.</p>	<p>design processes including</p> <ul style="list-style-type: none"> <li>• analysing needs, problems and opportunities</li> <li>• establishing criteria for success</li> <li>• researching</li> <li>• generating creative ideas</li> <li>• communicating ideas</li> <li>• experimenting and testing ideas</li> <li>• risk management</li> <li>• managing resources</li> <li>• producing design solutions</li> <li>• evaluating ideas and solutions</li> </ul>	<ul style="list-style-type: none"> <li>• establish a design process that responds to an identified need and opportunity</li> <li>• apply a design process when developing quality solutions for each design project</li> <li>• establish criteria for successful achievement of needs and opportunities</li> <li>• record design processes and decision making in a design folio for each design project.</li> <li>• consider short-term and long-term consequences of design in the design process</li> <li>• evaluate design processes</li> </ul>	<ul style="list-style-type: none"> <li>• Introduce the student to the design process Step 1: Identify the Need Step 2: Research and Think Up Ideas Step 3: Develop Ideas Step 4: Make the Product Step 5: Evaluate the Product</li> <li>• Students identify and document criteria required to satisfy the identified need of the project</li> <li>• Students will develop and maintain a project management folio through the design process</li> <li>• Through ongoing experimentation, testing and evaluation students will aim to develop a solution that satisfies the Identified Need</li> </ul>	<ul style="list-style-type: none"> <li>• Students display an understanding of the concept of a design process</li> <li>• Students successfully identify and justify Criteria for Success</li> <li>• Quality of completed project management folio</li> <li>• Observation of student involvement in experimentation and testing, and documented evaluation</li> </ul>
<p>4.2.1 A student generates and communicates creative design ideas and solutions.</p>	<ul style="list-style-type: none"> <li>• methods used to generate creative design ideas including                             <ul style="list-style-type: none"> <li>- mind mapping</li> <li>- brain storming</li> <li>- sketching, drawing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• use a variety of methods to generate creative design ideas for each design project</li> </ul>	<ul style="list-style-type: none"> <li>• In their groups students brainstorm ideas that aim to satisfy the Identified Need</li> <li>• Production of freehand sketches and Google SketchUp to develop initial ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Documented ideas resulting from brainstorming activity</li> <li>• Quality of initial design sketches</li> </ul>

	<ul style="list-style-type: none"> <li>- modelling</li> <li>- experimenting</li> <li>- testing</li> <li>• use of design folio to record and reflect on design ideas and decisions</li> <li>• communication methods including <ul style="list-style-type: none"> <li>- drawings, sketches and models</li> <li>- written reports</li> <li>- oral presentations</li> <li>- digital presentations</li> <li>- communication methods suitable for specific audiences including <ul style="list-style-type: none"> <li>- users and clients</li> <li>- technical experts</li> <li>- peers</li> </ul> </li> </ul> </li> <li>• using ICTs to plan, develop and document design projects</li> </ul>	<ul style="list-style-type: none"> <li>• use a design folio to record and reflect on design ideas and decisions</li> <li>• sketch, draw and model to aid design development</li> <li>• manipulate images with tools such as editing, resizing, grouping, aligning and positioning</li> <li>• communicate information appropriate to specified audiences</li> <li>• compose a design folio for a specific audience in electronic format including features such as tabs, indents, headers and footers, margins and line and paragraph spacing and using appropriate layout and graphic design</li> <li>• use ICTs to communicate information including saving a document in</li> </ul>	<ul style="list-style-type: none"> <li>• Experimentation with 'meccano' to discover it limitations in the production of a solution to the Identified Need</li> <li>• Students maintain a production diary and develop a project management folio</li> <li>• Student will keep a video log of the development of their project</li> <li>• Students will computer generate aspects of their project management folio</li> </ul>	<ul style="list-style-type: none"> <li>• Observation of students experimentation</li> <li>• Quality of completed project management folio</li> <li>• Successful production and editing of video log</li> <li>• Quality of completed project management folio</li> </ul>
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		<p>various file types and storage locations from within the application</p> <ul style="list-style-type: none"> <li>• use word processing features including page numbering and page breaks, find and replace, word count, spell check and thesaurus, columns and sections, inserting text/objects/images</li> </ul>		
<p>4.3.2 A student demonstrates responsible and safe use of a range of tools, materials and techniques in each design project.</p>	<ul style="list-style-type: none"> <li>• risk management strategies</li> <li>• responsible behaviour in working environments</li> <li>• Work Health and Safety practices</li> <li>• the safe and responsible use of materials, tools and techniques in each design project</li> <li>• maintenance of tools and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• manage risk when developing design projects</li> <li>• use tools, materials and techniques in a responsible and safe manner in each design project.</li> <li>• maintain tools and equipment including computer equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Student will undergo a basic induction program related to the environment they are working in.</li> <li>• Demonstration of safe work practices as required.</li> <li>• Expectations set with regards to the correct storage and handling of equipment and resources to be established.</li> </ul>	<ul style="list-style-type: none"> <li>• Students display safe working practices during practical activities</li> <li>• Students display the ability to maintain resources in an organised manner</li> </ul>
<p>4.5.1 A student applies management processes to successfully complete design projects.</p>	<ul style="list-style-type: none"> <li>• resource availability including <ul style="list-style-type: none"> <li>- time</li> <li>- money</li> <li>- materials, tools and techniques</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• identify resource availability and apply realistic limitations to each design project</li> </ul>	<ul style="list-style-type: none"> <li>• Students apply the five step design process to manage the design, development, realisation and evaluation of their solution to the Identified Need.</li> <li>• Students will be required to work within set</li> </ul>	<ul style="list-style-type: none"> <li>• Successful application of the design process</li> <li>• Students display</li> </ul>



	<ul style="list-style-type: none"> <li>- human resources including skills and expertise</li> <li>- other resources</li> </ul> <ul style="list-style-type: none"> <li>• management techniques including action, time and budget planning</li> </ul>	<ul style="list-style-type: none"> <li>• develop and apply action, time and budget plans in design projects</li> </ul>	<p>time frames and budgetary restraints</p> <ul style="list-style-type: none"> <li>• As components of the project management folio students will maintain action, time and finance plans.</li> </ul>	<p>the ability to meet set deadlines and work within set budgetary restraints</p> <ul style="list-style-type: none"> <li>• Quality of completed project management folio</li> </ul>
<p>4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.</p>	<ul style="list-style-type: none"> <li>• suitable materials, tools and techniques for design projects</li> <li>• skill development and refinement</li> <li>• construction steps that contribute to a quality solution</li> <li>• relationship of quality solutions to needs and opportunities and the criteria for success for each design project</li> </ul>	<ul style="list-style-type: none"> <li>• identify suitable materials, tools and techniques for each design project</li> <li>• practice and refine skills needed for design projects</li> <li>• apply a design process that responds to needs and opportunities for each design project</li> <li>• produce solutions reflecting quality standards appropriate to each design project</li> </ul>	<ul style="list-style-type: none"> <li>• Students will experiment, test and evaluate their ideas using the supplied meccano kits to develop a solution to the Identified Need</li> <li>• Students will construct two standard meccano projects to familiarise themselves with the resources available to them.</li> <li>• Class discussion on the concept of 'quality' and encourage student self and group evaluation of the results achieved.</li> </ul>	<ul style="list-style-type: none"> <li>• Observation of students during the experimentation and testing of ideas.</li> <li>• Documented evidence of testing performed and evaluation of testing</li> <li>• Quality of final solution and project management folio</li> </ul>
<p>4.6.1 A student applies appropriate evaluation techniques throughout each design project.</p>	<ul style="list-style-type: none"> <li>• developing criteria for success as a tool for assessing design development and production ongoing evaluation of design ideas and decisions final evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• apply criteria for success in decision making during the development of each design project</li> <li>• use criteria for success to reflect on the design process used and the solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Class discussion used to identify the need and to establish set Criteria for Success.</li> <li>• Application of self and group evaluation throughout the entire design process.</li> </ul>	<ul style="list-style-type: none"> <li>• Final solution satisfies the set Criteria for Success</li> <li>• Documented evidence of ongoing evaluation</li> <li>• Degree of satisfaction</li> </ul>






	<p>considering: design process used, design solutions and reflection on learning</p>	<ul style="list-style-type: none"> <li>• evaluate prior to, during and at completion of each design solution</li> <li>• self and peer-assess design solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Final evaluation performed by the group with reference to the Identified Need and established Criteria for Success</li> </ul>	<p>displayed by students with regards to results achieved</p>
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Science Outcomes:	Content	Teaching and learning strategies:
<b>SC4-4WS identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge</b>	WS4 <ol style="list-style-type: none"> <li>identifying questions and problems that can be investigated scientifically (ACSIS124, ACSIS139)</li> <li>making predictions based on scientific knowledge and their own <a href="#">observations</a> (ACSIS124, ACSIS139)</li> </ol>	<ul style="list-style-type: none"> <li>Investigate a range of problems using the scientific method.</li> <li>Use meccano to design and test a range of levers to determine the impact of length on effectiveness</li> </ul>
<b>SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems</b>	WS8 <ol style="list-style-type: none"> <li>using identified strategies to suggest possible solutions to a familiar problem ✨</li> <li>describing different strategies that could be employed to solve an identified problem with a scientific component ✨</li> <li>using scientific knowledge and findings from investigations to evaluate claims (ACSIS132, ACSIS234) ✨</li> <li>using cause and effect relationships to explain ideas and findings ✨</li> <li>evaluating the appropriateness of different strategies for solving an identified problem 📊 ✨</li> </ol>	
<b>SC4-10PW describes the action of unbalanced forces in everyday situations</b>	PW1 - Change to an object's motion is caused by unbalanced forces acting on the object. (ACSSU117). <ol style="list-style-type: none"> <li>identify changes that take place when particular forces are acting</li> <li>predict the effect of unbalanced forces acting in everyday situations</li> <li>analyse some everyday common situations where friction operates to oppose motion and produce heat 📱</li> <li>investigate factors that influence the size and effect of frictional forces</li> </ol> PW3 -Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change	Define Force and brainstorm using "think, pair, share" a range of common forces experienced on a daily basis.  Define the terms Friction and Gravity Perform a first-hand investigation using friction boards to determine the effect different surfaces have upon the level of friction. Design a poster to convey the scientific principles behind a common situation that aims to increase or decrease friction. Using a first-hand investigation to identify friction produces heat and identify and explain the importance of the use of lubricants in reducing friction

	<p>within systems. (ACSSU155)</p> <ol style="list-style-type: none"> <li>a. identify objects that possess energy because of their motion (kinetic) or because of other properties (potential)</li> <li>f. investigate some everyday energy transformations that cause change within systems, including motion, electricity, heat, sound and light</li> </ol>	<p>Define Kinetic and Potential energy, Use a YouTube clip to assist with concept Create energy flow diagrams for a range of appliances</p>
<p><b>SC4-11PW discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations</b></p>	<p>PW4 - Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations. (ACSHE120, ACSHE135)</p> <ol style="list-style-type: none"> <li>a. identify that most energy conversions are inefficient and lead to the production of heat energy, e.g. in light bulbs </li> <li>b. research ways in which scientific knowledge and technological developments have led to finding a solution to a contemporary issue, e.g. improvements in devices to increase the efficiency of energy transfers or conversions </li> <li>c. discuss the implications for society and the environment of some solutions to increase the efficiency of energy conversions by reducing the production of heat energy </li> </ol> <p>Additional Content</p> <ul style="list-style-type: none"> <li>• investigate some simple machines, e.g. levers, pulleys, gears or inclined planes</li> <li>• trace the history of the development of particular devices or technologies, e.g. circuitry through to microcircuitry</li> <li>• debate intergenerational implications of the use of non-renewable energy resources </li> </ul>	<p>Identify heat energy is often generated as a waste transformation during energy transformations - relate to friction burns Discuss energy Sankey diagrams for a range of appliances. Debate the need for improved energy efficiency in motor vehicles. Construct a timeline for the development of modern cars beginning with the development of the wheel and axle Using first hand investigations explain the benefit of using a range of simple machines to complete a range of tasks. Levers, wheel and axle, gears, inclined planes.</p>

Outcome:	Content	Teaching and Learning Strategies
<b>MA4-1WM</b> <b>A student communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols</b>		In various lessons and activities students are asked to communicate their mathematical thinking with a peer and to explain their solutions to another group of students ensuring they use mathematical symbols and terminology.
<b>MA4-2WM</b> <b>A student applies appropriate mathematical techniques to solve problems</b>		Throughout the learning activities students are applying mathematical techniques to solve problems in various ways.
<b>MA4-3WM</b> <b>A student recognises and explains mathematical relationships using reasoning</b>		Students are required to reason and communicate their mathematical thinking to other students.
<b>MA4-4NA</b> <b>A student compares, orders, and calculates with integers, applying a range of strategies to aid computation</b>	<ul style="list-style-type: none"> <li>• Compare, order, add and subtract integers (ACMNA280)</li> <li>• recognise and describe the 'direction' and 'magnitude' of integers</li> <li>• interpret different meanings (direction or operation) for the + and – signs, depending on the context</li> <li>• apply integers to problems involving money and temperature (Problem Solving) </li> <li>• Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)</li> <li>• use a calculator to perform the four operations with integers </li> <li>• Find percentages of quantities and express one quantity as a percentage of another, with and without the use of digital technologies</li> </ul>	<p>As much as possible, relate questions to real-life calculations which may include money, measurement, statistical and practical applications.</p> <p>Ensure calculator skills are appropriate. Develop the best method for solving problems; mental or calculator.</p> <p>Discuss directed numbers and the four operations. Also, locate whole negative and positive numbers on number line. Use the term integer and ask students to discuss possible applications e.g. temperature and share their ideas with another group of students.</p> <p>Answer questions such as 6-27</p>

		Understand square and triangular numbers Students justify answers, solutions, techniques and discuss with peers.
<b>MA4-5NA</b> <b>A student operates with fractions, decimals and percentages</b>	<ul style="list-style-type: none"> <li>multiply and divide fractions and decimals using a calculator</li> <li>calculate fractions and decimals of quantities using mental, written and calculator methods</li> <li>choose the appropriate equivalent form for mental computation, e.g. 0.25 of \$60 is equivalent to 14 of \$60, which is equivalent to <math>\\$60 \div 4</math> (Communicating) </li> <li>Round decimals to a specified number of decimal places (ACMNA156)</li> <li>round decimals to a given number of decimal places</li> <li>use symbols for approximation, e.g. <math>\doteq</math> or <math>\approx</math> </li> <li>Find percentages of quantities and express one quantity as a percentage of another, with and without the use of digital technologies (ACMNA158)</li> </ul>	Use of diagrams and concrete materials where necessary e.g. centicubes. Problem solving with practical applications. Students use a Fraction wall as well as calculator applications Using DMS on calculator.
<b>MA4-6NA</b> <b>A student solves financial problems involving purchasing goods</b>	<ul style="list-style-type: none"> <li>Investigate and calculate the Goods and Services Tax (GST), with and without the use of digital technologies</li> <li>calculate GST and GST-inclusive prices for goods purchased in Australia, given the pre-GST price </li> <li>interpret GST information contained on receipts (Communicating)</li> </ul>	Students develop skills and move to practical applications, students work in teams to decide financial mathematical solutions and communicate their ideas back to the whole class once discussed with a peer. Students use Financial Mathematics questions to supplement the percentage work - this is a topic that will be taught with percentages. Current catalogues, websites for online shopping and advertisements as well as online offers can be considered and investigated by students.
<b>MA4-19SP</b> <b>A student collects, represents and interprets single sets of data, using appropriate statistical displays</b>	<ul style="list-style-type: none"> <li>construct divided bar graphs, sector graphs and line graphs, with and without the use of digital technologies</li> <li>calculate the length of bar required for each section of divided bar graphs and the angle at the centre required for each sector of sector graphs (Problem Solving)</li> </ul>	

Week	Outcomes	Students learn to (Technology )	Students learn about (Tech)	Integrated learning experiences	Evidence of learning	Register
		Content(Science/Maths)				
1	No Class – Short week					
2	No Class – Year 7 Camp					
3	4.1.1 A student applies design processes that respond to needs and opportunities in each design project.	<ul style="list-style-type: none"> <li>• design processes including</li> <li>• analysing needs, problems and opportunities</li> <li>• establishing criteria for success</li> <li>• generating creative ideas</li> <li>• experimenting and testing ideas</li> <li>• managing resources</li> <li>• producing design solutions</li> <li>• evaluating ideas and solutions</li> </ul>	<ul style="list-style-type: none"> <li>• establish a design process that responds to an identified need and opportunity</li> <li>• apply a design process when developing quality solutions for each design project</li> <li>• establish criteria for successful achievement of needs and opportunities</li> </ul>	1. Introduction of STEM – what is it YouTube clips  2. Pasta challenge – students build the highest tower possible with limited supplies and build the strongest bridge  3. Graphic design task – design cover page for portfolio	Bridges and towers constructed. Cover for portfolio completed	
	MA4-2MW A student applies appropriate mathematical techniques to solve problem	Students learn to solve problems using mathematical techniques				
	SC4-8WS A student elects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems	a)using identified strategies to suggest possible solutions to a familiar problem ❄️ b)describing different strategies that could be employed to solve an identified problem with a scientific component ❄️ e)evaluating the appropriateness of different strategies for solving an identified problem ❄️❄️				

4	<p>4.3.2 A student demonstrates responsible and safe use of a range of tools, materials and techniques in each design project.</p> <p>4.5.1 A student applies management processes to successfully complete design projects</p> <p>4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.</p>	<ul style="list-style-type: none"> <li>• risk management strategies</li> <li>• responsible behaviour in working environments</li> <li>• Work Health and Safety practices</li> <li>• the safe and responsible use of materials, tools and techniques</li>   <li>• maintenance of tools and equipment</li>   <li>• resource availability including</li> <li>• time</li> <li>• money</li> <li>• materials, tools and techniques</li> <li>• human resources including skills and expertise</li> <li>• other resources</li>   <li>• suitable materials, tools and techniques for design projects</li> <li>• skill development and refinement</li> <li>• construction steps that contribute to a quality solution</li> </ul>	<ul style="list-style-type: none"> <li>• manage risk when developing design projects</li> <li>• use tools, materials and techniques in a responsible and safe manner in each design project</li> <li>• maintain tools and equipment</li>   <li>• identify resource availability and apply realistic limitations to each design project</li> </ul>	<p>4. Introduction to meccano kits. Students build a motorised and non-motorised project.</p> <p>5. Costings for each project are calculated using excel spreadsheet.</p> <p>6. Time considerations are built in (wages).</p>	<p>Students complete construction of two identified models.</p> <p>Spreadsheet of costing</p>	
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	<p>MA4-4NA</p> <p>A student compares, orders, and calculates with integers, applying a range of strategies to aid computation</p>	<p>-Compare, add and subtract integers</p> <p>-Carry out the four operations with rational numbers using efficient mental and written strategy and appropriate digital technology</p> <p>-Apply integers to problems involving money</p> <p>-Using grouping symbols as an operation with integers</p>				
5	<p>4.2.1 A student generates and communicates creative design ideas and solutions.</p>	<ul style="list-style-type: none"> <li>communication methods including</li> <li>digital presentations</li> <li>communication methods suitable for specific audiences including</li> <li>users and clients</li> <li>peers</li> </ul>	<ul style="list-style-type: none"> <li>communicate information appropriate to specified audiences</li> </ul>	<p>7. Film production training</p>	<p>3-5 minute film produced on transport</p>	
6	<p>4.2.1 A student generates and communicates creative design ideas and solutions</p> <p>4.5.1 A student applies management processes to successfully complete design projects.</p>	<ul style="list-style-type: none"> <li>methods used to generate creative design ideas including</li> <li>mind mapping</li> <li>brain storming</li> <li>sketching and drawing</li> <li>modelling</li> <li>experimenting and testing</li> </ul>	<ul style="list-style-type: none"> <li>use a variety of methods to generate creative design ideas for each design project</li> </ul>	<p>8. Introduction to project and identify criteria for success</p>	<p>Students display an understanding of project requirements</p> <p>Identification of criteria for success</p>	



	<p>MA4-5NA A student operates with fractions, decimals and percentages</p>	<p>-Find percentages of quantities and express one quantity as a percentage of another, with and without the use of digital technologies -Round Decimals</p>		<p>9. Initial design sketches and construct prototype.  10. Experiment, reflect redesign, present budget for each design  11. Recap costs and review excel spreadsheets</p>	<p>Production of initial design sketches  Prototype produced and evaluated  Spreadsheet for cost calculation</p>	
	<p>SC4-4WS A student identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge SC4-8WS A student elects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems</p>	<p>4WS-a)identifying questions and problems that can be investigated scientifically (AC SIS124, AC SIS139) 4WS-b)making predictions based on scientific knowledge and their own observations (AC SIS124, AC SIS139) 8WS-d)using cause and effect relationships to explain ideas and findings</p>				
7	<p>4.2.1 A student generates and communicates creative design ideas and solutions.  4.6.1 A student applies appropriate evaluation techniques throughout each design project.</p>	<ul style="list-style-type: none"> <li>• methods used to generate creative design ideas including</li> <li>• experimenting and testing</li> <li>• developing criteria for success as a tool for assessing design development and production</li> <li>• ongoing evaluation of design ideas and decisions</li> </ul>	<ul style="list-style-type: none"> <li>• use a variety of methods to generate creative design ideas for each design project</li> <li>• apply criteria for success in decision making during the development of each design project</li> <li>• use criteria for success to reflect on the design process used and the solutions</li> <li>• evaluate prior to, during and at completion of each design solution</li> </ul>	<p>12. Explore Simple machines and ways they help in society.  13. Identify simple machines in current design.  14. Force analysis in each design. Tension, Compression, Torsion, etc.</p>	<p>Students display an understanding of the use of simple machines in society  Students able to identify simple machines in current design.  Force analysis completed</p>	

	MA4-5NA A student operates with fractions, decimals and percentages	Carry out the four operations with decimals		15. Modify existing design incorporating knowledge gained of simple machines	Students continually evaluate existing design and modify as require following testing and experimentation.	
	SC4-10PW A student describes the action of unbalanced forces in everyday situations SC4-11PW A student discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations	10PW-a) identify changes that take place when particular forces are acting 10PW-b) predict the effect of unbalanced forces acting in everyday situations 10PW-e) investigate factors that influence the size and effect of frictional forces 11PW- investigate some simple machines, e.g. levers, pulleys, gears or inclined planes				
8	4.6.1 A student applies appropriate evaluation techniques throughout each design project.  4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.	<ul style="list-style-type: none"> <li>ongoing evaluation of design ideas and decisions</li> <li>suitable materials, tools and techniques for design projects</li> <li>skill development and refinement</li> <li>construction steps that contribute to a quality solution</li> </ul>		16. Continued evaluation and modification of existing designs  17. Energy conversions involved in motor operation and investigation on improving efficiency	Students continually evaluate existing design and modify as require following testing and experimentation.  Construction of energy flow	

	<p>MA4-6NA A student solves financial problems involving purchasing goods</p>	<p>-Investigate and calculate the Goods and Services Tax (GST), with and without the use of digital technologies -calculate GST and GST-inclusive prices for goods purchased in Australia, given the pre-GST price -interpret GST information contained on receipts (Communicating)</p>			diagrams	
	<p>SC4-10PW A student describes the action of unbalanced forces in everyday situations SC4-11PW A student discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations</p>	<p>10-PW3-a) identify objects that possess energy because of their motion (kinetic) or because of other properties (potential) 10-PW3-e) investigate some everyday energy transformations that cause change within systems, including motion, electricity, heat, sound and light</p>				
9	<p>4.6.1 A student applies appropriate evaluation techniques throughout each design project.  4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.</p>	<ul style="list-style-type: none"> <li>ongoing evaluation of design ideas and decisions</li> </ul> <p>suitable materials, tools and techniques for design projects</p> <ul style="list-style-type: none"> <li>skill development and refinement</li> <li>construction steps that contribute to a quality solution</li> </ul>	<ul style="list-style-type: none"> <li>Continued evaluation and modification of existing designs</li> <li>practice and refine skills needed for design projects</li> </ul>	<p>18. Test and evaluation of current design.  19. Explore what constitutes chemical waste and hazardous substances  20. Discuss</p>	<p>Students continually evaluate existing design and modify as require following testing and experimentation.  Identify a range of</p>	

	<p>MA4-19SP A student collects, represents and interprets single sets of data, using appropriate statistical displays</p> <p>MA4-1WM A student communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols</p>	<p>-construct divided bar graphs, sector graphs and line graphs</p> <p>-calculate the length of bar required for each section of divided bar graphs and the angle at the centre required for each sector of sector graphs</p>		transportation considerations	chemical warning labels	
	<p>SC4-6WS, SC4-17CW A student follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually</p>	<p>-collaboratively and individually conducting a range of investigation types, including fieldwork and experiments following the planned procedure, including in fair tests, measuring and controlling variables recording observations and measurements accurately</p>				
10	<p>4.6.1 A student applies appropriate evaluation techniques throughout each design project.</p>	<ul style="list-style-type: none"> <li>ongoing evaluation of design ideas and decisions</li> </ul>	Continued evaluation and modification of existing designs	21. Evaluation of current design, identify and make adjustments to design. Construct graphs of percentage of different resources and identify GST components within budget	Students continually evaluate existing design and modify as require following testing and experimentation.	
	<p>MA4-19SP A student collects, represents and interprets single sets of data, using appropriate statistical displays</p>	<ul style="list-style-type: none"> <li>construct divided bar graphs, sector graphs and line graphs with the use of digital technologies</li> </ul>			Graphs of percentage budget constructed	

	<p>SC4-9WS A student presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations</p>	<p>9WS-e) constructing and using the appropriate type of graph (histogram, column, sector or line graph) to express relationships clearly and succinctly, employing digital technologies as appropriate 📊💻</p>				
11	<p>4.6.1 A student applies appropriate evaluation techniques throughout each design project.</p>	<ul style="list-style-type: none"> <li>ongoing evaluation of design ideas and decisions</li> </ul>	Continued evaluation and modification of existing designs	22. Adjustments and modifications of design	Design improvements	
12	<p>4.6.1 A student applies appropriate evaluation techniques throughout each design project.</p>	<ul style="list-style-type: none"> <li>ongoing evaluation of design ideas and decisions</li> </ul>	Continued evaluation and modification of existing designs	<p>23. Further testing and fine tuning of design, Portfolio completion.</p> <p>24. Film editing for final showcase</p>	Completed film and projects	
	<p>SC4-9WS A student presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations</p>	<p>a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (AC SIS133, AC SIS148) 📊💻</p> <p>b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount 🗣️</p>				
13	<p>4.5.2 A student produces quality design solutions that respond to identified needs and opportunities in each design project.</p>	<ul style="list-style-type: none"> <li>relationship of quality solutions to needs and opportunities and the criteria for success for each design project</li> </ul>	Produce solutions reflecting quality standards appropriate to each design project	25. Final celebration day. Testing BBQ	Project presentation to school community	
	<p>SC4-8WS A student presents science ideas, findings and information to a given audience using</p>	<p>8WS-e)evaluating the appropriateness of different strategies for solving an identified problem</p> <p>9WS-a) presenting ideas, findings and solutions to problems using scientific</p>				

	<p>appropriate scientific language, text types and representations SC4-9WS A student elects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems</p>	<p>language and representations using digital technologies as appropriate (AC SIS133, AC SIS148) </p>				
<b>14</b>	No Class –NAPLAN(approx. week)					
15 Students begin next unit						
16 Project presentation to STEM conference						

