

**MACARTHUR GIRLS HIGH SCHOOL**

**STAGE 4 INTEGRATED STEM PROGRAM**

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| **Year 7** STEM unit - Robots Helping People | |
| **Duration 20 weeks, 50 Hours, 72 minute periods, 4 periods per fortnight semesterised** | |
| **Summary**  Students are assessed on their level of engagement with STEM and 21st century skills through survey. Students are informed and introduced to the unit of work by explaining the nature of the STEM learning. They are also introduced to the weebly website and given direction on how to navigate it.  Students are formed in pairs or small groups and asked to consider a tool which might help people with an identified disability. The weebly and explicit teaching is then used as a framework by which students engage with learning activities. Students complete the sequential and knowledge building activities presented on the weebly by consulting task instructions, videos, resources and success checklist.  Students will work practically and collaboratively on activities provided by EV3 Robotics to become familiar and knowledgeable about robot capacity, with reference to the design process.  Once students have completed all sequential knowledge building activities they work on completing their written portfolio of work, visual multimedia presentation, and functional robot innovation. This will form the assessment of students' attainment of STEM and 21st century learning outcomes. Students present their project to a contextually relevant audience. All activities, scaffolding, criteria and resources are available at [stemsrobotics.weebly.com](http://stemsrobotics.weebly.com/)  **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/>  **Science**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually  SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations  SC4-10PW describes the action of unbalanced forces in everyday situations  SC4-11PW discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations  **Technology**  4.1.1 applies design processes that respond to needs and opportunities in each design project  4.2.1 generates and communicates creative design ideas and solutions  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.3.2 demonstrates responsible and safe use of a range of tools, materials and techniques in each design project  4.5.1 applies management processes to successfully complete design projects  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  4.6.1 applies appropriate evaluation techniques throughout each design project  4.6.2 identifies and explains ethical, social, environmental and sustainability considerations related to design projects  **Mathematics**  MA4-1WM communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  MA4-2WM applies appropriate mathematical techniques to solve problems  MA4-3WM recognises and explains mathematical relationships using reasoning  MA4-4NA compares, orders and calculates with integers, applying a range of strategies to aid computation  MA4-5NA operates with fractions, decimals and percentages  MA4-7NA operates with ratios and rates, and explores their graphical representation  MA3-9MG selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length  MA4-12MG calculates the perimeters of plane shapes and the circumferences of circles  MA4-14MG uses formulas to calculate the volumes of prisms and cylinders, and converts between units of volume  MA4-19SP collects, represents and interprets single sets of data, using appropriate statistical displays  MA3-16MG measures and constructs angles, and applies angle relationships to find unknown angles | **Introduction to project and requirements (Design Brief, Your Mission)**  You and your team have just been employed by a new design and innovation company. You have been asked to identify an aged care or disability issue and then design and build a robot which will help to improve their quality of life. This robot is a prototype and not to scale. As designers you must ensure the robot functions correctly, is visually appealing and is safe. A range of additional materials could be used to improve the success of your robot such as fabric for the user's comfort.  Your project must include:   * Complete a series of introductory robotics challenges with supporting math challenges featured in the mission manual (student workbook) * **A video log** which documents the obstacles and solutions during the design process and building of your innovation. Short section included on promoting the benefits of their prototype for aged care or disabilities. Where you successful in achieving the design brief? * **A group design folio** must include:   + **Design Brief**      - analysing needs (design situation)     - problems and opportunities     - establishing criteria for success   + **Research:**     - Inspirational research: existing robotics examples     - technical research: costing, robotics types, methods for controlling, movement options, material, power source   + **Generating creative ideas (brainstorming):**      - Individual students create profiles for different robot ideas     - Planning sketching robot ideas potential ideas     - The group analyses by using a check list (Criteria for success) to narrow them to the groups final idea with justification.   + **Communicating ideas:**      - video logo/presentation,     - pseudocode,   + **Experimenting and testing ideas:**      - Introductory robotics challenges     - Ongoing math lessons     - Ways to test based on inspired teacher model ( math lesson) (i.e. weights) data logging and analysing results     - student ongoing testing   + **Producing design solutions**     - Production modify robot for design brief   + **Evaluating ideas and solutions**     - peer evaluating     - video journal * A completed and functional robotic tool **which fulfills the design brief and purpose for which it was intended.** |

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| **21st Century Learning Design** | **Learning Across the Curriculum** |
| Collaboration  Knowledge building  Use of ICT for learning  Real world problem solving  Self-regulation  Skilled Communication | Critical and creative thinking ​  Literacy  Numeracy ​  Information and communication technology capability  Personal and Social Capability  Difference and Diversity  Work and Enterprise |
| **Unit overview** |  |
| This is STEM unit which incorporates the technology, mathematics, science syllabuses. Students undertake a problem-based project of their choosing which is supported by instructional and faciliative teaching across a number of subjects.  Students work collaboratively to identify and research an aged care or disability issue in society, experiment or model possible solutions using critical thinking, compose a written portfolio, create a video log and create a scaled robotic tool.  Students complete a number of sequential and knowledge building activities which assist them and organising and communicating their about their innovation. |  |
| **Assessment overview** | |
| Students will initially complete formative assessment which will determine their readiness for some of the key STEM learning outcomes. Further formative assessment will be conducted to ascertain student readiness to engage in scientific and mathematical experiments in relation to their chosen issue.  Results from formative assessments will be used for teacher learning to identify learning areas which require further development.  Students conduct self and peer assessment by engaging with the self-regulation and feedback framework. This assessment will be ongoing over the whole period of unit study. Summative assessment takes the form of a work portfolio, a video log and complete and functional robotic tool. | |

**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 Aboriginal and Torres Strait Islander histories and cultures
* Asia and Australia's engagement with Asia Asia and Australia's engagement with Asia  
* Sustainability Sustainability

The general capabilities:

* Critical and creative thinking Critical and creative thinking
* Ethical understanding Ethical understanding
* Information and communication technology capability Information and communication technology capability
* Intercultural understanding Intercultural understanding
* Literacy Literacy
* Numeracy Numeracy
* Personal and social capability Personal and social capability

Other learning across the curriculum areas:

* Work and enterprise Work and enterprise
* Difference and Diversity

| **Outcomes** | **Content** | **Teaching and learning strategies** |
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| **TECHNOLOGY**  4.1.1 applies design processes that respond to needs and opportunities in each design project  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually  **TECHNOLOGY**  4.6.2identifies and explains ethical, social, environmental and sustainability considerations related to design projects | Design processes including: analysing needs, problems and opportunities  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation  WS6 Students conduct investigations by: performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  Ethical and responsible design | **Module 1:**  **Task:**  View the project launch for inspiration View the design brief, rules and video diary  Complete design brief work sheet robot and laptop box  Create group name and get your allocated  **Instructions:**  1. Watch the presentation "project launch"  2. Complete design brief work sheet, with rules, summary and definitions  Complete design brief work sheet, brainstorming  ***Success checklist***:  Have you...  1. Watched the presentation  2. Formed a group and created a group name  3. Collected you allocated robot and laptop box  4. Complete design brief work sheet,  5. Understood what the design brief is  6. Understood and begins to apply rules for the project  7. Brainstorming ways robots can help people with disabilities and the elderly  **Module 2:**  Task:  Establish and discuss group roles and how to collaborate successfully. Research examples of disabilities and their symptoms to develop a clearer understanding on how building your robot could help. |
|  |  | **Instructions:**  1. Establish group roles  2. Use a range of websites to locate information and use presentation to present your results  3. Complete questions on disabilities  4. Select a specific disability that you could help and suggest specific ways a robot could  help  **Success checklist:**  1. Established group roles. Each member understands their roles for the semester's project  2.  Use the Internet to complete the research questions using presentation to present your results  3. Selected a specific disability that you could help and suggest specific ways at least 4 ways a robot  could  help such as lift, carry, push  4. Submitted to your teacher. |
| **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation  WS5.3 Students choose equipment or resources for an investigation by:  a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies  b. selecting equipment to collect data with accuracy appropriate to the task  WS6 Students conduct investigations by: following the planned procedure, including in fair tests, measuring and controlling variables | **Module 3:**  **Task:**  Learn how to install and operate the Mindstorms software and the Intelligent Brick.    **Instructions:**  1. Watch the Powerpoint as your teacher goes through it  2. If you have your own device install the software by following the instructions in the power point  3. Open the software as the teacher goes through the power point  4. Operate the brick as you go through it.  ***Success checklist:***  1. Have you installed the software on your device?  2. Installed any patches required?  3. Opened the Mindstorms software and navigated to the program window?  4. Have you tried moving the program blocks into the program?  5. Turned on the Brick and operated it as per the instructions? |
| **TAS**  4.2.1 generates and communicates creative design ideas and solutions  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Methods used to generate creative design ideas  Mathematics Skills at Working Mathematically 1WM-3WM.  WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 | **Module 4:**  Task: Robot challenge 1: Communicating pseudocode    Instructions:  1. Watch introduction powerpoint to pseudocode  2.Create instructions for making a sandwich in English (some steps)  3.Powerpoint plan programs for First Lego League  4.Complete Peanut Butter and Jelly Worksheet as a group  5.Share your Peanut Butter and Jelly Worksheet group to check if they can follow the instructions clearly to get feedback on how to improve.  Success checklist: Have you...  1. Learned what pseudocode means  2. Learned why you use pseudocode  3. Learned to write pseudocode for a common task  4. Learned how to plan programs for First Lego League  5. Complete Peanut Butter and Jelly Worksheet as a group and submit to another group to check if they can follow the instructions clearly  6. Submit to teacher |
| **TECHNOLOGY**  4.3.2 demonstrates responsible and safe use of a range of tools, materials and techniques in each design project  **MATHEMATICS**  1) MA4-2WM Applies appropriate mathematical techniques to solve problems  2) MA4-3WM Recognises and explains mathematical relationships using reasoning  3) MA4-4NA Compares, orders and calculates with integers, applying a range of strategies to aid computation  4) MA4-5NA Operates with fractions, decimals and percentages  5) MA3-9MG Selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length | Responsible behaviour in working environments  1-2) Mathematics Skills at Working Mathematically 1WM-3WM.  3) Carry out the four operations with [rational numbers](http://numbers) and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)  (a) multiply and divide integers using mental and written strategies  (b) use a calculator to perform the four operations with integers  4) (i) [Multiply](http://multiply) and divide fractions and decimals using efficient written strategies and digital technologies (ACMNA154)  (a) calculate fractions and decimals of quantities using mental, written and calculator methods  4) (ii) [Round](http://round) decimals to a specified number of decimal places (ACMNA156)  5) Choose appropriate units of measurement for length (ACMMG108)  (a) select and use the appropriate unit and measuring device to measure lengths and distances  (b) estimate lengths and distances using an appropriate unit and check by measuring | **Module 5:**  **Task:**  Making your robot move and turn using the programmer.    **Instructions**:  1. Open up Maths workbook task 1. You will need to work through this sheet as you do the challenges! Task one will cover the first 2 lessons.  2. Get the Move Straight Challenge Worksheet and your robot.  3. Work your way as a group through the challenge. Make sure you are collecting information for the Maths task as you go.  4. Answer the reflection questions which will be on the white board after the groups have finished.  5. Watch the Simple forces video.  6. Finish the Maths sheets you started for homework if required  **Success checklist:**  Have you...  1. Completed the Move Straight Challenge worksheet?  2. Programmed your robot successfully?  3. Answered the reflection questions?  4. Completed at least 2 of the Maths Task 1 sheets?  5. Watched the Simple Forces video? |
| **SCIENCE**  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually  SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to  identify trends, patterns and relationships, and draw conclusions | WS6 Students conduct investigations by:  b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment  c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  WS7.1 Students process data and information by:  a. summarising data from students' own investigations and secondary sources  b. using a range of representations to organise data, including graphs, keys, models, diagrams, tables and spreadsheets  c. extracting information from diagrams, flowcharts, tables, databases, other texts, multimedia resources and graphs including histograms and column, sector and line graphs  d. accessing information from a range of sources, including using digital technologies  e. applying simple numerical procedures, eg calculating means when processing data and information, as appropriate |  |
| SC4-10PW describes the action of unbalanced forces in everyday situations | WS7.2 Students analyse data and information by:  a. checking the reliability of gathered data and information by comparing with observations or information from other sources  b. constructing and using a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate  c. identifying data which supports or discounts a question being investigated or a proposed solution to a problem  d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources  e. proposing inferences based on presented information and observations  f. reflecting on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected  PW1 Change to an object's motion is caused by unbalanced forces acting on the object. Students:  a. identify changes that take place when particular forces are acting  b. predict the effect of unbalanced forces acting in everyday situations  PW3 Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems. Students:  a. identify objects that possess energy because of their motion (kinetic) or because of other properties (potential)  c. relate electricity with energy transfer in a simple circuit  e. investigate some everyday energy transformations that cause change within systems, including motion, electricity, heat, sound and light |  |
| **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  4) MA3-9MG Selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length  5) MA4-19SP Collects, represents and interprets single sets of data, using appropriate statistical displays  6) MA4-5NA Operates with fractions, decimals and percentages  7) MA3-16MG Measures and constructs angles, and applies angle relationships to find unknown angles  8) MA4-12MG Calculates the perimeters of plane shapes and the circumferences of circles | Mathematics Skills at Working Mathematically 1WM-3WM.  4) Choose appropriate units of measurement for length (ACMMG108)  (a) select and use the appropriate unit and measuring device to measure lengths and distances  5) Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169)  (a) use spreadsheets or statistical software packages to tabulate and graph data  6) (a) Multiply and divide fractions and decimals using efficient written strategies and digital technologies (ACMNA154)  (b) Round decimals to a specified number of decimal places (ACMNA156)  (c) Investigate the concept of irrational numbers, including π  7)Construct angles using a protractor(ACMMG112)  (a) identify that a right angle is 90°, a straight angle is 180° and an angle of revolution is 360°  8) Investigate the concept of irrational numbers, including π  (ACMNA186)  (a) demonstrate by practical means that the ratio of the circumference to the diameter of a circle is constant, eg measure and compare the diameters and circumferences of various cylinders or use dynamic geometry software to measure circumferences and diameters | **Module 6:**  **Task**:  Making your robot move and turn using the programmer.    **Instructions**:  1. Complete Maths workbook task 1 C. During lesson  2. Watch powerpoint  3. Get the Turning Challenge Worksheet and your robot.  4. Challenge Details are on Slide 8 ,  5. Work your way as a group through the challenge. Experiment with pivot and spin turns. Discussion Page Slide 9  6. Challenge Solution on Slide 10  7. Answer the reflection questions which will be on the projection board.  8. Watch the centripetal motion video.  9. Complete the centripetal force worksheet  **Success checklist:**  Have you....  1. Learned to turn the robot a desired number of degrees  2. Learned the differences between Spin and Pivot Turns  3. Learned how to program two different type of turns  4. Completed the turning challenge? Demonstrated to your teacher.  5. Discussed and answered the reflection questions as a group and recorded your responses.  6. Asked questions about the Centripetal motion video?  7. Finished the Maths Task 1 workbook?  8. Completed the centripetal force worksheet? |
| 9) MA4-7NA Operates with ratios and rates, and explores their graphical representation  **SCIENCE**  SC4-10PW describes the action of unbalanced forces in everyday situations  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | 9) Investigate, interpret and analyse graphs from authentic data (ACMNA180)  (a) interpret distance/time graphs (travel graphs) made up of straight-line segments  (i) compare distance/time graphs of the same situation, decide which one is the most appropriate, and explain why (Communicating, Reasoning)  PW1 Change to an object's motion is caused by unbalanced forces acting on the object. Students:  a. identify changes that take place when particular forces are acting  b. predict the effect of unbalanced forces acting in everyday situations  WS6 Students conduct investigations by:  a. collaboratively and individually conducting a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed  b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment  c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities |  |
| SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to  identify trends, patterns and relationships, and draw conclusions | f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method  WS7.1 Students process data and information by:  a. summarising data from students' own investigations and secondary sources  e. applying simple numerical procedures, eg calculating means when processing data and information, as appropriate  WS7.2 Students analyse data and information by:  d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources |  |
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| SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to  identify trends, patterns and relationships, and draw conclusions | e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method  WS7.1 Students process data and information by:  a. summarising data from students' own investigations and secondary sources  e. applying simple numerical procedures, eg calculating means when processing data and information, as appropriate  WS7.2 Students analyse data and information by:  d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources |  |
| **TECHNOLOGY**  4.2.1 generates and communicates creative design ideas and solutions  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-10PW describes the action of unbalanced forces in everyday situations  SC4-11PW discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations | Communication methods including- digital presentations.  Research methods-searching techniques including use of the Internet.  Suitable materials, tools and techniques for design projects.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  PW1 Change to an object's motion is caused by unbalanced forces acting on the object. Students:. describe some examples of technological developments that have contributed to finding solutions to reduce the impact of forces in everyday life, eg car safety equipment and footwear design | **Module 10:**  **Instructions:**  1. Teacher is to go through Assessment Task 2 with the students and answer any queries.  2. In their groups, students are to start researching what aged care or disability issue they want to help, what function they are going to get the robot to do and how they are going to go about it. What problems and opportunities, potential strengthens and weaknesses of using robots to help people?  3. Research examples of robotics, machines and other sources for inspiration to solve this problem.  4. Groups may want to take video footage during their decision-making process.  **Success checklist:**  1. Our group understands what we are required to do in Assessment Task 2.  2. We have decided on what aged care or disability group we want to help.  3. We have started researching the function we are going to program the robot to do.  4. We are considering the problems and opportunities, potential strengthens and weaknesses of using robots to help solve problems  5. Sought inspirational examples to help solve this problem.  6. We are keeping a record of all our ideas, planning, research and setbacks. |
| SC4-5WS collaboratively and individually produces a plan to investigate questions and problems  SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | 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. Students: research ways in which scientific knowledge and technological developments have led to finding a solution to a contemporary issue, eg improvements in devices to increase the efficiency of energy transfers or conversions  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation  WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed |  |
| SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | WS5.3 Students choose equipment or resources for an investigation by:  a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies  b. selecting equipment to collect data with accuracy appropriate to the task  WS6 Students conduct investigations by:  a. collaboratively and individually conducting a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed  b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment  c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method |  |
|  | WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem  WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information |  |
|  | d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.2.1 generates and communicates creative design ideas and solutions  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems | Communication methods including- digital presentations.  Research methods-searching techniques including use of the Internet.  Experimentation and testing of design ideas.  Suitable materials, tools and techniques for design projects.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation | **Module 11:**  **Task**:  Student technical research    **Instructions:**  1. Students are to continue researching their ideas concerned with their robot.  2. Students are to complete the technical research task consider the type of robot they want, how the robot is to be controlled, what movements options are necessary for the robot to carry out its designed purpose, power source and materials. This information will help them complete their robot profiles.  3. Students may want to video part of their discussions to include in their video presentation.  **Success checklist:**  1. Complete technical research worksheet  2. Our group is exploring different design ideas for the robot, including:   * its function * method of movement * power source * Materials   3. Interact and use the material science games to apply your understanding of material properties. |
| SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed  WS5.3 Students choose equipment or resources for an investigation by:  a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies  b. selecting equipment to collect data with accuracy appropriate to the task  WS6 Students conduct investigations by:  a. collaboratively and individually conducting a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed  b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment |  |
| SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem |  |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.2.1 generates and communicates creative design ideas and solutions  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems | Communication methods including- digital presentations.  Research methods-searching techniques including use of the Internet.  Experimentation and testing of design ideas.  Suitable materials, tools and techniques for design projects.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation | **Module 12:**  **Task**:  Student technical research continued    **Instructions:**  1. Students are to continue researching their ideas concerned with their robot. Students are to consider the type of robot they want, how the robot is to be controlled, what movements options are necessary for the robot to carry out its designed purpose, power source, material, ergonomics  3. Students may want to video part of their discussions to include in their video presentation.  **Success checklist:**  1. Our group is exploring different design ideas for the robot, including:   * its function * movement options * power * its design   2. Video diary  3. Interact and use the material science games to apply your understanding of material properties. |
| SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed  WS5.3 Students choose equipment or resources for an investigation by:  a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies  b. selecting equipment to collect data with accuracy appropriate to the task  WS6 Students conduct investigations by:  a. collaboratively and individually conducting a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed |  |
| SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment  c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem  WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.2.1 generates and communicates creative design ideas and solutions  4.6.1 applies appropriate evaluation techniques throughout each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-3WM Recognises and explains mathematical relationships using reasoning  3) MA3-14MG Identifies three-dimensional objects, including prisms and pyramids, on the basis of their properties, and visualises, sketches and constructs them given drawings of different views  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems | Research methods-searching techniques including use of the Internet.  Methods used to generate creative design ideas including: sketching and drawing  Ongoing evaluation of design ideas and decisions  1-2) Mathematics Skills at Working Mathematically 1WM-3WM.  3) Connect three-dimensional objects with their [nets](http://nets) and other two-dimensional representations (ACMMG111)  (a) visualise and sketch three-dimensional objects from different views, including top, front and side views  (i) reflect on their own drawing of a three-dimensional object and consider how it can be improved (Reasoning)  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation | **Module 13:**  **Task**:  Generating creative ideas (brainstorming and analysing ideas)    **Instructions:**  1. Use the Internet and previous lesson on materials to research different options for the robot profile sheets. Based on the disability or aged care issue identified in the statement of intent.  2 Use the robot profile sheets (individual task) to develop at least 3 different possible robot designs (profiles) for their final group robot. Sketch and complete profile detail (such as method of movement, materials used for actual robot etc.) Research possible options  2. Discuss with group members advantages and disadvantages for each person's robot profile  3. Group decides which profile to build and justifies their selection based on provided criteria. Making any modifications as required to individual's profiles.  4. Time allocated to complete this lesson next lesson  **Success checklist:**  Have you...   1. Researched possible option for the different robot profiles? 2. Completed 3 different robotic profiles? 3. Listed advantages and disadvantages of each robot? 4. Discussed and decided one robot based on criteria, modification of selected robot as required? |
|  | WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed |  |
| **TECHNOLOGY**  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  4.5.1 applies management processes to successfully complete design projects  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA3-4NA Orders, reads and represents integers of any size and describes properties of whole numbers  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems | Research methods-searching techniques including use of the Internet.  Resource availability including:  Money materials, tools and techniques  1-2) Mathematics Skills at Working Mathematically 1WM-3WM.  3) Recognise, represent and order numbers to at least tens of millions  (a) use numbers of any size in real-life situations, including in money problems  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation | **Module 14:**  **Task:**  Complete robot profiles sheets from last lesson  Find the cost of your prototype using maths task 2  **Instructions:**  1. Complete robot profiles sheets from last lesson  1. Keep a tally of which components you have used (If you keep a running tally of how many components you have added to or taken from the base model the numbers used in the base model is provided)  2. Use the code sheet to see what category (letter) each component belongs to and its price  3. Enter your data into the excel spreadsheet "Robot Costing"  **Success checklist:**  Have you...   1. Kept a running tally of what you're adding and subtracting to the robot?   2. Considered other ways to determine what components you have used in your robot?  3. Completed robot profiles sheets?  4. Completed the "robot costing" to understand the constraints of budgets? |
|  | WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed |  |
| **TECHNOLOGY**  4.2.1 generates and communicates creative design ideas and solutions  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-5WS collaboratively and individually produces a plan to investigate questions and problems | Methods used to generate creative design ideas  1-2) Mathematics Skills at Working Mathematically 1WM-3WM.  WS5.1 Students identify data to be collected in an investigation by:  a. identifying the purpose of an investigation  b. proposing the type of information and data that needs to be collected in a range of investigation types, including first-hand and secondary sources  c. locating possible sources of data and information, including secondary sources, relevant to the investigation | **Module 15:**  **Task**:  Procedure writing using pseudocode    **Instructions**:  1. View presentation  2. Complete pseudocode challenges  3. Apply pseudocode to your robots instructions, get robots to carry out simply instructions  **Success checklist:**  1. Have you...  2. Understood the need for pseudocode?  3. Completed pseudocode challenges using accurate instructions?  4. Used pseudocode to instruct your robot, translating pseudocode to the block coding to carry out simple instructions using your robot? |
| SC4-6WS follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually | WS5.2 Students plan first-hand investigations by:  a. collaboratively and individually planning a range of investigation types, including fieldwork, experiments, surveys and research  b. outlining a logical procedure for undertaking a range of investigations to collect valid firsthand data, including fair tests  c. identifying in fair tests, variables to be controlled (held constant), measured and changed d. describing safety and ethical guidelines to be addressed  WS5.3 Students choose equipment or resources for an investigation by:  a. identifying suitable equipment or resources to perform the task, including safety equipment and digital technologies  b. selecting equipment to collect data with accuracy appropriate to the task |  |
| SC4-7WS processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions | WS6 Students conduct investigations by:  a. collaboratively and individually conducting a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed  b. assembling and using appropriate equipment and resources to perform the investigation, including safety equipment  c. selecting equipment to collect data with accuracy appropriate to the task  d. following the planned procedure, including in fair tests, measuring and controlling variables  e. recording observations and measurements accurately, using appropriate units for physical quantities  f. performing specific roles safely and responsibly when working collaboratively to complete a task within the timeline  g. assessing the method used and identifying improvements to the method |  |
| SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | WS7.1 Students process data and information by: a. summarising data from students' own investigations and secondary sources  b. using a range of representations to organise data, including graphs, keys, models, diagrams, tables and spreadsheets  c. extracting information from diagrams, flowcharts, tables, databases, other texts, multimedia resources and graphs including histograms and column, sector and line graphs  d. accessing information from a range of sources, including using digital technologies  e. applying simple numerical procedures, eg calculating means when processing data and information, as appropriate  WS7.2 Students analyse data and information by:  a. checking the reliability of gathered data and information by comparing with observations or information from other sources  b. constructing and using a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate  c. identifying data which supports or discounts a question being investigated or a proposed solution to a problem |  |
|  | d. using scientific understanding to identify relationships and draw conclusions based on students' data or secondary sources  e. proposing inferences based on presented information and observations  f. reflecting on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem |  |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.2.2 selects, analyses, presents and applies research and experimentation from a variety of sources  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  4) MA3-14MG Selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Experimentation and testing of design ideas  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  4) Choose appropriate units of measurement for mass (ACMMG108)  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 16:**  **Task**:  Experimenting and testing ideas using maths task 3  Start producing design solutions for your robot    **Instructions:**  1. follow teachers examples  2. using maths task 3 for the teacher's example  3. suggest other methods for testing the success of the robot  4 Begin the production and modifying your robot (on going testing/video journal) based on plans  5. begin editing video at home to show the major steps in production ensure video contains the major steps in production and addressing the design brief, (answering if their robot is functional for its intended purpose, safe, visually appealing and comfortable) . Also mention major problems and their possible solutions.  **Success checklist:**  Have you...   1. Completed maths task 3? 2. Understood how to test your robot using weight constraints and suggested other methods of testing? 3. Begun the production and modifying of your robot? 4. Video recorded   begun editing video at home to show the major steps in production |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Suitable materials, tools and techniques for design projects.  Skill development and refinement.  Construction steps that contribute to a quality solution  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 17:**  **Task**:  Producing design solutions for your robot with ongoing testing and video recording    **Instructions:**  1. production and modifying your robot (on going testing/video journal) based on plans and experimenting  **Success checklist:**  1. Have you...  2. Worked towards producing and modifying your robot (on going testing/video journal) based on plans and experimenting keeping in mind criteria for success and design brief? |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems | Suitable materials, tools and techniques for design projects.  Skill development and refinement.  Construction steps that contribute to a quality solution.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 18:**  **Task**:  Producing design solutions for your robot with ongoing testing and video recording    **Instructions**:  1. production and modifying your robot (on going testing/video journal) based on plans and experimenting  **Success checklist:**  1. Have you...  2. Worked towards producing and modifying your robot (on going testing/video journal) based on plans and experimenting keeping in mind criteria for success and design brief? |
| SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Suitable materials, tools and techniques for design projects.  Skill development and refinement.  Construction steps that contribute to a quality solution.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 19:**  **Task:**  Testing using maths task 3  Mini demonstration of your robot to another group and peer evaluation (PMI) (pair up with another team to demo and evaluate each other robots)  Producing design solutions for your robot with ongoing testing and video recording    **Instructions:**  1. Test your robot using the technique developed in maths task 3 applied to your robot  2. Complete PMI evaluation for another team  3. Analyse feedback from PMI evaluation carried out on your robot by another team  4. production and modifying your robot (on going testing/video journal) based on plans and experimenting  **Success checklist:**  Have you...   1. Tested your robot using maths task 3? 2. Demonstrated your robot to another team? 3. Carried out a PMI evaluation of that team’s robot? 4. Worked towards producing and modifying your robot (on going testing/video journal) based on plans and experimenting keeping in mind criteria for success and design brief? |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.5.2 produces quality solutions that respond to identified needs and opportunities in each design project  **MATHEMATICS**  1) MA4-1WM Communicates and connects mathematical ideas using appropriate terminology, diagrams and symbols  2) MA4-2WM Applies appropriate mathematical techniques to solve problems  3) MA4-3WM Recognises and explains mathematical relationships using reasoning  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Suitable materials, tools and techniques for design projects.  Skill development and refinement.  Construction steps that contribute to a quality solution.  1-3) Mathematics Skills at Working Mathematically 1WM-3WM.  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 20:**  **Task:**  Modify robot modify based on evaluation and testing feedback    **Instructions:**  1. modify robot modify based on evaluation and testing feedback  2. video modification  3. edit video  **Success checklist:**  Have you...   1. Modified robot based on evaluation and testing feedback? 2. Video recorded your modifications? 3. Edited video? |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |
| **TECHNOLOGY**  4.2.1 generates and communicates creative design ideas and solutions  4.6.1 applies appropriate evaluation techniques throughout each design project  **SCIENCE**  SC4-8WS selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems  SC4-9WS presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations | Communication methods including:  digital presentations  • communication methods suitable for specific Audiences including:  technical experts  peers  • using ICTs to plan, develop and document design projects  Final evaluation considering: design process used,  design solutions and reflection on learning  WS8 Students solve problems by:  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  c. using scientific knowledge and findings from investigations to evaluate claims  d. using cause and effect relationships to explain ideas and findings  e. evaluating the appropriateness of different strategies for solving an identified problem | **Module 21:**  **Task:**  Display video log and final robot in video/ response to design brief/benefits of their model for design situation  Task" submit assignment 2  Teacher panel final feedback on robot  **Instructions:**  1. Each group has a time limit of 5 minutes to demonstrate their final robot with their video log outlining the major steps in production and addressing the design brief, (answering if their robot is functional for its intended purpose, safe, visually appealing and comfortable) . Also mention major problems and their possible solutions.  **Success checklist:**  Have you...   1. Demonstrated your final robot with your video log 2. Submitted assignment 2 |
|  | WS9 Students communicate by:  a. presenting ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate  b. using appropriate text types in presentations, including a discussion, explanation, exposition, procedure and recount  c. using a recognised method to acknowledge sources of data and information  d. constructing and using a range of representations to honestly, clearly and/or succinctly present data and information including diagrams, keys, models, tables, drawings, images, flowcharts, spreadsheets and databases  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 |  |

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| **Evaluation** |
| This unit will be evaluated using pre and post surveys and questionnaire tools which integrate a range of qualitative and quantitative items. Such tools will be given to students and teachers to judge the extent to which engagement with 21st century learning skills have increased during the unit.  Students will also maintain a daily learning log which will be used to evaluate level of engagement, achievement and the level to which their zone of proximal development is being met. Student work samples will be used to measure whether the aims and expectations of the unit have been met. |