













# 2024 TERM 4 | YEAR 7 TECHNOLOGY MANDATORY



Unit Name	STEM Unit – Space Locks	Duration	8 Weeks
<b>Unit Description</b>	<p>Students work in groups to solve the challenge of designing a tool to open the locks on the “Space Door”. The STEM Space Locks website outlines the need for students to quickly and efficiently produce a tool which opens a series of locks on a mock space door, within a space station. The students will 3D print their tools, which have been tested for print speed and weight of filament, then complete during the STEM Day to determine which is the most efficient in opening the locks. This collaborative unit includes an abbreviated design process and informal portfolio / communication activities. Students will develop skills in rapid prototyping, collaboration, project management and problem solving.</p> <p>Context</p> <p><input checked="" type="checkbox"/> Engineered Systems (10 hours)</p> <p><input checked="" type="checkbox"/> Material Technologies (10 hours)</p> <p><b>Assessment Overview</b></p> <p>There are no formal assessment tasks relating to this unit. Students will compete during the STEM Day to determine their level of success in designing their Space Tool. Formative assessment and peer feedback will occur throughout the unit.</p> <p>Digital Technologies</p> <p>Students will utilise a range of digital technologies through the application of equipment and software during the design process. A range of tutorials have been developed and chosen to develop basic skills. Students will then apply their learning to the production of a 3D printed Space Tool. Students learn to use industry-level software packages, such as Solid Edge. Students learn to open, save and transfer files and develop knowledge and experience using the 3D printer.</p>		
<b>Syllabus Outcomes</b>	<p>TE4-1DP designs, communicates and evaluates innovative ideas and creative solutions to authentic problems or opportunities</p> <p>TE4-2DP plans and manages the production of designed solutions</p> <p>TE4-3DP selects and safely applies a broad range of tools, materials and processes in the production of quality projects</p> <p>TE4-8EN explains how force, motion and energy are used in engineered systems</p> <p>TE4-9MA investigates how the characteristics and properties of tools, materials and processes affect their use in designed solutions</p> <p>TE4-10TS explains how people in technology related professions contribute to society now and into the future</p>		
<b>Resources</b>	<p>Solid Edge 3D Modelling Software</p> <p>3D Printers and filament</p> <p>Student Laptops and internet access</p> <p>Schoolbox Stem Project Website</p> <p>Workshop tools and measurement tools.</p>		

Content	Teaching, Learning and Assessment	Resources
<p><b>Foundational Content</b></p> <ul style="list-style-type: none"> <li>•</li> </ul> <p><b>ENGINEERED SYSTEMS</b></p> <p><b>Identifying and defining</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• investigate the way in which technologies evolve locally, regionally or globally and how competing factors are prioritised in the development of design solutions, for example: (ACTDEK029) <b>ST</b> 🧠 🛠️ ⚙️</li> <li>– automation and data transfer in manufacturing, eg Industry 4.0</li> <li>– GPS and drone technologies used in farming</li> <li>• investigate the role of an engineering professional and their impact on the environment and society 🧠 ⚙️</li> <li>• investigate the way Aboriginal and/or Torres Strait Islander Peoples use engineered solutions to serve community needs including those of cultural identity, for example: 🤝 📺</li> <li>– transport, eg canoe building</li> <li>– tools, eg boomerang, woomera</li> <li>– structures, eg customary shelters, contemporary architecture</li> <li>• investigate needs or opportunities for designing an engineered system and investigate and select from a range of materials, components, tools, equipment and processes (ACTDEP035) <b>DT ST</b> ⚙️</li> <li>• develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031) <b>DT ST</b> 🛠️ ⚙️ 🏠 ⚙️</li> </ul> <p><b>Researching and planning</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• investigate how force, motion and/or energy are utilised when designing engineered systems, for example: (ACTDEK031) ⚙️ 📺 📺</li> <li>– electronic circuits</li> </ul>	<p>Yearly Examination Revision of Engineered Systems and Material Technologies (Approx 5 Lessons) Week 1-3 Exams in Week 3</p> <p>Revision Lesson 1</p> <ul style="list-style-type: none"> <li>- T go through assessment notification</li> <li>- T to explain that the theory booklets and content in class will make up exam</li> <li>- S fill out glossary on assessment notification</li> <li>- S choose 5 terms they are not familiar with and make a meme about one or more</li> <li>- S to post on Class forum or One Note, following T instructions</li> <li>- S to study any terms they are not familiar with at home (remind students that some terms are for year 8 eg. stirring and variable)</li> </ul> <p>Revision Lesson 2</p> <ul style="list-style-type: none"> <li>- T to give time to answer practice short answer questions</li> <li>- T to go through answers once all students completed it</li> </ul> <p>Revision Lesson 3 (Textiles)</p> <ul style="list-style-type: none"> <li>- Give time to work on workbook</li> <li>- Textiles key terms</li> <li>- Revision Games</li> </ul> <p>Revision Lesson 4 (Woodwork)</p> <ul style="list-style-type: none"> <li>- Give time to work on workbook</li> <li>- Woodwork key terms</li> <li>- Revision Games</li> </ul> <p>Revision Lesson 5 (Metal)</p> <ul style="list-style-type: none"> <li>- Give time to work on workbook</li> <li>- Metalwork key terms</li> <li>- Revision Games</li> </ul>	<p>Assessment Notification on Schoolbox</p> <p>Meme example:</p>  <p>Extra Revision Questions <a href="#">7TEC Revision Questions.docx</a> <a href="#">7TEC Revision Answers.docx</a></p> <p>Textiles <a href="https://www.purposegames.com/game/sewing-machine-parts-bernina-1008-quiz">https://www.purposegames.com/game/sewing-machine-parts-bernina-1008-quiz</a> <a href="https://www.purposegames.com/game/do-you-know-your-bernina-sewing-machine-parts">https://www.purposegames.com/game/do-you-know-your-bernina-sewing-machine-parts</a> <a href="https://www.purposegames.com/game/4b92d6695e">https://www.purposegames.com/game/4b92d6695e</a></p> <p>Blooket – Fabrics <a href="https://dashboard.blooket.com/set/632d9a7eb0e0566028072e47">https://dashboard.blooket.com/set/632d9a7eb0e0566028072e47</a></p> <p>Easy <a href="https://dashboard.blooket.com/set/601140f395508a00191f81b3">https://dashboard.blooket.com/set/601140f395508a00191f81b3</a></p> <p>Difficult - <a href="https://dashboard.blooket.com/set/66b1c1db000c08b71fa1c7f2">https://dashboard.blooket.com/set/66b1c1db000c08b71fa1c7f2</a></p> <p>Other <a href="https://dashboard.blooket.com/set/632467d9acb86cc571861609">https://dashboard.blooket.com/set/632467d9acb86cc571861609</a></p>

Content	Teaching, Learning and Assessment	Resources
<ul style="list-style-type: none"> <li>– mechanisms involving simple machines</li> <li>– built environments</li> <li>• select and use a variety of critical and creative thinking strategies to generate innovative design ideas, for example: <b>DT ST</b> </li> <li>– brainstorming</li> <li>– sketching</li> <li>– 3-D modelling</li> <li>– experimenting</li> <li>• generate and communicate the development of design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques, for example: (ACTDEP036) <b>CT DT</b>    </li> <li>– sketches, drawings and computer-aided design (CAD)</li> <li>– models and prototypes</li> <li>– engineering reports</li> <li>– digital presentations</li> </ul> <p><b>Producing and implementing</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• produce products or systems that apply engineering principles, for example: (ACTDEK031, ACTDEP039) <b>DT</b>   </li> <li>– a product that applies force, motion and/or energy for a purpose, eg toys, windmill</li> <li>– aeronautical vehicles designed according to the principles of flight</li> <li>– structures designed according to statics and properties of materials</li> <li>– electronic circuits designed using electrical laws</li> <li>• develop models, prototypes or products using a range of tools, materials and equipment to test the functionality of design ideas and consider innovative applications of advancing technologies, for example: (ACTDEP037) <b>DT</b>   </li> <li>– developing computer-aided design (CAD) files to automate manufacturing technologies</li> </ul>		<p>Woodwokr quizlet  <a href="https://quizlet.com/au/409278836/technology-mandatory-sling-puck-unit-flash-cards/">https://quizlet.com/au/409278836/technology-mandatory-sling-puck-unit-flash-cards/</a></p> <p><a href="https://www.purposegames.com/game/sewing-machine-parts-bernina-1008-quiz">https://www.purposegames.com/game/sewing-machine-parts-bernina-1008-quiz</a></p>

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<ul style="list-style-type: none"> <li>– programming a microcontroller to collect data or automate a task</li> <li>– computer-aided manufacturing (CAM)</li> </ul> <p><b>Testing and evaluating</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• develop and apply testing procedures to evaluate an engineered system ⚙️💻📱</li> <li>• evaluate the effectiveness and suitability of choices made during the development and production of the engineered solution</li> <li>• assess the solution against the predetermined criteria ⚙️</li> </ul> <p><b>MATERIAL TECHNOLOGIES</b></p> <p><b>Content</b></p> <p><b>Identifying and defining</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• investigate products and services for the individual and/or the community, considering ethical and social factors (ACTDEK029) <b>ST</b> 🏠🌐🚧</li> <li>• investigate a current and innovative product developed by an Aboriginal and/or Torres Strait Islander designer that is influenced by their cultural identity 🤝🌟</li> <li>• investigate the role of the professional in the related technology, and their impact on the environment and society 🌱🌟</li> <li>• develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031) <b>DT ST</b> 🛠️⚙️🏗️</li> </ul> <p><b>Researching and planning</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• investigate the characteristics and properties of a range of materials and products (ACTDEK034)</li> </ul>		

Content	Teaching, Learning and Assessment	Resources
<ul style="list-style-type: none"> <li>select from a range of materials, components, tools, equipment and processes to develop design solutions (ACTDEP035) <b>ST</b> ✨ ⚙️ 🖨️ ⭐</li> <li>experiment with a range of appropriate techniques to produce a design solution <b>DT</b> ⚙️</li> <li>generate and communicate the development of design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques, for example: (ACTDEP036) <b>CT DT</b> ⚙️ 🖨️ 📱 📺</li> <li>sketches, drawings and computer-aided designs (CAD)</li> <li>patterns</li> <li>models</li> <li>digital presentations</li> <li>use appropriate project management processes when working both individually and collaboratively to coordinate the production of a designed solution (ACTDEP039) <b>CT ST</b> 🏗️ ⭐</li> <li>select and justify the safe use of tools and equipment used to create a design solution</li> </ul> <p><b>Producing and implementing</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>demonstrate safe, independent and collaborative work practices in the production of designed solutions (ACTDEP037) 🏗️ ⭐</li> <li>apply appropriate tools, equipment, materials, techniques and processes in the production of a design project, for example: (ACTDEP034) <b>ST</b> ⚙️ 📱 📺</li> <li>contemporary, traditional and/or advancing manufacturing techniques</li> <li>surface preparation techniques, finishes, embellishments and/or decorations</li> <li>materials to meet a specific need</li> <li>consider innovative applications of advancing technologies to increase efficiency of time and/or materials in the production of models or products <b>DT</b> ⚙️ 🖨️</li> </ul>		

Content	Teaching, Learning and Assessment	Resources
<p><b>Testing and evaluating</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>evaluate the effectiveness and suitability of choices made during the development and production of the solution</li> <li>assess the solution against the predetermined criteria ⚙️</li> </ul>		
<p><b>Identifying and defining</b></p> <ul style="list-style-type: none"> <li>investigate products and services for the individual and/or the community, considering ethical and social factors (ACTDEK029) ST</li> <li>investigate the role of the professional in the related technology, and their impact on the environment and society</li> <li>develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031) DT ST</li> </ul> <p><b>Research and planning</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>investigate how force, motion and/or energy are utilised when designing engineered systems, for example: (ACTDEK031) <ul style="list-style-type: none"> <li>electronic circuits</li> <li>mechanisms involving simple machines</li> <li>built environments</li> </ul> </li> <li>select and use a variety of critical and creative thinking strategies to generate innovative design ideas, for example: DT ST <ul style="list-style-type: none"> <li>brainstorming</li> <li>sketching</li> <li>3-D modelling</li> <li>experimenting</li> </ul> </li> <li>use appropriate project management processes when working both individually and collaboratively to</li> </ul>	<p><b>Space Locks</b> <b>Week 4-8</b></p> <p><b>Week 4:</b> <b>Introduces the unit to the class:</b></p> <ul style="list-style-type: none"> <li>Watch welcome video (Project tutorial video 1)</li> <li>Space Power Point on Space Environment</li> <li>Assign groups (No more than 3 in a group)</li> <li>Introduce Solid Edge – Begin tutorials</li> </ul> <p><b>Inform groups about the dimensions and the importance of this in the project</b></p> <p><b>Problem Phase</b> <i>Focus Question: What is a Space Lock and how does it work..?</i></p> <p><b>Teacher</b></p> <ul style="list-style-type: none"> <li>Introduces the design situation and leads a discussion about the requirements of the brief. Relates the design situation to the focus question, and the concept of design as a problem-solving exercise.</li> <li>Leads a discussion about the possible criteria and testing techniques used to evaluate the success of a product</li> <li>Introduces a worksheet to measure the dimensions of each of the Space Locks.</li> <li>Introduces the concept of collaboration and leads a discussion about effective structures and techniques to ensure successful collaboration and teamwork.</li> </ul> <p><b>Students working in groups</b></p>	<p>Space Lock Dimensions worksheet.</p>

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coordinate the production of a designed solution (ACTDEP039) CT ST	<ul style="list-style-type: none"> <li>Participate in discussions about the focus question, design brief needs, problems and opportunities.</li> <li>Complete the worksheet and participate in discussions about the types of shapes and devices needed to open each lock.</li> <li>Conduct an analysis of the need by developing a range of constraints and questions associated with the design situation.</li> <li>Participate in the discussion about collaborative working structures then work with group members to develop a project management plan for their project.</li> </ul>	
<b>Researching and planning</b> <ul style="list-style-type: none"> <li>investigate the characteristics and properties of a range of materials and products (ACTDEK034)</li> <li>select and justify the safe use of tools and equipment used to create a design solution</li> <li>experiment with a range of appropriate techniques to produce a design solution DT</li> </ul>	<p><b>Week 5 -6</b> Begin the design process:</p> <ul style="list-style-type: none"> <li>Finish tutorials if not all complete.</li> <li>Remind class about the importance of measuring correctly.</li> <li>Groups to begin sketching their design</li> <li>Students are introduced about the process 3D printing and how this works Video</li> </ul> <p><b>Research Phase</b> <i>Focus Question: How does a 3D Printer work? What is CAD?</i></p> <p><b>Teacher</b></p> <ul style="list-style-type: none"> <li>Demonstrates the safe and appropriate use of tools and machinery in the development of a skills exercise. Depending upon student ability, this may include</li> </ul> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>Develop practical skills and knowledge of tools and materials by completing the allocated skills exercise.</li> </ul>	Internet access to undertake research
<b>Researching and planning</b> <ul style="list-style-type: none"> <li>generate and communicate the development of design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques, for example: (ACTDEP036) CT DT</li> </ul>	<p><b>Ideas Phase</b> <i>Focus Question: How do designers develop creative design ideas?</i></p> <p><b>Teacher</b></p>	Stationery for drawing Solid edge tutorials

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<ul style="list-style-type: none"> <li>sketches, drawings and computer-aided drawings (CAD)</li> <li>patterns</li> <li>models</li> <li>digital presentations</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrates a range of hand drawing skills which, depending upon student ability, may include pictorial, orthogonal, perspective or rendering exercises.</li> <li>Provides feedback and advice relating to student idea generation.</li> <li>Demonstrates the use of Solid Edge CAD Software in order to develop drawings that can be converted to an STL file to drive the 3D printer.</li> </ul> <p><i>Students</i></p> <ul style="list-style-type: none"> <li>Practice and refine hand drawing skills by completing a range of drawing exercises.</li> <li>Brainstorm, develop and evaluate a range of initial idea sketches for their balsa plane.</li> <li>Practice and refine CAD skills by completing a range of video tutorials.</li> <li>Produce a CAD development of their chosen idea and communicate pictorial and orthogonal versions within their portfolio document.</li> <li>Within the portfolio, evaluate the use of CAD technology for the purpose of communicating their design ideas and laser cutting models.</li> </ul>	
<p><b>Producing and implementing</b></p> <ul style="list-style-type: none"> <li>demonstrate safe, independent and collaborative work practices in the production of designed solutions (ACTDEP037)</li> <li>apply appropriate tools, equipment, materials, techniques and processes in the production of a design project, for example: (ACTDEP034) ST             <ul style="list-style-type: none"> <li>contemporary, traditional and/or advancing manufacturing techniques</li> <li>surface preparation techniques, finishes, embellishments and/or decorations</li> <li>materials to meet a specific need</li> </ul> </li> <li>consider innovative applications of advancing technologies to increase efficiency of time and/or materials in the production of models or products DT</li> </ul>	<p><b>Week 6</b> Students being to refine their designs:</p> <ul style="list-style-type: none"> <li>Begin to convert sketches to Solid Edge</li> <li>Students continue to work on and finalise their Solid Edge designs (Introduction to 3D Printing PDF)</li> <li>Students will convert their files to an STL file to look at printing time and make amendments to reduce down the file (STL Export Tutorial Video)</li> </ul> <p><b>Manufacturing Phase</b> <i>Focus Question: What are the hazards surrounding the development of a model making project?</i></p> <p><i>Teacher</i></p> <ul style="list-style-type: none"> <li>Identifies and discusses contemporary and advanced manufacturing techniques that would be used in an industrial or commercial setting.</li> </ul>	



Content	Teaching, Learning and Assessment	Resources
	<ul style="list-style-type: none"> <li>Facilitates a Think – Pair – Share activity to prompt student discussion about advantages and disadvantages of technologically advanced manufacturing techniques.</li> <li>Demonstrates safe use of tools, equipment and processes required.</li> <li>Monitors student progress during practical activities and provides feedback to develop student skills and maintain quality project work.</li> </ul> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>Participate within a discussion and Think – Pair – Share activity relating to advantages and disadvantages of suggested manufacturing techniques.</li> <li>Select and use a range of tools, equipment and processes in the development of their design solution.</li> </ul>	
<p><b>Testing and evaluating</b></p> <ul style="list-style-type: none"> <li>evaluate the effectiveness and suitability of choices made during the development and production of the solution</li> </ul> <p>assess the solution against the predetermined criteria</p>	<p><b>Evaluation Phase</b></p> <p><b>Teacher</b></p> <ul style="list-style-type: none"> <li>Describes the process of collecting data for evaluation purpose – as established in the criteria to evaluate success – used within the portfolio document.</li> <li>Facilitates testing of wrench to collect data, prior to conducting evaluations and applying new solutions.</li> </ul> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>Undertake data collection of the wrench that the group has created through the process of trial and error.</li> <li>Evaluate their findings, develop design improvement prior to modifying their original design.</li> <li>Continue process till such a time that the student groups are happy with their wrench and ready to test their product in competition with other students.</li> </ul>	
	<p>Week 7-8</p> <p>Competition Week:</p> <p>Students will need to have to submit their lock at least 3 days prior to the competition day for ample printing time.</p>	

Content	Teaching, Learning and Assessment	Resources
Ad Altissima Extension Content <ul style="list-style-type: none"><li></li></ul>		

## Resources

### Movie Clips

[https://www.youtube.com/watch?v=xP\\_PoLI\\_FFY&ab\\_channel=UniversalPictures](https://www.youtube.com/watch?v=xP_PoLI_FFY&ab_channel=UniversalPictures)

inertial docking scene [https://www.youtube.com/watch?v=onVhbeY7nLM&ab\\_channel=4KHDRMedia](https://www.youtube.com/watch?v=onVhbeY7nLM&ab_channel=4KHDRMedia)

### countdown

[https://www.youtube.com/watch?v=Vfn\\_u768UoQ&ab\\_channel=KellyHeil](https://www.youtube.com/watch?v=Vfn_u768UoQ&ab_channel=KellyHeil)

### nasa launch

[https://www.youtube.com/watch?v=fhYMh6KTJMQ&ab\\_channel=NASAVideo](https://www.youtube.com/watch?v=fhYMh6KTJMQ&ab_channel=NASAVideo)

### space x

[https://www.youtube.com/watch?v=C3iHAgwIYtI&ab\\_channel=SpaceX](https://www.youtube.com/watch?v=C3iHAgwIYtI&ab_channel=SpaceX)

### how we are going to the moon

[https://www.youtube.com/watch?v=\\_T8cn2J13-4&ab\\_channel=NASA](https://www.youtube.com/watch?v=_T8cn2J13-4&ab_channel=NASA)

### kids video

[https://www.youtube.com/watch?v=eqn-JjTmUps&ab\\_channel=CBCKidsNews](https://www.youtube.com/watch?v=eqn-JjTmUps&ab_channel=CBCKidsNews)