

# MAKERS EMPIRE DESIGN AND TECHNOLOGY CURRICULUM

**The Makers Empire Design and Technology Curriculum describes the development of skills, knowledge, and understandings across K-8.**

**The aims of the Makers Empire Design and Technology Curriculum are that students:**

- develop confidence as designers and problem solvers
- use design thinking processes to generate and communicate design ideas
- produce designed solutions suitable for a range of technologies contexts by selecting and manipulating a range of materials, systems, components, tools and equipment creatively, competently and safely; and managing processes
- evaluate processes and designed solutions and transfer knowledge and skills to new situations
- become competent users of 3D design and 3D printing
- develop spatial awareness and spatial reasoning skills
- understand how technology is and can be used to develop designed solutions in real-world contexts and for a range of users.

**The Makers Empire Design and Technology Curriculum is aligned to and based on design and technology, and engineering curricula from around the world including:**

## **Australia**

- The Australian Curriculum: Technologies, Design and Technologies
- The NSW Syllabus: Science K-10 (incorporating Science and Technology K-6)
- Victorian Curriculum: Technologies, Design and Technologies

## **USA**

- Next Generation Science Standards: Engineering Design (US)
- ISTE Standards for Students

## **UK**

- UK National Curriculum: Design and Technology

*NB Can be aligned to other curriculum frameworks, on request.*

**The Makers Empire Design and Technology Curriculum has 6 content strands:**

1. Technology Applications
2. Investigating
3. Generating Ideas
4. Prototyping and Modelling
5. Testing and Evaluating
6. Planning and Managing

**These strands include skills, knowledge and understandings that develop across 4 bands:**

K-2, 3-4, 5-6, 7-8

## BAND K-2

Makers Empire Strand	Makers Empire Outcome	Australian Curriculum v 8.4	Australian Curriculum v 9	NGSS (US)	ISTE (US)	UK National Curriculum
<b>Technology Applications</b>						
1.1K2	Recognises examples of design being used to produce familiar products and consider sustainability to meet community needs	ACTDEK001	AC9TDEFK01 AC9TDE2K01	K-2-ETS1-1	4.a	Key Stage 1 Evaluate
1.2K2	Explores how technologies are used to create solutions	ACTDEK002	AC9TDE2K01	K-2-ETS1-1	4.a	Key Stage 1 Technical Knowledge
1.3K2	Explores how properties of materials and components of designed objects relate to their function and purpose	ACTDEK004	AC9TDE2K02	K-2-ETS1-1	4.a	Key Stage 1 Technical Knowledge
<b>Investigating</b>						
2.1K2	Makes observations, asks questions and describes needs and opportunities in given situations	ACTDEP005	AC9TDE2K02	K-2-ETS1-1	4.d	Key Stage 1 Design
2.2K2	Defines a simple problem that could be improved with a designed solution	ACTDEP005	AC9TDEFP01 AC9TDE2P01	K-2-ETS1-1	4.a	Key Stage 1 Design
<b>Generating Ideas</b>						
3.1K2	Generates ideas for designs	ACTDEP006	AC9TDE2P01	K-2-ETS1-2	4.a	Key Stage 1 Design

3.2K2	Communicates and records design ideas	ACTDEP006	AC9TDE2P01	K-2-ETS1-2	4.a	Key Stage 1 Design
<b>Prototyping &amp; Modelling</b>						
4.1K2	Uses specific features in digital 3D modelling tools	ACTDEP007	AC9TDE2P02	K-2-ETS1-2	4.b	Key Stage 1 Make
4.2K2	Follow directions using common position words and movements	ACTDEP007	-	K-2-ETS1-2	4.b	Key Stage 1 Make
4.3K2	Explains how the shape of an object relates to its function	ACTDEP007	AC9TDE2P02	K-2-ETS1-2	4.b	Key Stage 1 Make
4.4K2	Uses 3D modelling tools to create designs, prototypes, and models	ACTDEP007	AC9TDE2P02	K-2-ETS1-2	4.b	Key Stage 1 Technical Knowledge
<b>Testing and Evaluating</b>						
5.1K2	Develops simple tests to evaluate designs created for specific purposes	ACTDEP008	AC9TDE2P02	K-2-ETS1-3	4.c	Key Stage 1 Evaluate
5.2K2	Makes adjustments to designs based on tests and feedback	ACTDEP008	AC9TDE2P03	K-2-ETS1-3	4.d	Key Stage 1 Evaluate
<b>Planning &amp; Managing</b>						
6.1K2	Sequences steps for creating designs	ACTDEP009	AC9TDE2P04	K-2-ETS1-2	4.a	Key Stage 1 Make
6.2K2	Works collaboratively with others to create designs	ACTDEP009	AC9TDE2P04	K-2-ETS1-2	4.a	Key Stage 1 Design

## BAND 3-4

<b>Makers Empire Strand</b>	<b>Makers Empire Outcome</b>	<b>Australian Curriculum v 8.4</b>	<b>Australian Curriculum v 9</b>	<b>NGSS (US)</b>	<b>ISTE (US)</b>	<b>UK National Curriculum</b>
<b>Technology Applications</b>						
1.134	Identifies factors that impact on the design of products and services to serve community needs	ACTDEK010	AC9TDE4K01	3-4-ETS1-1	4.a	Key Stage 2 Evaluate
1.234	Explains how forces and the property of materials affect the way a product behaves or performs	ACTDEK011	AC9TDE4K02	3-4-ETS1-1	4.a	Key Stage 2 Technical Knowledge
1.334	Investigates the suitability of materials, systems, components, tools and equipment for a range of purposes	ACTDEK013	-	3-4-ETS1-1	4.a	Key Stage 2 Technical Knowledge Make
<b>Investigating</b>						
2.134	Defines a problem by identifying opportunities, critiquing needs, making predictions and analysing collected data	ACTDEP014	AC9TDE4P01	3-5-ETS1-1	4.d	Key Stage 2 Design
2.234	Identifies criteria for success for a designed solution including sustainability considerations and constraints on materials, time or cost	ACTDEP014	-	3-4-ETS1-1	4.a	Key Stage 2 Design

<b>Generating Ideas</b>						
3.134	Generates and compares design ideas and makes decisions about design ideas most likely to meet the design criteria and constraints	ACTDEP015	AC9TDE4P02	3-5-ETS1-2	4.a	Key Stage 2 Design
3.234	Communicates and records design ideas using technical terms and graphical representation techniques	ACTDEP015	AC9TDE4P02	3-5-ETS1-2	4.a	Key Stage 2 Design
<b>Prototyping &amp; Modelling</b>						
4.134	Uses and chooses specific features in digital 3D modelling tools	ACTDEP016	AC9TDE4P03	3-5-ETS1-2	4.b	Key Stage 2 Make
4.234	Interprets information and follows instructions using directional language	ACTDEP016	-	3-5-ETS1-2	4.b	Key Stage 2 Design Make
4.334	Explains their design decisions related to the design criteria, including the use of symmetry, shapes, and angles	ACTDEP016	AC9TDE4P03	3-5-ETS1-2	4.b	Key Stage 2 Evaluate
4.434	Uses 3D modelling tools to create structurally sound designs, prototypes, and models	ACTDEP016	AC9TDE4P03	3-5-ETS1-2	4.b	Key Stage 2 Design Make

<b>Testing and Evaluating</b>						
5.134	Develops fair tests with guidance to evaluate designs against identified design criteria	ACTDEP017	AC9TDE4P03	3-5-ETS1-3	4.c	Key Stage 2 Evaluate
5.234	Makes further improvements and iterations of designs based on test results and feedback in order to address design criteria	ACTDEP017	AC9TDE4P04	3-5-ETS1-3	4.d	Key Stage 2 Evaluate
<b>Planning &amp; Managing</b>						
6.134	Plans a sequence of production steps when making designed solutions	ACTDEP018	AC9TDE4P05	3-5-ETS1-2	4.a	Key Stage 2 Design
6.234	Works collaboratively with others to plan, make and evaluate designs that address identified criteria	ACTDEP018	AC9TDE4P05	3-5-ETS1-2	4.a	Key Stage 2 Design

## BAND 5-6

<b>Makers Empire Strand</b>	<b>Makers Empire Outcome</b>	<b>Australian Curriculum v 8.4</b>	<b>Australian Curriculum v 9</b>	<b>NGSS (US)</b>	<b>ISTE (US)</b>	<b>UK National Curriculum</b>
<b>Technology Applications</b>						
1.156	Explains how competing considerations, including sustainability are addressed in the design of products and services to meet community needs	ACTDEK019	AC9TDE6K01	MS-ETS1-1	4.a	Key Stage 2 Evaluate
1.256	Investigates how sources of energy can control movement, sound, or light in a designed product	ACTDEK020	AC9TDE6K02	MS-ETS1-1	4.a	Key Stage 2 Technical Knowledge
1.356	Investigates characteristics and properties of a range of materials, systems, components, tools, and equipment, and evaluate the impact of their use	ACTDEK023	-	MS-ETS1-1	4.a	Key Stage 2 Technical Knowledge
<b>Investigating</b>						
2.156	Investigates a range of needs, opportunities, or problems by posing testable questions and gathering data; and defines them in terms of functional design requirements	ACTDEP024	AC9TDE6P01	MS-ETS1-1	4.d	Key Stage 2 Design

2.256	Negotiates criteria for success and design constraints, including sustainability considerations	ACTDEP024	-	MSETS1-1	4.a	Key Stage 2 Design
<b>Generating Ideas</b>						
3.156	Generates and compares design ideas and evaluates competing design solutions using a systematic process to determine how well they meet the negotiated criteria and constraints	ACTDEP025	AC9TDE6P02	MS-ETS1-2	4.a	Key Stage 2 Design
3.256	Communicates and presents design ideas and processes for specific audiences using appropriate technical terms and graphical representation techniques	ACTDEP025	AC9TDE6P02	MS-ETS1-2	4.a	Key Stage 2 Design
<b>Prototyping and Modelling</b>						
4.156	Demonstrates efficient use of the tools and features of 3D modelling software	ACTDEP026	AC9TDE6P03	MS-ETS1-4	4.b	Key Stage 2 Make
4.256	Creates and interprets 3D models and diagrams	ACTDEP026	AC9TDE6P03	MS-ETS1-4	4.b	Key Stage 2 Design Make
4.356	Explains their design decisions in terms of the design criteria including the specific applications of features and properties of 2D and 3D shapes	ACTDEP026	AC9TDE6P03	MS-ETS1-4	4.b	Key Stage 2 Evaluate



4.456	Uses 3D modelling tools to create structurally sound designs, prototypes and models including 3D printed prototypes	ACTDEP026	AC9TDE6P03	MS-ETS1-4	4.b	Key Stage 2 Design Make
<b>Testing and Evaluating</b>						
5.156	Develops fair tests and analyses test data to evaluate designs against identified design criteria and constraints	ACTDEP027	AC9TDE6P03	MS-ETS1-3	4.c	Key Stage 2 Evaluate
5.256	Uses a systematic process to make modifications and iterations of designs based on test results and feedback in order to address design criteria and constraints	ACTDEP027	AC9TDE6P04	MS-ETS1-3	4.d	Key Stage 2 Evaluate
<b>Planning and Managing</b>						
6.156	Develops project plans that include consideration of resources for making designed solutions	ACTDEP028	AC9TDE6P05	MS-ETS1-2	4.a	Key Stage 2 Design
6.256	Works collaboratively with others to design processes, production techniques and testing procedures to achieve negotiated design criteria	ACTDEP028	AC9TDE6P05	MS-ETS1-2	4.a	Key Stage 2 Design

## BAND 7-8

<b>Makers Empire Strand</b>	<b>Makers Empire Outcome</b>	<b>Australian Curriculum v 8.4</b>	<b>Australian Curriculum v 9</b>	<b>NGSS (US)</b>	<b>ISTE (US)</b>	<b>UK National Curriculum</b>
<b>Technology Applications</b>						
1.178	Explains how social, ethical, technical and sustainability considerations influence the design of innovative and enterprising solutions. Considers the potential impact of designed solutions on people and the natural environment	ACTDEK029	AC9TDE8K01	MS-ETS1-1	4.a	Key Stage 3 Evaluate
1.278	Analyses how scientific principles impact on designed solutions including the transfer of thermal energy, motion and force, particularly in reference to electromechanical systems	ACTDEK031	AC9TDE8K03	MS-ETS1-1 MS-PS3-3	4.a	Key Stage 3 Technical Knowledge
1.378	Analyses ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment	ACTDEK034	-	MS-ETS1-1	4.a	Key Stage 3 Technical Knowledge

<b>Investigating</b>						
2.178	Critiques needs or opportunities for designing solutions, and analyses, and selects from a range of materials, components, tools, equipment and processes	ACTDEP035	AC9TDE8P01	MS-ETS1-1	4.d	Key Stage 3 Design
2.278	Independently develops criteria for success for design ideas, processes and solutions and their sustainability	ACTDEP038	-	MSETS1-1	4.a	Key Stage 3 Design
<b>Generating Ideas</b>						
3.178	Generates, develops, and evaluates design ideas and processes for a range of audiences by analysing how well they meet the identified criteria for success.	ACTDEP036	AC9TDE8P02	MS-ETS1-2	4.a	Key Stage 3 Design
3.278	Communicates design ideas using appropriate technical terms and technologies including graphical representation techniques	ACTDEP036	AC9TDE8P02	MS-ETS1-2	4.a	Key Stage 3 Design
<b>Prototyping and Modelling</b>						
4.178	Demonstrates effective and accurate use of the tools and features of 3D modelling software	ACTDEP037	AC9TDE8P03	MS-ETS1-4	4.b	Key Stage 3 Make

4.278	Creates and interprets accurate and precise 3D models and diagrams including appropriate scale and perspective	ACTDEP037	AC9TDE8P03	MS-ETS1-4	4.b	Key Stage 3 Design Make
4.378	Justifies their design decisions in terms of the design criteria including the specific applications of features and properties of 2D and 3D shapes and suitability for 3D printing	ACTDEP037	AC9TDE8P03	MS-ETS1-4	4.b	Key Stage 3 Evaluate
4.478	Uses 3D modelling tools to create structurally sound designs, prototypes and models including 3D printed prototypes. Operates a 3D printer safely and independently	ACTDEP037	AC9TDE8P03	MS-ETS1-4	4.b	Key Stage 3 Design Make
<b>Testing and Evaluating</b>						
5.178	Independently develops tests to evaluate designed solutions against predetermined criteria for success and sustainability considerations	ACTDEP038	AC9TDE8P03	MS-ETS1-3	4.c	Key Stage 3 Evaluate
5.278	Plans and executes improvements and iterations of designed solutions in response to test results and feedback in order to effectively address design criteria and constraints	ACTDEP038	AC9TDE8P04	MS-ETS1-3	4.d	Key Stage 3 Evaluate

Planning and Managing						
6.178	Use project management processes to coordinate production of designed solutions	ACTDEP039	AC9TDE8P05	MS-ETS1-2	4.a	Key Stage 3 Design
6.278	Works collaboratively and independently to coordinate the production of designed solutions, including the negotiating and taking responsibility for specific group roles	ACTDEP039	AC9TDE8P05	MS-ETS1-2	4.a	Key Stage 3 Design

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