Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE TEACHING AND LEARNING OUTLINE

TECHNOLOGIES

DESIGN AND TECHNOLOGIES: ENGINEERING PRINCIPLES AND SYSTEMS

YEAR 2

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This document is an introduction to planning a teaching and learning outline with syllabus content for Year 2 Design and Technologies: Engineering principles and systems context. It provides suggested sequencing and timing for teaching the syllabus content, giving students the opportunity to study at least one of the contexts for Design and Technologies. For further details on curriculum requirements and available options, teachers should refer to the School Curriculum and Standards Authority's (the Authority's):

- *Policy Standards for Pre-primary to Year 10: Teaching, Assessing and Reporting*
- Table 1: *Western Australian Curriculum and Assessment Outline:* curriculum requirements and available options.

Schools may choose to teach the syllabus content for two hours per week for a semester, **or** one hour per week for the year. Sample plans provide a range of possible learning experiences from which assessment should be drawn. This *Year 2 Sample Teaching and Learning Outline* provides teachers with possible learning experiences over eight weeks and unpacks the syllabus content to support teachers in their understanding.

A presentation (*Western Australian Curriculum Technologies Presentation*), which unpacks the process to develop this plan, is available on the Presentations page of the Authority website (https://k10outline.scsa.wa.edu.au/home/resources/presentations).

Year 2 Syllabus Content – Design and Technologies: Engineering principles and systems context

Content	Description
Technologies and society	People design and produce familiar products, services and environments to meet local and community needs
Engineering principles and systems	Forces create movement in objects
Investigating and defining	Explore design to meet needs or opportunities
Designing	Develop, communicate and discuss design ideas through describing, drawing, modelling and/or a sequence of steps
Producing and implementing	Use components and given equipment to safely make solutions
Evaluating	Use simple criteria to evaluate the success of design processes and solutions
Collaborating and managing	Work independently, or collaboratively when required, to organise information and ideas to safely create and share sequenced steps for solutions

Year Level Description

Learning in Design and Technologies builds on the dispositions developed in the early years. Learning focuses on practical and applied knowledge and understanding of process and production skills.

In Year 2, students have opportunities to create solutions in at least one of the following technologies contexts: Engineering principles and systems; Food and fibre production; and Materials and technologies specialisations. Students experience designing and producing products, services and environments.

Students have opportunities to investigate technologies: materials, systems, components, tools and equipment, including their purpose and how they meet personal and social needs within local settings. They develop an understanding of how society and environmental sustainability factors influence design and technologies decisions. Students evaluate and judge designed solutions using questions such as 'How does it work?', 'What purpose does it meet?', 'Who will use it?', 'What do I like about it?' or 'How can it be improved?' They are encouraged to make judgments about the design solutions in order to solve problems in their own design ideas.

Students begin to consider the impact of their decisions, and of technologies, on others and the environment, including in relation to preferred futures. They have opportunities to reflect on their participation in a design process. With support, students develop new strategies and engage in different ways of evaluating and judging products, services and environments based on personal preferences.

Using a range of techniques, including a variety of graphical representations to communicate, students draw, model and explain design ideas; label drawings; draw products and simple environments; and verbalise design ideas.

Year 2 Learning Area: Technologies – Design and Technologies (context: Engineering principles and systems)			
Year 2 Achievement Standard At Standard, students identify and exemplify roles of people that design and produce products, services and environments within the community. In Engineering principles and systems, students use a range of forces to move objects and observe the reactions. In Food and fibre production, students make simple connections between healthy living, food and fibre choices. In Materials and technologies specialisations, students develop ideas and make design decisions, considering both the characteristics and properties of materials. With all Design and Technologies contexts, students explore design to meet needs or opportunities. They develop, communicate and discuss design ideas through describing, drawing, modelling and/or sequenced steps. Students use components and given equipment to safely make solutions. They use simple criteria to evaluate the success of design processes and solutions. Students work independently, or collaboratively, to organise information and ideas to safely create and share sequenced steps for solutions.			
Weeks	**Syllabus content**	**Content unpacked**	**Suggested teaching and learning experiences**
1–2	**Engineering principles and systems** Forces create movement in objects **Technologies and society** People design and produce familiar products, services and environments to meet local and community needs	• Investigate forces and movement: ▪ toy vehicles of varied size, material type and wheel size ▪ spinning tops ▪ yoyos ▪ Jack-in-the-box ▪ large and small balls of varied materials ▪ toy cars on ramps ▪ bicycles ▪ skateboards ▪ scooters ▪ kites ▪ parachute toys ▪ swings, playground equipment ▪ other toys students are familiar with. • Design features of familiar products, such as toys: ▪ shape ▪ size ▪ dimensions ▪ mechanisms. • To meet local and community needs for: ▪ products, such as shopping trolley, pram, cart, mobility scooter ▪ services, such as volunteers helping another person, group or organisation; provision of essential functions like electricity, water, transport ▪ environments, such as shaded area, playground, classroom, home, with consideration to sustainable use of resources.	**Toys** • Through play, investigate how toys move: ▪ describe movement – push, pull, rotation, spin, gravity, force and motion ▪ extend discussion to include throw, fly, glide and fall. • Model and demonstrate, using appropriate language, how a change to force affects movement. • Make predictions about changes to the amount of force applied to toys and the results, and consider: ▪ gravity is constant, slope is variable ▪ wheel circumference affects rotation and distance travelled ▪ increased push force increases distance travelled ▪ surface. • Annotate photographs and/or drawings to exemplify understanding of the type of movement, the different values of force applied and/or the effect of pushing and/or pulling. • Identify familiar items/objects within the environment that meet local and community needs, such as wheeled vehicles, and consider: ▪ forces ▪ forces applied to rotational movement ▪ distance travelled ▪ surface. • Explain design ideas and features necessary to meet local and community needs through drawing, modelling and/or logically sequenced steps. • Explain how the application of force is applied to create movement. • Create a graphic organiser to communicate information regarding wheel size and push/pull force. • Develop links between forces and supporting technologies with products, such as wheeled chairs and carts.
3–4	**Investigating and defining** Explore design to meet needs or opportunities **Designing** Develop, communicate and discuss design ideas through describing, drawing, modelling and/or a sequence of steps	• Design opportunities: ▪ identify design ideas ▪ reflect and consider design features ▪ alter design to initiate improvement. • Design ideas for products, such as toys: ▪ shape ▪ colour ▪ size ▪ dimensions ▪ choice of materials ▪ mechanisms.	**Toys** • Discuss familiar toys with wheels and moving parts. • Investigate moving parts and use technology to support understanding (time lapse footage). • Explain the design ideas through descriptions, drawing and description of the toy's movement and workings. • Establish design ideas/criteria for a selected toy. • Develop design ideas and/or design opportunities to adapt and/or create a different moving toy. • Develop annotated drawings to communicate design ideas and concepts. • Develop a sequence of steps for making the toy. • Make the toy and apply the design criteria (time permitting). • Evaluate the success or improvement opportunities for the design idea. • Improve the design and re-evaluate.

Weeks	Syllabus content	Content unpacked	Suggested teaching and learning experiences
5	**Engineering principles and systems** Forces create movement in objects **Evaluating** Use simple criteria to evaluate the success of design processes and solutions	• Forces can be applied to create movement in products, like spinners: ▪ rotation ▪ balance ▪ impact on the design features, like colour.	**Toys – spinners** • Through play, investigate and explore various types and styles of spinners: ▪ finger/fidget spinners ▪ spinning tops. • Model and demonstrate, using appropriate language, how a change to force affects the movement of the spinners. • Make predictions about changes to the amount of force applied to the spinners, and the results. • Introduce the concept of rotational speed (how quickly the spinner is rotating around the axis). • Annotate photographs and/or samples that show spinners or spinning tops and the rotational speed: ▪ describe the shape, colour, patterns and purpose of the device ▪ describe the action to spin the device (the force applied). • Discuss cultural significance of spinner toys or other simple toys (relate to students and school community).
6	**Investigating and defining** Explore design to meet needs or opportunities **Designing** Develop, communicate and discuss design ideas through describing, drawing, modelling and/or a sequence of steps	• Communicate design ideas for products; for example, material suggestions: ▪ disks, spinning tops, marbles and re-usable adhesive ▪ toothpick and paper disc spinners ▪ wheels, dowelling, marbles and re-usable adhesive ▪ plastic bottle lids, toothpicks, beads and re-usable adhesive.	**Toys – spinners** • Select a style or version of spinner to investigate, design and make: ▪ consider online suggestions and ideas that may suit resourcing and available materials (activity will require a minimum of one spinner between four students) ▪ explain how a simple spinner works (use time lapse footage to support explanation) ▪ describe a sequence of steps to detail production of a spinner ▪ develop and trial spinners and consider: o how it works o who will use it o design idea and preferred elements (colour, size, shape, pattern, movement). • Draw and explain how the selected type of spinner works.
7	**Investigating and defining** Explore design to meet needs or opportunities **Designing** Develop, communicate and discuss design ideas through describing, drawing, modelling and/or a sequence of steps	• Develop design ideas for products, like spinners: ▪ shape ▪ colour ▪ size ▪ dimensions ▪ choice of materials ▪ mechanisms.	**Toys – spinners** • Investigate needs or opportunities for the use of spinners, other than fidget spinners: ▪ board games ▪ Mathematics ▪ child development toys. • Develop an octagonal game spinner collaboratively: ▪ discuss design ideas and select a theme or topic for the octagonal game spinner ▪ draw the design ideas ▪ follow a sequence of steps to produce the triangular segments for the octagonal game spinner.
8	**Producing and implementing** Use components and given equipment to safely make solutions **Collaborating and managing** Work independently, or collaboratively when required, to organise information and ideas to safely create and share sequenced steps for solutions **Technologies and Society** People design and produce familiar products, services and environments to meet local and community needs	• Provide a variety of equipment and materials for constructing an individual product, such as a toy spinner. Consider: ▪ materials ▪ shape ▪ size ▪ weight. • Implement planned, logically sequenced steps. • Work collaboratively to safely create a solution. • To meet local and community needs for: ▪ products, such as shopping trolley, pram, cart, mobility scooter ▪ services, such as volunteers helping another person, group or organisation; provision of essential functions like electricity, water ▪ environments, such as shaded area, playground, classroom, home, with consideration to sustainable use of resources.	**Toys – spinners** • Follow a sequence of steps to produce the octagonal game spinner: ▪ use components such as cardboard to create an octagonal base for the spinner ▪ use given equipment safely to create a centre hole for the spinner axle (dowel), then: o collect the eight triangular segments o arrange the triangular segments onto the octagonal base using the design idea o glue the segments into position o safely insert the spinner axle and fix with adhesive o test and adjust as necessary. • Trial spinner and consider: ▪ how it works ▪ design idea and preferred elements (colour, size, shape, pattern, movement). • Evaluate design success and consider: ▪ how fast it spins ▪ which segment it falls on most/least ▪ application of spinners to Mathematics in tally/probability exercises ▪ the benefits of working collaboratively.