Sample teaching planner –
Engineering principles and systems

Design and Technologies

Foundation to Level 6

**Disclaimer:** It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students undertaking any activities suggested in this teaching planner.

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Level 7, 2 Lonsdale Street
Melbourne VIC 3000

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Introduction

The Technologies Contexts sub-strand Engineering principles and systems in the Victorian Curriculum F–10 Design and Technologies explores the design process and materials properties, technologies, components, tools and equipment used to make designed solutions. Students consider the ways that motion, forces and energy affect a system and safely produce a product or system.

This teaching planner identifies themes, key messages and ideas for teaching content from specific content descriptions of Engineering principles and systems Foundation to Level 6. The information in the teaching planner has been provided to assist teachers to design and plan teaching and learning programs that are suitable for their own cohort of students. The ideas for teaching curriculum content are not intended to comprise a sequence of learning but rather they are ideas to support teachers to plan suitable lessons.

Please note, teachers are advised to use their professional judgment to ensure lesson plans comprehensively address the relevant content descriptions.

Online resources for Engineering principles and systems

To complement the sample teaching planner, a suite of online resources has been curated and published on FUSE’s [Engineering principles and systems page](https://fuse.education.vic.gov.au/pages/engineering). The resources are categorised according to the four themes identified in this sample teaching planner and support the teaching of content in the Technologies Contexts sub-strand Engineering principles and systems in Victorian Curriculum F–10 Design and Technologies.

Hyperlinks to relevant FUSE resources, plus other online resources, are included within the ‘Ideas for the classroom’ sections in this teaching planner

Key theme 1: Forces, motion and energy

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to how a product or system is affected by forces, motion and energy.

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|  | **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** |
| **Key messages** | * A force will push or pull an object.
* Components of products and systems create movement.
 | * Motion and forces affect the behaviour of a product or system.
 | * Forces or electrical energy can control movement, sound and light.
* Mimicking the movements of nature can help solve problems.
 |
| **Ideas for the classroom** | * Use a magnet and paper clips to demonstrate push and pull.
* Observe how supermarkets have conveyor belts to move products short distances using forces.
* Use a spinning toy such as an Aboriginal mammandur to demonstrate the principles of push and pull. Draw the toy and label the parts that are push and pull.
* Observe a seesaw to examine how forces work.
* Produce a sled to carry small items across the classroom to explore a product that uses the principles of push and pull.
* Produce a boat powered by a rubber band to demonstrate how forces create movement. Discuss how effectively the boat uses forces to create movement.
* Investigate different components used to make a toy push-car and identify the types of movement created.
* Watch a video of a system such as a marionette or [Indonesian wayang kulit shadow puppet](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=QJG7QY&SearchScope=All) to see that movement can be created by combining materials with forces.
* Test or observe different ways a product or system might use forces to create movement, for example wheelbarrow, ball, windmill, swings.
* Explore suitable components, tools and equipment needed to produce a working door on a model building. Design, produce and evaluate the door.
* Use a ruler as a lever to lift an object from a table to demonstrate how input creates a process that results in an output. Discuss how forces and motion operate.
 | * Discuss the term [‘force’](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=WN857K&SearchScope=All). Then explore how forces and motion are used in [the design of a suspension bridge.](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=9ZJMMU&SearchScope=All)
* Explore how a wind turbine can generate electrical energy from wind. Discuss the advantages and disadvantages of this type of energy.
* Fly a kite under varying weather conditions to experiment with ways that forces affect its behaviour.
* Discuss factors that need to be taken into consideration when producing a paper plane to fly a specific distance. Create and fly paper planes to investigate these factors.
* Drawing free-hand or using 3D design software such as SketchUp, design a toy that uses springs in its design. Bring in a Slinky (metal spring) toy and other types of springs to stimulate ideas. Develop steps for producing a toy that uses a spring in its design, for example a flow chart of the production steps and the materials and equipment needed could be drawn and annotated. Further [information about SketchUp](https://fuse.education.vic.gov.au/ResourcePackage/ByPin?pin=7BJL84) can be found on FUSE.
* Produce a land yacht that can be moved using an electric fan or hairdryer and experiment with ways motion affects the yacht’s behaviour. Critique the movement and structure of the land yacht and discuss with the class how effectively it operates when an input creates a process that results in an output, for example the way the electric fan affects the behaviour of the land yacht. In groups, evaluate the success of the land yacht by ranking it in terms of its intended function, how it uses forces and motion, how it operates when an input creates a process that results in an output, the material or materials it is made from (their suitability and environmental impact) and the way it looks (visual appeal).
 | * Produce a music speaker from a paper cup, magnets and magnetic wire to experiment with ways that properties of materials control sound.
* Deconstruct a model wind turbine with moving sails to find out how motion and forces affect its behaviour. Investigate how humpback whales have been an inspiration for wing structures on wind turbines.
* Use a variety of materials to create a small pulley to lift a toy. Ask students to suggest ideas of materials and processes to use and to identify where they got their ideas from. Create the pulley and discuss the steps undertaken to create it. Make a list of the steps and the equipment and materials required.
* Play with recyclable materials and produce a marble run to demonstrate how forces can produce movement in a system. Discuss tools and equipment needed to make a marble run and demonstrate the production process. As a class, select and correctly use materials, components, equipment and techniques to support safe work practices to make the marble run.
* Design a questionnaire to determine the methods of travel that students and teachers use to get to school. Find out which are the most common forms of transport and which forms of transport they consider best for the environment. Is there a difference between the findings of students and teachers?
* Investigate ways that engineers have drawn on inspiration from nature – for example termite mounds, photosynthesis of leaves, schools of fish – to produce more efficient energy.
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| **Content descriptions** | * Explore how technologies use forces to create movement in designed solutions [(VCDSTC014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC014)
* Explore needs or opportunities for designing, and the technologies needed to realise designed solutions [(VCDSCD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD018)
* Use materials, components, tools, equipment and techniques to produce designed solutions safely [(VCDSCD020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD020)
 | * Investigate how forces and the properties of materials affect the behaviour of a designed solution [(VCDSTC024)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC024)
* Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions [(VCDSCD028)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD028)
* Select and use materials, components, tools and equipment using safe work practices to produce designed solutions [(VCDSCD030)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD030)
* Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities [(VCDSCD031)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD031)
* Plan a sequence of production steps when making designed solutions [(VCDSCD032)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD032)
 | * Investigate how people in design and technologies occupations address competing considerations, including sustainability, in the design of solutions for current and future use [(VCDSTS033)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS033)
* Investigate how forces or electrical energy can control movement, sound or light in a designed product or system [(VCDSTC034)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC034)
* Generate, develop, communicate and document design ideas and processes for audiences using appropriate technical terms and graphical representation techniques [(VCDSCD039)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD039)
* Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD040)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD040)
* Develop project plans that include consideration of resources when making designed solutions [(VCDSCD042)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD042)
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Key theme 2: Electronics

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to the way that the characteristics and properties of materials affect the behaviour of a product or system used in circuitry.

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|  | **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** |
| **Key messages** | * Electricity and batteries are found in everyday products.
* The properties of materials affect the way a product or system functions.
 | * Different materials act as conductors and insulators of heat and electric current.
 | * Circuits can control light, sound and movement.
 |
| **Ideas for the classroom** | * Discuss how light globes have a number of uses, such as warning, sensing and monitoring.
* Use conductive thread to [make a soft circuit with felt](https://fuse.education.vic.gov.au/Resource/ByPin?Pin=XC5BTF&SearchScope=All).
* Make a paper circuit by adding a light emitting diode (LED) and adhesive copper tape to a cardboard lighthouse or a police car or candle.
* Explore the variety of ways lights are used, for example they help us see in the dark, on computer screens and phone screens, fire exits, door bells, car lights, street lights.
 | * Discuss [Newton’s first law of motion](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=TMF89S&SearchScope=All).
* Explore why both conductors and insulators are important in electronics. Discuss how the movement of electrons is called current or electricity. Identify some common conductors and insulators, and associate metals with being good conductors.
* Discuss the difference between conductors and insulators of heat and current (electricity). Watch the video clip [Conductors and insulators – Animation for kids](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=KDCN24&SearchScope=All) and discuss:
* materials that are good conductors of heat and materials that are good insulators of heat
* materials that are good conductors of current and materials that are good insulators of current.
* Deconstruct a torch to explore circuit design and discuss the ways properties of materials can control light. Draw a cross-section of a torch and label the globe, batteries, switch and conducting path. Ask students to describe the path of electrons.
* Design and produce a torch that can be operated with one hand. Use criteria for success to evaluate how well the torch operates.
* Brainstorm ideas about how clothing can include integrated circuits, for example smart helmets that monitor heart rate, or shoes that light up for safety or that track performance.
* Experiment with squishy circuits using conductive dough (for example playdough) and insulating dough (for example modelling clay).
* Discuss suitable components, tools and equipment needed to create working lights for a doll’s house.
 | * Explore [how electric current (electricity) flows through a circuit](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=R2RSQC&SearchScope=All) to light up a light globe. Discuss components of a simple series electrical circuit, such as a battery, wires, globes and switches. [Construct a simple series circuit](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=9JSKB7&SearchScope=All). Discuss how a switch opens and closes a circuit and relate this to whether or not a lamp in a simple series circuit will light up.
* Predict what is needed for a circuit to be complete and make a light globe light up. After making predictions, create circuits. Test which circuits work and provide reasons.
* Make a circuit with
* one light
* two lights
* a buzzer.
* Design a backpack with in-built solar panels.
* Explore the use of e-textiles in different settings and situations, such as for astronaut space suits, wearable medical devices and high-tech military tents.
* Discuss energy transformation. For example, kettles and toasters transform electrical energy into heat; hairdryers transform electrical energy into heat, kinetic energy (movement) and sound; mobile phones and televisions transform electrical energy into light and sound.
* Experiment with circuitry that controls movement, sound or light, such as use [Circuit Scribe](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=2M7SL9&SearchScope=All) hardware to produce circuits using conductive ink and magnetic modules. Discuss and critique the finished products or systems as a class, including how effectively they control movement, sound or light.
* Develop circuitry that controls movement, sound or light; for example use software such as [Makey Makey](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=QJ5PBD&SearchScope=All) to enable household objects to control a computer.
* Role-play electrons in a circuit to demonstrate how current flows and that a complete circuit is necessary for a circuit to work. In the role-play, represent a switch to demonstrate how it can be used to break the circuit so that the current stops and the lamp goes out. Discuss if electrons rush back to the battery or not.
 |
| **Content descriptions** | * Explore how technologies use forces to create movement in designed solutions [(VCDSTC014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC014)
* Use materials, components, tools, equipment and techniques to produce designed solutions safely [(VCDSCD020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD020)
 | * Recognise the role of people in design and technologies occupations and explore factors, including sustainability, that impact on the design of solutions to meet community needs [(VCDSTS023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS023)
* Investigate how forces and the properties of materials affect the behaviour of a designed solution [(VCDSTC024)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC024)
* Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions [(VCDSCD028)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD028)
* Select and use materials, components, tools and equipment using safe work practices to produce designed solutions [(VCDSCD030)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD030)
 | * Investigate how forces or electrical energy can control movement, sound or light in a designed product or system [(VCDSTC034)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC034)
* Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions [(VCDSCD038)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD038)
* Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD040)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD040)
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Key theme 3: Robotics

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to the design, construction, operation and use of complex machines.

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|  | **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** |
| **Key messages** | * Robots are complex machines.
 | * Robots follow instructions from humans.
* Robots are used in a range of industries.
 | * Nature can be an inspiration for robotic solutions to human problems.
 |
| **Ideas for the classroom** | * Discuss what a robot is, what robots can do and how they might operate.
* Discuss the types of tasks that robots are useful for, highlighting tasks that are either dangerous or repetitive. Ask students to identify a task that they would like robots to do and then design a robot that could do this task.
* Design a simple sequence of steps (algorithm) to solve a problem and then program a robot, such as a Bee-Bot or Blu-Bot, using the algorithm. Refer to the [VCAA learning sequence 'Robot basics'](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=Y2KG8D&SearchScope=All) for information about Bee-Bots and Blu-Bots and additional teaching ideas.
* As a class, discuss where engineers get ideas to create different kinds of robots.
* Discuss how robots are complex machines that work using a variety of different mechanisms. Ask students to identify a simple machine and sketch it to better understand how it works. What additions could be added to make it work better and to make it a complex machine?
 | * Explore where robots are used in industries (such as in car factories, food manufacturing, public transport and space exploration) and debate the strengths and weaknesses of robots doing the work of humans.
* Discuss how a robot is a computer that operates by following a list of instructions called a program. Highlight that a robot will perform a specific task. Discuss the following:
* Why is it important that programs are well written?
* What are the issues with a robot performing instructions exactly as written?
* Would it be advantageous if people followed instructions exactly too?
* Discuss how some robots in space are called rovers, and ask students to research the Mars rovers that are currently in space. Ask students to identify the problems that the rovers are trying to solve.
* Ask students to write instructions to create a paper plane and then give their instructions to a classmate to follow. Were there any issues?
* [Build and test a robot-like hand](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=PTJG8X&SearchScope=All) to show how data is collected when using robotic technology.
* Watch the video [Kismet: The social robot](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=KDBXZ9&SearchScope=All) and describe the problem to which Kismet is the solution.
 | * Explore rotation sensors in systems with electric motors. Discuss what a speedometer does and research how it works.
* Examine how a rotation sensor works in a robot such as LEGO Mindstorms Ev3.
* Discuss the use of binary and how it relates to the use of digital devices, including robots.
* Explore the benefits of [biomimicry robots](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=WJTK4Z&SearchScope=All), which are robots that are more like forms we find in nature.
* Explore an easy-to-use microcontroller that is programmed by free downloadable software such as [PICAXE](http://www.picaxe.com/Hardware/Robot-Kits/).
* Design a small circuit that can drive a solenoid from the input/output pins on an [Arduino](https://www.arduino.cc/) board.
* Explore the building and programming of [VEX robots](https://www.vexrobotics.com/).
* Rough, uneven surfaces can be problematic for wheel-, track- or leg-based robots. Explore how mechanical engineers have taken inspiration from kangaroos to build robust robots for these terrains.
* Explore how robot design has become more sophisticated over time and how robots are now designed to act autonomously, for example the Mars rovers and humanoid robots.
 |
| **Content descriptions** | * Explore how technologies use forces to create movement in designed solutions [(VCDSTC014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC014)
* Explore needs or opportunities for designing, and the technologies needed to realise designed solutions [(VCDSCD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD018)
* Visualise, generate, and communicate design ideas through describing, drawing and modelling [(VCDSCD019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD019)
 | * Recognise the role of people in design and technologies occupations and explore factors, including sustainability, that impact on the design of solutions to meet community needs [(VCDSTS023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS023)
* Investigate how forces and the properties of materials affect the behaviour of a designed solution [(VCDSTC024)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC024)
* Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions [(VCDSCD028)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD028)
* Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques [(VCDSCD029)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD029)
* Select and use materials, components, tools and equipment using safe work practices to produce designed solutions [(VCDSCD030)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD030)
* Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities [(VCDSCD031)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD031)
* Plan a sequence of production steps when making designed solutions [(VCDSCD032)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD032)
 | * Investigate how people in design and technologies occupations address competing considerations, including sustainability, in the design of solutions for current and future use [(VCDSTS033)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS033)
* Investigate how forces or electrical energy can control movement, sound or light in a designed product or system [(VCDSTC034)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC034)
* Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions [(VCDSCD038)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD038)
* Generate, develop, communicate and document design ideas and processes for audiences using appropriate technical terms and graphical representation techniques [(VCDSCD039)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD039)
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Key theme 4: Solving real-world problems

The ‘Ideas for the classroom’ in this theme promote skills, knowledge and understanding of concepts related to using engineering design to solve real-world problems in creative and innovative ways.

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|  | **Foundation to Level 2** | **Levels 3 and 4** | **Levels 5 and 6** |
| **Key messages** | * Exploring materials can help with solving problems.
* Engineers solve big problems.
 | * Engineers solve problems with new inventions.
* Nature can provide inspiration for new ideas to solve problems.
 | * Sustainability issues can be addressed through engineering design thinking.
* Biomimicry can inspire better ways to solve human challenges.
 |
| **Ideas for the classroom** | * Discuss with students what an engineer does. Ask student to identify real-world problems.
* Identify ways individuals can be more environmentally sustainable when using energy – for example, choosing energy-efficient light globes, using solar energy.
* Investigate how to keep a home cool. Design an experiment to find out whether factors such as shaded areas or the colour of a house would assist with keeping a house cool. As a class, construct a model of a house to test your ideas, using a small cardboard box. Use a lamp to simulate the sun if necessary.
* As a class, evaluate the success of a product such as a car or a system such as public transport, by ranking it in terms of:
* its intended function and how it uses motion, forces and/or energy to operate
* the material or materials it is made from (suitability and environmental impact)
* how it looks (visual appeal).
 | * Examine real-world examples of how engineers have used creative and innovative techniques to solve problems, such as building a train system underground in Melbourne, building a pedestrian A-shaped bridge in Adelaide, converting waste plastic bottles into filament for use in 3D printers.
* Explore the properties of materials such as straws, spaghetti, icypole sticks and paper, by trialling different materials to make a model bridge that can carry the weight of a toy car. As a class, identify which material or materials are most suited to the problem that they want to solve.
* As a class, discuss the properties and characteristics of materials that would be suitable for producing a chariot to transport an item using Sphero. Refer to the [VCAA learning sequence ‘Design a robot chariot’](http://fuse.education.vic.gov.au/?XBM5P2) for further ideas.
* Make a chariot out of different materials, such as paper or cardboard of varying thickness and types (for example, corrugated and non-corrugated), to transport an item using Sphero. Discuss how the properties and characteristics of the materials used to make the chariot affect the way it functions. Select and correctly use materials, components, tools and equipment to support safe work practices.
* Produce [glow-in-the-dark bouncy balls](https://www.instructables.com/id/Glow-in-the-Dark-Bouncy-Balls/) to simulate glow-worms and fireflies, to demonstrate how a product that controls movement and light may be inspired by biomimicry. Brainstorm how these bouncy balls could be used to solve a problem.
* Investigate different materials used in improving road safety, such as safety lines for the prevention of fatigue-related accidents and wire rope safety barriers.
* Discuss the specific features of birds that influence the design of paper planes, and then create paper planes using this design inspiration.
 | * Explore specific examples of innovative engineering design in a range of fields, such as chemical, aerospace, construction/mechanical, civil and electrical engineering.
* Investigate [products and systems inspired by biomimicry](http://fuse.education.vic.gov.au/Resource/ByPin?Pin=W7NKCK&SearchScope=All). For example, discuss with the class how Japanese engineers used a kingfisher bird to help redevelop the bullet train, how Velcro was inspired by the burdock plant or how a motorboat hull was inspired by sea animals.
* Investigate the use of solar panels to store energy and discuss how biomimicry was used, with a particular focus on flora.
* Design a self-sufficient home that can be built and powered by environmentally sustainable methods. Consider:
* sources of water, electricity and heating
* use and/or disposal of waste
* how energy usage will be minimised.
* As a class, create a Rube Goldberg machine to complete a simple task, such as putting recyclable materials into the recycle bin.
 |
| **Content descriptions** | * Identify how people create familiar designed solutions and consider sustainability to meet personal and local community needs [(VCDSTS013)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS013)
* Explore how technologies use forces to create movement in designed solutions [(VCDSTC014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC014)
* Explore needs or opportunities for designing, and the technologies needed to realise designed solutions [(VCDSCD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD018)
* Visualise, generate, and communicate design ideas through describing, drawing and modelling [(VCDSCD019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD019)
* Use materials, components, tools, equipment and techniques to produce designed solutions safely [(VCDSCD020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD020)
* Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment [(VCDSCD021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD021)
* Sequence steps for making designed solutions [(VCDSCD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD022)
 | * Recognise the role of people in design and technologies occupations and explore factors, including sustainability, that impact on the design of solutions to meet community needs [(VCDSTS023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS023)
* Investigate how forces and the properties of materials affect the behaviour of a designed solution [(VCDSTC024)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC024)
* Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions [(VCDSCD028)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD028)
* Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques [(VCDSCD029)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD029)
* Select and use materials, components, tools and equipment using safe work practices to produce designed solutions [(VCDSCD030)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD030)
* Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities [(VCDSCD031)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD031)
* Plan a sequence of production steps when making designed solutions [(VCDSCD032)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD032)
 | * Investigate how people in design and technologies occupations address competing considerations, including sustainability, in the design of solutions for current and future use [(VCDSTS033)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTS033)
* Investigate how forces or electrical energy can control movement, sound or light in a designed product or system [(VCDSTC034)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSTC034)
* Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions [(VCDSCD038)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD038)
* Generate, develop, communicate and document design ideas and processes for audiences using appropriate technical terms and graphical representation techniques [(VCDSCD039)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD039)
* Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions [(VCDSCD040)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD040)
* Negotiate criteria for success that include consideration of environmental and social sustainability to evaluate design ideas, processes and solutions [(VCDSCD041)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD041)
* Develop project plans that include consideration of resources when making designed solutions [(VCDSCD042)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCDSCD042)
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