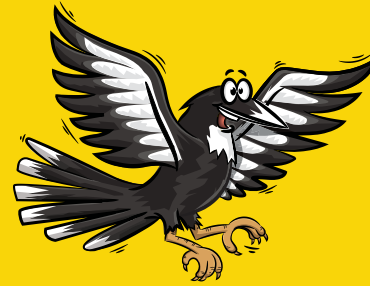




STAGE 3

Sonny the Sustainability Scout Schools Challenge



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Science and Technology

STAGE 3

This unit provides opportunities for students to work mathematically in collecting, analysing, and representing data. Students use literacy skills in interviewing, collaborating and communicating proposed water, waste and energy efficiency strategies. The unit integrates Stage 3 outcomes and content from the Science and Technology and Geography K-6 Syllabus.

Duration (recommended): 10 x weeks (1 x lesson per week)

This unit draws on strategies and resources contained in the K-6 Syllabus.

Unit overview

Students investigate how people change the natural environment in Australia and other places around the world. They also explore how the environment influences the human characteristics of places. Students examine ways people influence the characteristics of places, including the management of spaces. Students explore the impact bushfires have on Australian people, places and environments and propose ways people can reduce the impact of bushfires in the future.

Students examine how environmental conditions affect the growth, adaptations, structural features, and survival of living things. Students explain how energy is transformed, describe the difference between contact and non-contact forces, and investigate how electrical energy can control movement. They compare the regular events in the solar system with the irregular events that cause rapid changes to the Earth's surface. Students collect, store, and interpret different types of data and explain how digital systems connect to form networks that transmit data. They define problems, and design, modify and follow simple algorithms that involve branching, iteration, and user input.

Goals

Through studying this integrated Science & Technology and Geography program, students explore scientific and technological concepts and gain knowledge and an understanding of the world. They develop skills in conducting scientific investigations and designing and producing solutions through learning about the Living World, Material World, Physical World, Earth and Space, and Digital Technologies.

Strategies

Concepts: Place, space, environment, interconnection, scale, sustainability, and change

Skills: Acquiring, processing, and communicating geographical information

Tools: Maps, graphs and statistics, spatial technologies, and visual representations. Fieldwork is undertaken at a local natural environment.

Outcomes

ST3-1WS-S - Plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions

ST3-2DP-T - Plans and uses materials, tools, and equipment to develop solutions for a need or opportunity

ST3-8PW-ST - Explains how energy is transformed from one form to another

ST3-9PW-ST - Investigates the effects of increasing or decreasing the strength of a specific contact or non-contact force

GE3-1 - Describes the diverse features and characteristics of places and environments

GE3-2 - Explains interactions and connections between people, places, and environments









GE3-3 - Compares and contrasts influences on the management of places and environments

Assessment overview

Evidence of student learning can be gathered through:

- Developing knowledge and understanding of the features and characteristics of places and environments across a range of scales
- Developing knowledge and understanding of interactions between people, places, and environments
- Students undertaking activities that will assist in the development of skills to acquire, process, and communicate geographical information
- Consideration of the availability and sustainability of resources when defining design needs and opportunities.




ACTIVITY ONE - CREATIVE OPPORTUNITY

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Describe examples where light, sound, heat, and electrical energy transform from one type of energy to another, for example: ComT Syst   A toaster transforms electrical energy into heat energy A microphone transforms sound energy into electrical energy A solar panel transforms light energy into electrical energy Investigate how electrical energy can control movement, sound, or light in a product or system (ACTDEK020) ComT Syst   Design, test and evaluate a product or system that involves an energy transformation to meet an identified need using electrical energy ComT Dest     	<p>Wind energy conversion is the process of converting the kinetic energy of wind into electrical energy. Wind turbines are a clean and renewable energy source.</p> <p>Students will complete a design and production investigative task to implement the skills and knowledge associated with understanding energy transformations between kinetic (movement), electric and light energies. Students will design, test, and evaluate a system that uses energy transformations to meet a need.</p> <p>Students will work in pairs to design and construct a wind turbine tower that demonstrates how different types of energy can transform.</p> <p>Present students with a visual two-step sequence.</p> <p>Start by asking students to put forward their own ideas on how they could build a wind turbine. Present them with the videos from the resource's column on wind turbines and then discuss the basic operation of a renewable wind turbine.</p> <p>Students will then work together to write their own instructions, and then build their own wind turbine that will transform kinetic energy into electric energy through a hobby motor, that will then transform to light energy to illuminate a LED light using the core resource pack provided.</p> <p>Some observations could be:</p> <ul style="list-style-type: none"> If the wind turbine is taller – more energy is generated because wind intensity increases the higher you go Longer the blades the better, but means you have to build your turbine higher More wind = more energy 	<p>Activity Sheets 1: How to make a Paper Wind Turbine</p> <p>Wind Turbine Videos</p> <ul style="list-style-type: none"> Wind farms (3:48mins) Dutch Windmill Inside (7:18mins) How Our Wind Farms Work (1:08mins) How do wind turbines work? (SafeYouTube Origin Energy 1:43mins) How does a wind turbine work? Sustainability - ACCIONA (2:46mins) <p>Note: Using the core resource pack provided and then sourcing their own creative elements, students will work together to build and decorate a working wind turbine.</p> <p>Core resource pack includes:</p> <ul style="list-style-type: none"> DC Motor Positive and Negative wires LED light <p>Creative resources could include rigid paper cups, plastic cups, scissors, binding covers, paddle pop sticks, hot glue gun (Adult supervision required)</p> <p>Teacher note: for student guidance on how to connect the DC Motor, wires and LED light watch this basic How To video.</p> <p>Teacher Note: for student guidance on how to connect the DC Motor, wires and LED light, watch the basic How to Build a Hobby Motor Turbine at https://sustainablesunny.tamworth.nsw.gov.au/watch/</p>

ACTIVITY TWO - THE WATER CYCLE

Content	Teaching, learning and assessment	Resources
<p>Investigate how the water cycle works</p> <p>Aus. Curriculum – ACSSU002, ACSHE013, ACSIS014, ACSIS011, ACSIS233, ACSIS012</p> <ul style="list-style-type: none"> Investigate characteristics and properties of a range of materials and evaluate the impact of their use (ACTDEK023) DesT SciT Identify and evaluate the functional and structural properties of materials, for example:(ACTDEK023) <ol style="list-style-type: none"> Shade cloth for shelter Aluminium for playground seats Canvas for boat sails Critique needs or opportunities for designing using sustainable materials DesT Design a sustainable product, system or environment individually and/or collaboratively considering the properties of materials SysT Select appropriate materials, components, tools, equipment and techniques and apply safe procedures to produce designed solutions DesT 	<p>In Science, we refer to resources as plants, animals, water, and energy, found in the natural environment. Inquiry Question: What are Earth's resources and how do we use and care for them?</p> <p>Focus on water Once we use water, it is never really gone. It just changes its form as it moves around the Earth, into the atmosphere and back down to Earth again. Nature's way of recycling. Water forms, dissipates, and forms again in a cycle called the water cycle. Being a cycle there is no start and end, however for the purpose of these activities let's start at the collection point – or the Earth's oceans which cover three-quarters of Earth.</p> <p>Part 1: 1. Complete the water cycle in a bag experiment using the worksheet provided. Water Cycle Experiment: Start this experiment in the morning so you have plenty of time to observe what happens. 1. Pour some water into the zip-lock bag – around 2 tablespoons. 2. Seal the bag closed – ensuring there's enough air inside. 3. Tape the bag to a window in a sunny spot. 4. Observe the zip-lock bag throughout the day and discuss what has happened.</p> <p>Class Discussion – what's happening? You should be able to watch water change state as it heats up in the model. When the sun shines on the water source and heats it, it will turn into a gas called water vapor which rises. This is called evaporation. When the sun stops shining on the water and it cools, the water vapor turns back into tiny liquid water droplets. This is called condensation. When the water droplets are heavy enough, they will run down the bag, like rain. This is called precipitation. Discuss what might happen in the event of a natural disaster, where there might be too much precipitation, or evaporation. Students will start researching natural disasters and how that impacts the 'normal' water cycle and access to water.</p> <p>Part 2: 1. Investigate disasters related to the water cycle or disasters that impact access to water. 2. Design a poster demonstrating the specific disaster/ area researched. Include areas/subheadings, summarise the information they have found into a poster plan, then design a poster</p> <p>As a group, discuss the following: What do you find interesting about the water cycle? What have you demonstrated in your poster? What did you find the most interesting about how natural disasters affect the water cycle? How might we secure the water cycle and our water supply?</p>	<p>Activity sheets 2: The Water Cycle</p> <p>Materials:</p> <ul style="list-style-type: none"> Clear zip-lock bag Tablespoon Water Tape A3 paper or cardboard Coloured textas/pens <p>Internet access</p>

ACTIVITY THREE - WASTE AS ART

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Investigate sustainable practices that protect environments, including those of Aboriginal and Torres Strait Islander Peoples, for example: (ACHGK023, ACHGK024, ACHGK025)  Examination of how environments can be used sustainably e.g. sustainable agricultural, commercial and recreational practices  Discussion of ways waste can be managed sustainably  Cross curriculum links VAES1.2, VAS1.2, VAS2.2, BAS3.2 	<p>As a class, investigate the following:</p> <ol style="list-style-type: none"> How long does it take for plastic bags to break down? How long does it take for glass bottles to break down? How long does it take for metal or aluminium cans to break down? How long does it take for a cotton t-shirt to break down? How long does it take for a tyre to break down? <p>You can find the information you need on our website under the 'Did you know' section! www.sustainablesonny.tamworth.nsw.gov.au/did-you-know/</p> <p>From their investigation, students will identify an environmental problem that comes from waste and design a mask or headband from recycled materials that represents the problem.</p> <p>Display the collection of found objects and recycled materials in front of the students. Ask students how some of these objects could be reused or repurposed? For example, an empty container could become a plant pot, old bottle lids could become eyes, pieces of plastic or glass could become beads.</p> <p>Mask or Headband Making</p> <p>As a class, choose an environmental problem that occurs because of wasteful production and consumption e.g. excess packaging.</p> <p>Each student then takes a pre-cut mask or headband template and creates a collage of materials on the surface to represent the chosen environmental problem. For older students, they may wish to cut out their own mask template from recycled cardboard. Or, they may be at a stage where total autonomy of their waste art piece is appropriate.</p> <p>Students use glue or tape to attach paper and foil, and may also tie things like string and ribbons, or staple things such as foam, plastic or waste packaging to create their art piece. Demonstrate some basic techniques needed to join different materials together.</p> <p>As students work, discuss the different qualities of the collected materials including where they came from, whether they are disposable or recyclable, and artistic qualities such as colour and texture.</p> <p>Once the masks or headbands are complete, hole punch and attach (using a staple) ribbon, string, or elastic to fit the mask or headband for each student.</p>	<p>Activity Sheet 3: Waste as Art</p> <p>Collection of clean recycled materials and excess packaging for designing masks for example;</p> <ul style="list-style-type: none"> Used envelopes Plastic bottle lids Small containers Coloured paper Old birthday cards Egg cartons Plastic wrappers <p>Mask or headband template</p> <p>Construction supplies:</p> <ul style="list-style-type: none"> Staples Glue Masking tape Scissors Textas Hole punch Ribbon, string or elastic

ACTIVITY FOUR - MIND MAP

Content

- Investigate sustainable practices that protect environments, including those of Aboriginal and Torres Strait Islander Peoples, for example: (ACHGK023, ACHGK024, ACHGK025)



- Examination of how environments can be used sustainably e.g. sustainable agricultural, commercial and recreational practices



- Discussion of ways waste can be managed sustainably



Teaching, learning and assessment

We all have a responsibility to care for the environment we live in to ensure it remains happy and healthy for generations to come.

But the environment needs our help, and that's where we can draw on our sustainable skills.

In this activity, students are encouraged to explore what sustainability means to them, how they can maintain and improve the environment and act for a more sustainable future.

They will do this by noting down key words to make a mind-map which can be displayed as a daily reminder of why being sustainable should be a part of everything we do.

Students will break up into groups, each group has their own poster size sheet of paper, each group is to write out in VERY BIG writing the word Sustainability and then brainstorm, what they think sustainability means, and how they can be more sustainable each day.

For example:

- Nature
- Recycling
- Walking
- Solar

And so on.

Once everyone has finished, bring the class together to discuss the ideas and share the reasons behind each of the sustainability related words.

Hang your sustainability mind map somewhere in your classroom so you can remember what it means to be sustainable every day.

Resources

Sonny and Skye Introduction Video

<https://sustainablesonny.tamworth.nsw.gov.au/watch/>

Materials:

- Large poster sheets of paper
- Textas





ACTIVITY FIVE - FILL IN THE BLANKS AND FIND-A-WORD

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Explore some common sources and uses of electrical energy and describe different ways electrical energy can be generated sustainably, for example:(ACSSU219) <ul style="list-style-type: none"> solar cells hydroelectric power wind turbines geothermal power generation wave power 	<p>Sometimes we read and hear words that we don't understand about energy on the TV, in the news and when we talk with our parents and friends.</p> <p>This activity is about getting familiar with some frequently used energy words and what each type of energy does.</p> <p>Using the activity sheet provided, students will write the energy related word in the blank spot. They will choose the word from a supplied list.</p> <p>At the end of the activity discuss as a class:</p> <ul style="list-style-type: none"> What sentences did we create? How do these sources of energy create power for us to use at home and at school? What types of energy sources do you have at home? <p>Students will then create a find-a-word using the 10 words below. Swap find-a-words with the person sitting next to you for them to complete.</p> <ul style="list-style-type: none"> Save Sustainability Emissions Air Pollution Solar Wind Hydropower Energy Efficiency Renewable Energy Coal <p>When students are finished, they can colour in the pictures.</p>	<p>Activity Sheet 5: Fill in the Blanks</p> <p>Activity Sheet 5: Energy Colouring</p> <p>Activity Sheet 5: Create a find-a-word</p>





ACTIVITY SIX - WATER LEAK INVESTIGATION

Content	Teaching, learning and assessment	Resources
<p>Stage 3 Earth and Space – use and conservation of Earth's resources</p> <ul style="list-style-type: none"> Plan and implement strategies considering conservation of resources to address sustainability and to meet personal and/or community needs, for example: (ACTDEK001) <p>Dest Syst </p> <ul style="list-style-type: none"> Turning off dripping taps Turning off unnecessary lights Reusing/recycling campaigns Identify and explore the use of a variety of Earth's resources including water and soil (ACSSU032) <p></p>	<p>How much water is lost to leaks or dripping taps?</p> <p>Students will conduct an experiment to measure how much water can be lost to leaks or dripping taps.</p> <p>Water overuse is one of the most significant environmental issues of the 21st century. In this investigation, students measure and record the amount of water lost from a leaking tap over a one-hour period.</p> <p>Method:</p> <ul style="list-style-type: none"> Slightly turn on a tap in your classroom so that it drips steadily. Only a very small amount of water should be "leaking" from the tap. Place the measuring cylinder underneath the tap. Start the timer on your stopwatch. Every ten minutes check the level of the water in the measuring cylinder, record the amount of water captured in the table on the worksheet. After one hour, turn off the tap and record the final amount of water. Construct a column graph to present the data from the investigation. <p>While the experiment is being conducted, students can also be completing the Water in our School, Water Audit Workbook.</p> <p>Teacher Note: Collected water from this experiment should be put onto plants in the school garden rather than poured down the sink.</p>	<p>Activity Sheets 6: Water Leak Investigation</p> <p>Materials:</p> <ul style="list-style-type: none"> 1 x cylindrical measuring container A stopwatch Water usage calculator (refer to Water Use Calculator from Activity 8) <p>Water in Our School – Water Audit Workbook</p>





ACTIVITY SEVEN - WASTE MANAGEMENT

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Investigate sustainable practices that protect environments, including those of Aboriginal and Torres Strait Islander Peoples, for example: (ACHGK023, ACHGK024, ACHGK025)  Examination of how environments can be used sustainably e.g. sustainable agricultural, commercial and recreational practices  Discussion of ways waste can be managed sustainably  Examination of how the practices of Aboriginal and Torres Strait Islander Peoples support the sustainable use of environments e.g. use of resources  	<p>Investigate sustainable practices that protect the environment so that we can learn from Aboriginal and Torres Strait Islander Peoples.</p> <p>Students will work in groups of three or four to examine, discuss and present sustainable practices.</p> <p>In groups, discuss: The number of items you can think of in the grocery store that are packaged in plastic, or need plastic bags, note it down.</p> <p>Students to share with each other any litter reducing strategies from home.</p> <p>Research: How the practices of Aboriginal and Torres Strait Islander Peoples support the sustainable use of environments, in particular, how Aboriginal and Torres Strait Islander People stored, transported and collected their food.</p> <p>How environments can be used more sustainably (for example agricultural, commercial and recreational practices) and what are some items / products we could use in place of plastics.</p> <p>Present:</p> <ul style="list-style-type: none"> Using your knowledge and research present ways in which you can reduce your waste and single plastic use day-to-day. 	<p>Activity Sheets 7: Waste Management</p> <p>Materials:</p> <ul style="list-style-type: none"> Internet access Notebook/ paper

ACTIVITY EIGHT- WATER TRACKER

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Investigate sustainable practices that protect environments, including those of Aboriginal and Torres Strait Islander Peoples, for example: (ACHGK023, ACHGK024, ACHGK025)  Examination of how environments can be used sustainably e.g. sustainable agricultural, commercial and recreational practices  Discussion of ways waste can be managed sustainably VR  Examination of how the practices of Aboriginal and Torres Strait Islander Peoples support the sustainable use of environments e.g. use of resources  	<p>Did you know that most Australian's use water at least 16 times a day?</p> <p>Do you know how much water you use?</p> <p>Most of the time our water use is subconscious. We reach for the tap, and water comes out of it. But have you ever stopped to think about where that water comes from?</p> <p>This activity is about building a basic knowledge of how many times a day we use water, a precious resource. It encourages students to think wisely before wasting water.</p> <p>Notes:</p> <p>Tamworth Regional Council is a part of The Water Conservancy campaign to increase water efficiency around home and school. Check out more information at: https://thewaterconservancy.org/</p> <p>Process:</p> <ul style="list-style-type: none"> For 1 day, students will keep track of their daily water usage by putting a mark next to the water activity (i.e. flushing the toilet, filling up a cup or drink bottle, washing hands, having a shower) The following day, students will discuss their findings as a group and discuss strategies to conserve water use and stop water waste Discuss how Aboriginal and Torres Strait Islander Peoples conserve water in their environments Using the water usage calculator, work out how much water you use approximately in one day. 	<p>Activity Sheets 8: Water Tracker</p> <p>Activity Sheet 8: Water Usage Calculator</p>

ACTIVITY NINE - LITTER FREE LUNCH

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Investigate sustainable practices that protect environments, including those of Aboriginal and Torres Strait Islander Peoples, for example: (ACHGK023, ACHGK024, ACHGK025)  <ul style="list-style-type: none"> Examination of how environments can be used sustainably e.g. sustainable agricultural, commercial and recreational practices  <ul style="list-style-type: none"> Discussion of ways waste can be managed sustainably  <ul style="list-style-type: none"> Examination of how the practices of Aboriginal and Torres Strait Islander Peoples support the sustainable use of environments e.g. use of resources 	<p>Students are encouraged to create a personal connection with their contribution to the waste generated at school and what goes to landfill.</p> <p>The purpose of this activity is to create awareness around lunchbox waste and get students to look at ways they can reduce this waste.</p> <p>Some schools or classes may choose to implement the children's suggested changes for a period of time i.e., a one-week challenge and they do a review of the lunchboxes each day on the waste in the lunchbox and discuss the changes and observations at the end.</p> <p>This activity is NOT a look at nutritional value of foods or anything to do with healthy lunchboxes, it is purely to look at the waste being generated from lunchboxes.</p> <p>Notes: We are mindful that there are occasions where some students don't have lunchboxes of food and teachers will be aware of students in this situation. This is not about shaming students. If there are cases where students are in this situation, a solution could be to get students to pair up and review one lunchbox rather than two.</p> <p>If students have lunch orders, this activity can still be undertaken but it will focus on the waste that lunch orders generate within the school canteen or students could be paired up with a student with a lunchbox so that the activity is consistent for the class.</p> <p>Steps:</p> <ol style="list-style-type: none"> Discovery Day – Review lunchbox initially to look at the waste that is in the lunchbox. (Sheet 1) Optional – Implement a class challenge to see if students and parents can help reduce the amount of waste being generated in lunchboxes for a week <p>At the completion of the lunchbox review, students can play the Waste or Recycle game on the Sonny Website.</p> <p>Facilitate a class discussion around alternatives to single use plastics. For example, rather than glad wrap or zip lock bags for sandwiches and snacks what else could be used? Eg. Reusable containers or where containers aren't available, foil is a better alternative to plastic wrap.</p> <p>Discuss that rather than buying individual packets of snacks, with individual packaging ie Shapes or Tiny Teddy's - urge parents/guardians/carers to buy a large box and place the snack in reusable tupperware containers.</p> <p>To reduce single use plastic litter items, the NSW Government introduced from 1 June 2022 a ban on single use plastic bags and from 1 November 2022, unless you are a person with a disability of medical reason, you will not be able to use or purchase single use plastic knives, spoons, forks or straws. Some of the alternatives for these items for example in a school lunch box are personal cutlery packs/kits that are washable and reusable and come in all different shape sizes or colours. From a shop they could be the same items but made out of a different material such as bamboo or wood and these are compostable.</p> <p>Teacher resource: https://dpe.mysocialpinpoint.com.au/plastics-ban-nsw/faqs</p>	<p>Activity Sheet 9: Litter Free Lunchbox Review</p> <p>Activity Sheet 9: Litter Free Lunchbox</p> <p>Litter Free Lunchbox Challenge A5 flyer</p> <p>Litter Free Lunchbox Challenge A4 poster</p> <p>Sonny Game 2: Waste or Recycle</p>

ACTIVITY TEN - ENERGY BASICS

Content	Teaching, learning and assessment	Resources
<ul style="list-style-type: none"> Explore some common sources and uses of electrical energy and describe different ways electrical energy can be generated sustainably, for example:(ACSSU219) <ul style="list-style-type: none"> solar cells hydroelectric power wind turbines geothermal power generation wave power 	<p>The aim of this activity is to increase awareness about different sources of energy, and emissions.</p> <p>Background: We have several energy sources such as coal, wind, oil, solar and gas.</p> <p>Firstly, what are the different types of energy commonly used in Tamworth region households and what are some examples of how this energy is used? Refer to the learning materials guide on energy sources and usage examples for help on running this discussion.</p> <p>Once students have a grasp on the different types of energy and how it is used day-to-day, the activity will get more complex and require some critical thinking about alternative sources of energy and emissions surrounding their usage.</p> <p>At the completion of this activity, students should have a basic understanding of the different sources of energy, and the environmental impacts.</p> <p>Process:</p> <ol style="list-style-type: none"> Using the learning material provided, discuss all the commonly used energy sources in your typical Tamworth region home and examples of how that energy is used day to day. Students then list all the energy sources they might use daily, for example electricity, petrol, sun etc. Students draw all of the day-to-day items that they, their family or the school use that require energy. For example; a car, washing machine, mobile phone etc. Discuss whether these energy sources are renewable or non-renewable and discuss alternatives if they are not renewable. Students discuss the history of energy by referring to page 37 of the Tamworth Powerstation Museums school Education Kit. This sheet provides a timeline of electricity including when Tamworth became the first Australian town to get street lighting. 	<p>Activity Sheets 10: Energy Sources Learning Guide</p> <p>Optional Activity: Complete the “Past and Present” activity located on the Tamworth Powerstation Museum’s website: https://tamworthpowerstationmuseum.com.au/wp-content/uploads/2022/10/M_PSM_EduKitK-6-1.pdf</p> <p>Guided Tour: Educators can also book a guided tour of the Tamworth Powerstation Museum https://tamworthpowerstationmuseum.com.au/</p>