

STAGE 2

Sonny the Sustainability Scout Schools Challenge

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Science and Technology

STAGE 2

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 2 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

In this program, students will engage in a range of opportunities to identify sustainable practices, recognising that there are differing views on how sustainability can be achieved and they recognise how science knowledge helps people to understand the effect of their actions on the environment. Students create an improved waste collection process to demonstrate how waste can be managed more sustainably in their local area or school.

Goals

Through studying this integrated Science and Technology and Geography program, students explore scientific and technological concepts and gain knowledge and 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

Physical World: What are the different forms of energy around us and how can we detect them?

Earth and Space: What are Earth's resources and how do we use and care for them?

Digital Technologies: What is data and how can we store and represent it?

Outcomes

ST2-1WS-S - Questions, plans and conducts scientific investigations, collects and summarises data and communicates using scientific representations

ST2-2DP-T - Selects and uses materials, tools and equipment to develop solutions for a need or opportunity

ST2-8PW-ST - Describes the characteristics and effects of common forms of energy, such as light and heat

ST2-9PW-ST - Describes how contact and non-contact forces affect an object's motion

GE2-1 - Examines features and characteristics of places and environments

GE2-2 - Describes the ways people, places and environments interact

GE2-3 - Examines differing perceptions about the management of places and environments

GE2-4 - Acquires and communicates geographical information using geographical tools for inquiry

Assessment overview

Evidence of student learning can be gathered through:

- Activities engaging students in the use and conservation of Earth's resources
- Activities engaging students in identifying water, waste and energy efficient strategies
- Activities engaging students in identifying water, waste and energy terminology
- Students ability to communicate their findings

SKILLS FOCUS:

Concepts - Place, space, environment, interconnection, scale, and sustainability

Skills - Acquiring, processing and communicating geographical information

Tools - Maps, fieldwork, graphs and statistics, spatial technologies, and visual representations.





ACTIVITY ONE - CREATIVE OPPORTUNITY

Content	Teaching, learning and assessment	Resources
<p>Stage 1 of the Physical World strand focuses on the identification of light, sound and heat energy, and how they are sensed and produced. Stage 2 of this strand allows students to further develop their understanding of forces and energy and how these can be used for specific purposes in products.</p> <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 <ul style="list-style-type: none"> investigate how forces and materials interact in a product or system to perform a function (ACTDEK011) <p>ComT SciT Syst </p>	<p>Wind energy is a renewable source of energy. Wind energy is expected to play a critical role in Australia's future energy mix. In this activity, children will learn about how wind turbines work with the goal to make their own wind turbine spin.</p> <p>Show students the video on how wind energy is produced.</p> <p>Discuss elements of a wind turbine to reinforce students' understanding:</p> <ul style="list-style-type: none"> What can students see? What will students be learning about? How do wind turbines create energy? What are the different forms of energy around us and how can we detect them? How would students build their own wind turbine? What materials would students use? <p>Show students the video of how to build a wind turbine and ask them to follow the instructions to make their own.</p> <p>As students are constructing their wind turbines, some discussion points 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 Sheet 1: How to make a Paper Wind Turbine</p> <p>How is wind energy produced? www.youtube.com/watch?v=-8-9j3mXIYE</p> <p>How to Build a Wind Turbine Video https://sustainablesonny.tamworth.nsw.gov.au/watch/</p> <p>Materials:</p> <ul style="list-style-type: none"> 2 x A4 pieces of paper Pen or Pencil Scissors Ruler




ACTIVITY TWO - THE WATER CYCLE

Content	Teaching, learning and assessment	Resources
<p>Investigate how the water cycle works Aus Curriculum – ACSSU002, ACSHE013, ACSIS014, ACSIS011, ACSIS233, ACSIS012</p>	<p>In science, we refer to resources as plants, animals, water and energy, found in the natural environment.</p> <p>Inquiry Question: Water is our most precious resource. What are some ways we can use our water more wisely?</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.</p> <p>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.</p> <ol style="list-style-type: none"> 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>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 vapour 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.</p> <p>Part 2: 1. Design a poster demonstrating the water cycle. As a group, discuss the following: What do you find interesting about the water cycle? How have you demonstrated the water cycle in your poster?</p>	<p>Activity sheet 2: The Water Cycle</p> <p>Materials:</p> <ul style="list-style-type: none"> • Clear zip-lock bag • Tablespoon • Water • Tape <ul style="list-style-type: none"> • A3 paper or cardboard • Coloured textas/pens

ACTIVITY THREE - RUBBISH BIN SORT





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 eg sustainable agricultural, commercial and recreational practices  Discussion of ways waste can be managed sustainably  Identify that scientific knowledge helps people understand the effect of their actions, for example: (ACSHE051, ACSHE062)  	<p>Using the right rubbish bin is important to make sure that we look after the Earth's environment. If too much rubbish goes to the tip, it's bad for the environment.</p> <p>Recycling can be tricky, so it's important to really think about what bin we put our rubbish in every day.</p> <p>Class Activity:</p> <ol style="list-style-type: none"> Using the worksheets provided, students will cut out the rubbish items and sort them into the correct coloured bin and stick them on the page. Discuss what items should go into what bin. Discuss what might happen if we don't put the rubbish in the right bin. Discuss why one item didn't belong in any of the bins. What item was it and why? <p>Teacher notes: Explain to students about the correct way to recycle household batteries. Batteries can be taken to a local Council office or tip or some local businesses.</p> <p>If we put household batteries in any of our bins (Green, Yellow or Red), they end up in a compaction truck that squishes up the waste and batteries can react and cause a fire in the back of a truck. Truck drivers then have to empty out the whole load and the fire department must come to put out the fire. It created a big environmental mess to clean up.</p> <p>Understanding what can and can't go in each bin will help reduce waste in our landfills.</p> <p>Teacher discussion point: Sonny has a friend called Curby. Curby has a new recycling program which collects things like soft plastics and coffee capsules from the community using the existing yellow recycling bin. So, while things like chip packets can still go in the red lid bin, you can now collect all these types of plastics and place them in a bag, tag them with a special tag and pop them in the yellow lid bin to be recycled. This rubbish will then be recycled into something new! You can find more information on Curby here: www.curbyit.com/about-us/</p>	<p>Activity Sheets 3: Rubbish Bin Short</p> <p>Materials:</p> <ul style="list-style-type: none"> Glue Stick Scissors

ACTIVITY FOUR - SCAVENGER HUNT

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 eg sustainable agricultural, commercial and recreational practices  Discussion of ways waste can be managed sustainably  	<p>Students are encouraged to explore their own school playgrounds and backyards to increase awareness of how being more sustainable can help our environment.</p> <p>Students will be broken up into groups of two and using the activity sheet will hunt around the school playground and mark off the items listed on the Scavenger Hunt activity sheet. Students will tick items off as they discover them and be sure to leave the items behind – just as nature intended.</p> <p>Not all items may be found, and that's ok, nature is unique like that, and every school playground and backyard are different.</p>	<p>Sonny and Skye Introduction Video https://sustainablesonny.tamworth.nsw.gov.au/watch/</p> <p>Activity Sheets 4: Scavenger Hunt</p> <p>Materials:</p> <ul style="list-style-type: none"> Clipboard or something to lean on Hat and sunscreen



ACTIVITY FIVE - FILL IN THE BLANKS





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)     • 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. When students are finished, they can colour in the pictures.</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>Activity Sheet 5: Fill in the Blanks Activity Sheet 5: Energy Colouring Answer Sheet 5: Teacher Answer Sheet</p>







ACTIVITY SIX - LET'S THRIVE AND DESIGN A WATERWISE GARDEN

Content	Teaching, learning and assessment	Resources
<p>Stage 2 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>The aim of this activity is to encourage students to explore different waterwise gardening techniques that will create an outdoor area that will be drought resilient and water efficient.</p> <p>As a class, use the Tamworth Regional Council Let's Thrive booklet to learn about:</p> <ul style="list-style-type: none"> Alternative water sources including rainwater tanks and greywater Planning a water wise garden and things to consider Alternative ground covers including pavers, mulch, native plants to the Tamworth region, artificial products, or concrete/ gravel products Irrigation systems and water control Shade in the garden <p>Following the discussion about various ways to create a waterwise outdoor area, students will then design their own waterwise garden using the activity sheet provided.</p> <p>Encourage students to think about:</p> <ul style="list-style-type: none"> Why would native plants be suitable in a waterwise garden? How does shade change the design of the garden and what you plant? Is there a more efficient time of day to water your waterwise garden and why? 	<p>Activity Sheet 6: Let's Thrive and Design a Waterwise Garden</p> <p>Let's Thrive: Your Guide to a Waterwise Garden booklet;</p> <p>https://www.tamworth.nsw.gov.au/live/environment-and-sustainability/water-sustainability</p>





ACTIVITY SEVEN - LITTER DETECTIVES

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>The purpose of this activity is to role play as a Litter Detective' and in small groups conduct a grid search of the playground in a designated area, for example in the lunch area after a break period. .</p> <p>Depending on the school's individual space availability, teachers can allocate a defined area per group, i.e., 2m x 2m location, for the students to then investigate.</p> <p>Using the worksheet provided work out whether your school is a high litter, low litter or no litter school and which area has the most litter!</p> <p>Ensure you have the right resources and follow your schools' procedures to clean up the litter after the activity is completed.</p> <p>Discuss:</p> <ul style="list-style-type: none"> Strategies to reduce litter in the playground. Students to share their litter reducing strategies from home. <p>Examine:</p> <ul style="list-style-type: none"> How waste can be managed sustainably How the practices of Aboriginal and Torres Strait Islander Peoples support the sustainable use of environments How environments can be used more sustainably 	<p>Activity Sheet 7: Litter Detectives</p> <p>Materials:</p> <ul style="list-style-type: none"> Clipboard or something to lean on Hat and sunscreen





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>For more information about the Tamworth/Moonbi-Kootingal water supply system, teachers can reference this education video: http://schools.tamworth.nsw.gov.au/</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 	<p>Activity Sheets 8: Water Tracker</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)  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>Students are encouraged to create a personal connection to their contribution to the waste generated at school which goes to landfill.</p> <p>The purpose of this activity is to create awareness around lunchbox waste and ask students to look at ways to reduce this waste.</p> <p>This activity can be conducted over a period of time (i.e. a one-week challenge).</p> <p>This activity is NOT a look at nutritional value of foods or anything to do with healthy lunch boxes, it is purely to look at the waste being generated from lunch boxes.</p> <p>Notes:</p> <p>We are mindful there are occasions where some students don't have lunch boxes of food. If there are cases where students are in these situations, a solution could be to have students pair up and review one lunchbox rather than two.</p> <p>If students have lunch orders, this activity can still be undertaken. Focus instead on the waste that lunch orders generate within the school canteen.</p> <p>Steps:</p> <ul style="list-style-type: none"> Discovery Day – Review lunchbox initially to look at the waste that is in the lunchbox (<i>activity sheet 9</i>) Optional – Implement a class challenge to see if students and parents can help reduce the amount of waste being generated in lunch boxes for a week. <p>Discussion Points:</p> <ul style="list-style-type: none"> What alternatives to single use plastics are available? For example, rather than gladwrap or zip-lock bags what else can be used? Rather than buying individual packs of snacks, can we buy a large box and place the snack in reusable Tupperware containers? Discuss the NSW Governments single use plastics ban and what that means for students and their families. For more information about this: https://nswplasticsban.com.au/ 	<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>

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)     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 what their everyday lives would look like without electricity e.g., lamp = candle/lantern, ceiling fan = opened window or hand fan. 	<p>Activity Sheets 10: Energy Sources Learning Guide</p> <p>Optional Activity: Complete the “Electricity in my home” 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>