# Sample Unit – Science and Technology Stage 2

# Growth and Survival

## Sample for implementation from 2019

|  |
| --- |
| Strand |
| Working Scientifically/Design and Production/Living World |
| Context | Duration |
| Stage 2 of the Living World strand focuses on the classification, life cycles and survival of living things. Students design and produce a product or system to support the growth of a plant and/or animal. | 10 weeks |
| Outcomes |
| A student:**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**ST2-4LW-S** compares features and characteristics of living and non-living things  |
| Overview |
| This unit builds on students’ prior knowledge from Stage 1. They extend their understanding of observable features, change and growth of living things to the concept of life cycles, as they observe their local environment for the existence (or not) of native plants or animals. Students are reintroduced to the design process and continue to develop skills appropriate to the design task. Students will plan, design, develop and evaluate a solution or product based on their investigation about how changes in the environment have affected the life cycle of a particular plant or animal. To help inform their design solutions, students work in teams to observe and investigate the existing local environment and about the living things which are native to that environment. They will design a solution to attract or protect the identified living things and reflect and evaluate the processes and the success of their final product. |
| Skills focus  |
| **Working Scientifically****Planning and conducting investigations*** plan scientific investigations with guidance
* conduct scientific investigations to find answers to questions
* use appropriate materials and equipment safely (ACSIS054, ACSIS065)
* consider and apply the elements of fair tests
* collect and record accurate, honest observations using labelled observational drawings, basic formal measurements and digital technologies as appropriate (ACSIS055, ACSIS066)
* reflect on investigations, including whether testing was fair or not (ACSIS058, ACSIS069)
* participate individually and collaboratively with clear roles and goals

**Processing and analysing data*** use a range of methods to represent data, including tables and column graphs
* identify patterns and trends in gathered data (ACSIS057, ACSIS068)
* compare results with predictions
* suggest possible reasons for findings (ACSIS215, ACSIS216)
 | **Design and Production** **Identifying and defining*** critique needs or opportunities for designing solutions through evaluating products and processes
* define a need or opportunity according to functional and aesthetic criteria
* consider potential resources in defining design needs and opportunities
* investigate and research materials, components, tools and techniques to produce design solutions (ACTDEP014)

**Researching and planning*** identify and define a design problem with consideration of practical and aesthetic needs
* consider sustainable use of resources and time constraints in planning design solutions
* develop, record and communicate design ideas and decisions using appropriate technical terms
* produce labelled and annotated drawings including digital graphic representations (ACTDEP015)
* plan a sequence of production steps when producing designed solutions individually and collaboratively (ACTDEP018)
 |
| Inquiry and focus questions | Assessment |
| * How can we group living things?
* What are the similarities and differences between the life cycles of living things?
* How are environments and living things interdependent?
 | Throughout the unit the content marked with an \* indicates opportunities for assessment for, as or of learning. Teachers should always be looking for ways to collect evidence of learning which then informs practice and future directions. |
| Content | Skills focus | Suggested teaching, learning and assessment  | Assessment opportunities |
| **Classification of living things**Students:* collect data and identify patterns to group living things according to their external features, and distinguish them from non-living things (ACSSU044) **SysT** Critical and creative thinking icon Literacy icon Numeracy icon
* identify that science involves making predictions and describing patterns and relationships (ACSHE050, ACSHE061) **SciT** Critical and creative thinking icon

**Life cycles of living things**Students:* identify that living things have life cycles (ACSSU072) Sustainability icon Information and communication technology capability icon
 | **Working Scientifically*** plan scientific investigations with guidance
* conduct scientific investigations to find answers to questions
* consider and apply the elements of fair tests
* collect and record accurate, honest observations using labelled observational drawings, basic formal measurements and digital technologies as appropriate (ACSIS055, ACSIS066)
* represent and communicate observations, ideas and findings, using formal and informal representations (ACSIS060, ACSIS071)
* represent and communicate observations, ideas and findings, using formal and informal representations (ACSIS060, ACSIS071)
 | **Introducing life cycles****Teacher background**To extend students’ prior knowledge and understanding from Stage 1 of Living Things and their interaction with the environment, they are introduced to the concept of the ‘life cycle’ – the continuous process by which new generations of offspring are produced.Students identify why it is important to find out about life cycles and the possible effect their actions have on the survival of living things at various stages of growth.Throughout the unit, each student will keep a journal to record their plans, actions, reflections, progress and findings.**Group activity**\*Students explore and make observations of the school and local area. They collect data from their observations in a variety of ways, including notes, digital images, sketches/drawings. They observe the variety of living things which exist in their local environment and contribute to a ‘living things in this area’ information wall display. They will revisit and reinforce their prior learning about:* the observable features of living things
* how living things change and grow
* what living things (including humans) look like at the beginning of their lives.

**Group activity**Before beginning the activity, a Y chart could be developed on effective group work, setting the scene for the expectations of cooperation and teamwork while working in a group.Students use teacher-provided pictures or digital images of a familiar animal or plant at different stages of life, for example chicken, frog, sea turtle, butterfly, cicada, flowering plant, to identify a sequence that shows the development of a living thing. The examples provided to each group may be different.Students use the information to:* decide which image they think shows the first stage in the animal’s or plant’s life and explain why they have reached this decision
* arrange the images in a sequence to show the growth and development of the animal or plant over time, showing each stage in the life cycle and its observable features
* select a living thing of their choice, create a visual representation of the life cycle of this living thing and add it to the class information wall. \*Their visual representation could be a chart, series of diagrams or flowcharts, showing each stage in the life cycle and its observable features.

**Class activity**Each group presents their visual representation to groups or the class, who provide constructive feedback.During group presentations, the teacher encourages the use of the term ‘cycle’ and the concept of a ‘life cycle’ as they explain the stages in the life of living things.\*Students use peer and teacher feedback to modify their visual representation to reflect their understanding of the term ‘life cycle’ prior to adding it to the class wall.  | Student observationsGroup work collaborationVisual representation and how well it shows each stage in the life cyclePeer reflections |
| **Life cycles of living things**Students:* identify that living things have life cycles (ACSSU072) Sustainability icon Information and communication technology capability icon
* conduct an investigation into the life cycle of plants and/or animals(ACSSU072) **SciT** Ethical understanding icon Information and communication technology capability icon Literacy icon Personal and social capability icon
 | * identify and pose questions in familiar contexts that can be investigated scientifically
* make predictions based on prior knowledge (ACSIS053, ACSIS064)
* plan scientific investigations with guidance
* conduct scientific investigations to find answers to questions
* use appropriate materials and equipment safely (ACSIS054, ACSIS065)
 | **Planning and setting up an investigation of a plant or animal habitat in the local environment****Teacher background**To assist students in developing their understanding about the processes of Working Scientifically, they are encouraged to use results from their observations to make decisions about what they will investigate.Brainstorm all observations made and categorise into like-groups. Make generalisations about these categories. This process supports students to make decisions about their investigations.Teachers should refer to the Working Scientifically Skills Continuum from the *Science and Technology K–6 Syllabus* (downloadable version pp 29–30)**Class activity**Students discuss and record in their journals:* what they have and need to find out before they begin their investigation
* the roles and skills needed for effective groupwork. \*

**Group activity**Students question and predict by:* deciding on the focus of their investigation
* making and recording decisions about what they will do at each step of the process *see* *attached* Working Scientifically scaffold PDF.

Students plan and conduct investigations by:* suggesting and listing the equipment they will need to conduct the investigation, for example transparent containers, bug catchers, suitable measuring equipment, digital camera
* identifying and allocating team roles
* identifying the data and information they will collect during their investigation and from secondary sources

Students process and analyse data by:* designing a scaffold for the collection and recording of firsthand data/information
* using a range of methods to represent their data
* identifying patterns and trends in their data
* comparing their results with their predictions
* suggesting possible reasons for their findings

Students communicate by:* representing their observations, ideas and findings, using formal and informal representation

Students are encouraged to continually use their journals to take notes, reflect, plan, sketch as appropriate during their investigation. \* | Student recording of the roles and skills needed for effective groupworkRecorded decisionsJournal notes, sketches and plans |
| **Survival of living things**Students:* describe how living things depend on each other and the environment to survive, for example: (ACSSU073) **SysT** Asia and Australia’s engagement with Asia icon Sustainability icon Literacy icon
	+ bees and flowers
	+ birds eat and disperse seeds
 | **Researching and planning*** identify and define a design problem with consideration of practical and aesthetic needs
* consider sustainable use of resources and time constraints in planning design solutions
* develop, record and communicate design ideas and decisions using appropriate technical terms
* produce labelled and annotated drawings including digital graphic representations (ACTDEP015)
* plan a sequence of production steps when producing designed solutions individually and collaboratively (ACTDEP018)
 | **Introducing the design project****Teacher background**To assist students in applying the design process, they need to examine their findings from the scientific investigation and use this information to plan their design task. For example, students have found that frogs used to be abundant in their local environment. They have observed that this environment has changed and could be the cause of their declining numbers. Students apply this learning to the design of a renewed frog-friendly environment.Alternatively, students look at maintaining their local environment by caring for Country or exploring how they continue to manage the land. Students investigate local solutions to maintain that balance by inviting local community Elders to share cultural practices and knowledge. Do this by:* involving local Aboriginal communities and/or appropriate knowledge holders in determining suitable resources, or to use Aboriginal or Torres Strait Islander authored or endorsed publications
* read the [*Principles and Protocols*](http://ab-ed.bostes.nsw.edu.au/principles-and-protocols) relating to teaching and learning about Aboriginal and Torres Strait Islander histories and cultures and the involvement of local Aboriginal communities.

Students need to plan the steps they will take in the design processes *see attached* Design and Production scaffold.**Class activity**Students brainstorm criteria which will determine success of their design solutions once completed. These are based on defined needs and opportunities derived from their investigations.**Group activity**\*Students plan and draw/sketch ideas of their design solution that includes labelling, materials and equipment to be used, measurements and justification for choices. Students may want/need to construct a prototype to test ideas and make modifications.Students identify and define ideas by:* critiquing needs and opportunities as defined from the investigation
* accessing and recording additional information required to achieve success
* considering potential resources and investigating and researching available materials, components, tools and techniques
* discussing their individual design ideas
* agreeing on techniques and a sequence of steps

Students research and plan by:* considering sustainable use of resources and time management
* developing, recording and communicating design ideas and decisions
* producing labelled and annotated drawings including digital graphics

Students produce and implement by:* selecting appropriate tools
* selecting and effectively manipulating appropriate materials
* allocating particular tasks to team members
* ensuring that the product they plan to develop has a minimal impact on the environment.

Collaboratively, students follow their plans, ensuring they document ideas, reflections, modifications and annotations in their journals.\*During the investigation and the design and production processes, the teacher continually observes and talks to each team to stimulate student questioning and clarification of ideas, review the team results and discuss their progress. | Design planAccessing information from community groups to inform decision-makingObservations and discussions |
|  |  | **Reflecting on the evaluation process and on individual learning****Teacher background**\*Students reflect on how their design solution could be improved and on their personal learning during the unit.With teacher guidance, each team:* reflects on the results of the evaluation process in terms of:
	+ how well the team addressed the criteria for success
	+ what could have been done differently to ensure that the information product meets the needs of the user/audience.

\*A modified Pluses, Minuses and Improvements (PMI) chart could be used by the teams to reflect on the design process and the final products.Students reflect on their own learning by:* identifying new learning acquired from each team presentation
* identifying further questions that could be answered through the processes of Working Scientifically and Design and Production
* comparing and contrasting the team presentations
* identifying what they learned from working with others in a group.

Through their journals and team discussions, the teacher assesses the ability of individual students to reflect on the design process, the effectiveness of their information product and their own learning. | Student reflectionsContributions to PMI chartJournal entries |

|  |  |
| --- | --- |
| Resources |  |
| **Science and Technology K–6 Syllabus (2017) downloadable version**<https://www.educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/technologies/science-and-technology-k-6-new-syllabus> **Aboriginal and Torres Strait Islander resources**Read the [*Principles and Protocols*](http://ab-ed.bostes.nsw.edu.au/principles-and-protocols) relating to teaching and learning about Aboriginal and Torres Strait Islander histories and cultures and the involvement of local Aboriginal communities. <https://www.environment.gov.au/indigenous/index.html>or better still:https://www.youtube.com/watch?v=iHg9vgGQFSE**Materials and equipment*** Specimens, pictures, digital images to show stages in life cycles
* Materials required for observation of plant and animal life cycles, for example:
	+ silkworms – mulberry leaves, cardboard boxes
	+ broad beans – containers, stakes, garden bed or containers/potting mix
* Existing information products related to animals or plants
* Working Scientifically scaffold (attached)
* Design and Production scaffold (attached)

**Online file sharing:** [Google Docs](https://www.google.com.au/docs/about/), [OneDrive](https://onedrive.live.com/about/en-au/), School Portal**Presentation applications:** PowerPoint, SMART Notebook, [Storybird](https://storybird.com/)**Word-processing/Publishing:** Word, Publisher, [Pages](https://www.apple.com/au/pages/) | **Websites****Life Cycle Facts & Worksheets**[www.kidskonnect.com/subject-index/15-science/87-life-cycles.html](http://www.kidskonnect.com/subject-index/15-science/87-life-cycles.html)**Life Cycle of a Silkworm**[www.youtube.com/watch?v=NS2tGT6zVyg](http://http://www.youtube.com/watch?v=NS2tGT6zVyg)**Bean Seed Life Cycle for Kids**[www.ehow.com/about\_6553715\_bean-seed-life-cycle-kids.html](http://www.ehow.com/about_6553715_bean-seed-life-cycle-kids.html)**Life Cycle of Butterflies and Moths**[www.kidsbutterfly.org/life-cycle](http://www.kidsbutterfly.org/life-cycle)**Amazing Cicada Life Cycle – Sir David Attenborough's *Life in the Undergrowth* – BBC Wildlife** [www.youtube.com/watch?v=tjLiWy2nT7U](http://www.youtube.com/watch?v=tjLiWy2nT7U)**SWOT – State of the World’s Sea Turtles** – interactive life cycle diagram<http://seaturtlestatus.org/learn/lifecycle?gclid=CPiC-cqKqrMCFQoxpgod5UEAlA>  |

Working Scientifically Scaffold

Need/problem/opportunity:

What do you want to happen? For example, frogs used to live in this area. How can I bring them back?

Questioning and predicting

From what is already known, question and predict. For example: Which plants/animals survive in this type of environment? Consider weather, exposure and seasons.

Planning and conducting

Identify the investigation. Carry out your investigation by accurately measuring and recording results in your journal.

Processing and analysing

From data collected, draw conclusions and provide explanations.

Communicating
How will you communicate your findings?

Design and Production Scaffold

Need/problem/opportunity:

What do you want to happen? For example, we want to encourage frogs to return to our environment.

Identifying and defining

Consider issues you may face. What is it you want to do? Take measurements, find facts. Develop the design brief. Develop design criteria.

Researching and planning

Research your focus topic. Brainstorm ideas. Plan the steps you will follow. Select a design idea AFTER research, testing and design development.

Producing and implementing

Construct your project using appropriate tools, materials and techniques. Consider safe work practices. Carry out ongoing evaluation throughout the process**.**

Testing and evaluating
Self and peer assessment of final product. Does it meet the design criteria? Does it solve the problem? What improvements could be made? What did you learn?