## Stage 2 Breakdown

## Stage 2

By the end of Stage 2, students engage in the processes of Working Scientifically, and Design and Production by asking questions, predicting outcomes and undertaking guided investigations with increasing independence. Students make and record observations, using formal units where appropriate, and compare results with predictions. They reflect on whether methods undertaken are fair and identify ways to improve subsequent investigations. Students organise and identify patterns in data and create tables to organise and represent information.

Students develop solutions that address specific criteria. They generate and develop ideas, using research to inform their design ideas, which are represented using sketches, brainstorms and where appropriate, digital technologies. Students select materials appropriate for their purposes, with consideration of sustainability and constraints to produce designed solutions. They are guided to develop specific criteria to critically evaluate designed solutions.

**Students compare living things and identify the life cycles which support the survival of plant and animal species. They describe how agricultural processes are used to grow plants and raise animals for food, clothing and shelter.** Students identify the physical properties of materials and how heat can alter their state. They investigate the suitability of natural and manufactured materials for specific purposes. They explain how energy is transferred from one place to another, and how forces affect objects and the behaviour of a product or system. Students describe the regular changes caused by interactions between the Earth and the Sun, and the changes to the Earth’s surface that are caused over time by natural processes and human activity. They describe how digital systems transmit data, explore different types of data and how data patterns can be represented and interpreted.

| **Stage 2 outcomes**  A student: |
| --- |
| **ST2-4LW-S**  compares features and characteristics of living and non-living things |
| **ST2-5LW-T**  describes how agricultural processes are used to grow plants and raise animals for food, clothing and shelter |
| **ST2-6MW-S**  describes how adding or removing heat causes a change of state |
| **ST2-7MW-T**  investigates the suitability of natural and processed materials for a range of purposes |

# Content for Stage 2

## Living World

### Outcomes

**A student:**

* questions, plans and conducts scientific investigations, collects and summarises data and communicates using scientific representations ST2-1WS-S
* selects and uses materials, tools and equipment to develop solutions for a need or opportunity ST2-2DP-T
* compares features and characteristics of living and non-living things ST2-4LW-S
* describes how agricultural processes are used to grow plants and raise animals for food, clothing and shelter ST2-5LW-T

### Content Focus

Stage 2 of the Living World strand focuses on the classification, life cycles and survival of living things. Students consider the agricultural processes used to grow plants and raise animals. Students design and produce a product or system to support the growth of a plant and/or animal.

### 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)

**Communicating**

* represent and communicate observations, ideas and findings, using formal and informal representations (ACSIS060, ACSIS071)

#### 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

* 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?
* How do we create food and fibre products from animals and plants?

### Content

**Classification of living things**

**Inquiry question:** How can we group 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**

**Inquiry question:** What are the similarities and differences between the 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

**Survival of living things**

**Inquiry question:** How are environments and living things interdependent?

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

**Producing food and fibre from living things**

**Focus question:** How do we create food and fibre products from animals and plants?

Students:

* investigate and compare advancing technologies used in food and fibre production in Australian agriculture and those used in traditional agriculture, for example: (ACTDEK012) **DesT SciT SysT** Civics and citizenship iconWork and enterprise icon
  + automated farming using microcontrollers and sensors compared to animal-drawn equipment
  + autonomous vehicles to harvest crops compared to manual harvesting processes
* investigate food technologies and techniques used to produce healthy food, for example: **SciT** Ethical understanding iconLiteracy icon Numeracy icon Personal and social capability icon
  + peeling and segmenting/slicing fruits and vegetables
  + follow a recipe step by step
  + measure and mix dry ingredients
* design, plan and produce a product, system or environment to support the growth of a plant and/or animal that could be used in a healthy meal, for example: **DesT** Sustainability icon Critical and creative thinking icon Literacy icon Work and enterprise icon
  + a greenhouse
  + a chicken coop
  + a watering system

## Material World

### Outcomes

**A student:**

* questions, plans and conducts scientific investigations, collects and summarises data and communicates using scientific representations ST2-1WS-S
* selects and uses materials, tools and equipment to develop solutions for a need or opportunity ST2-2DP-T
* describes how adding or removing heat causes a change of state ST2-6MW-S
* investigates the suitability of natural and processed materials for a range of purposes ST2-7MW-T

### Content Focus

Stage 2 of the Material World strand focuses on how solids and liquids change state and the properties of natural and processed materials. Students investigate how different properties of materials affect their suitability for products. They have the opportunity to develop a design solution to an identified need or opportunity, using a variety of materials. Stage 2 of this strand develops students’ knowledge and understanding of the properties and performance of materials and the material sciences.

### Skills Focus

#### Working Scientifically

**Questioning and predicting**

* identify and pose questions in familiar contexts that can be investigated scientifically
* make predictions based on prior knowledge (ACSIS053, ACSIS064)

**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

#### Design and Production

**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)

**Producing and implementing**

* select appropriate tools for a specific purpose
* select and effectively manipulate appropriate materials for a specific purpose
* use safe work practices
* consider sustainability and constraints when choosing resources and managing time in production of designed solutions (ACTDEP016)

### Inquiry and Focus Questions

* How do materials change when heated and cooled?
* How do you decide upon which material to use for a particular purpose?

### Content

**Changes of state**

**Inquiry question:** How do materials change when heated and cooled?

Students:

* identify solids, liquids and gases as states of matter **SciT** Critical and creative thinking icon
* recognise that a change of state can be caused by adding or removing heat (ACSSU046) **ComT** **SciT** Critical and creative thinking icon Literacy icon Numeracy icon
* describe examples of changes of state in everyday life **SysT** Literacy icon Personal and social capability icon
* predict and observe the effects of adding or removing heat on a variety of solids and/or liquids **SciT** Critical and creative thinking iconLiteracy icon

**Materials are used for a specific purpose**

**Focus question:** How do you decide upon which material to use for a particular purpose?

Students:

* investigate how the properties of natural and processed materials influence their suitability and use in products, services and/or environments, for example: (ACSSU074, ACTDEK013) **DesT SciT** Sustainability icon Ethical understanding icon Personal and social capability icon Difference and diversity icon
  + elasticity
  + thermal conductivity
* develop a design solution for an identified need or opportunity, using a variety of tools and materials that considers factors such as sustainability and time (ACTDEK010) **DesT** Sustainability icon Critical and creative thinking icon Ethical understanding icon Personal and social capability icon
* identify the roles of people working in science and technology occupations (ACTDEK010) Personal and social capability icon Difference and diversity icon Work and enterprise icon