# Science and technology Stage 2 learning sequence – Living world

**Learning sequence description**

Students identify characteristics of living things and distinguish living things from non-living things. They identify and describe patterns and understand how scientists use external features to group living and non-living things. Students describe and follow a sequence of steps involving decisions to group things (solve a problem).

## Syllabus outcomes and content

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

* conduct scientific investigations to find answers to questions
* represent and communicate observations, ideas and findings, using formal and informal representations

**ST2-3DP-T** – defines problems, describes and follows algorithms to develop solutions

* develop a sequence of steps and decisions (algorithms) to solve a problem

**ST2-4LW-S** – compares features and characteristics of living and non-living things

* collect data and identify patterns to group living things according to their external features, and distinguish them from non-living things
* identify that science involves making predictions and describing patterns and relationships

**ST2-11DI-T** – describe how digital systems represent and transmit data

* describe and follow a sequence of steps and decisions (algorithms) to solve defined problems involving branching

[Science and Technology K-6 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-and-technology-k-6-new-syllabus) © 2017 NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales.

## Lesson 1 – How can we group living and non-living things?

Students are learning to:

* identify patterns to group living things and distinguish them from non-living things
* conduct scientific investigations to find answers to questions and communicate observations
* identify that science involves describing patterns and relationships
* represent and communicate observations using formal and informal representations.

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 1.1 | Assess student prior knowledge. Pose this question to students. How do we know something is living? (This should be prior knowledge for students.) Record and collate student responses. Answers will probably include: it moves, grows, eats, drinks, can have babies (reproduces), breathes and produces waste (respires), responds to its environment (external stimuli).  |  |  |
| 1.2 | **Safety is important. Communicate safe practices to students when outdoors observing living things.** For example look don’t touch any animals, be careful when lifting rocks or looking in leaf litter, use a stick to move small rocks and leaves. **Always wash hands after being outside.** Explain that scientists use their senses to make observations. Students will observe and identify living and non-living things in an outdoor environment such as backyard, local park or beach (with their family). If students are unable to access an outdoor environment, they could explore their home. Students could choose to explore a second, different environment and compare their observations with the first environment they explored. Students record their observations and justify why they thought it was a living or non-living thing. Students could take photographs, or make drawings, of their observations/list. |  | Resource 1 – Student workbook – Activity Characteristics of living things |
| 1.3 | **Opportunity for monitoring student learning**Assessment of prior knowledge – collection of student work**What to look for:*** correctly identifies living and non-living things
* justifies why something is living or non-living (for example, if it is living – it breathes, moves if it non-living – remains still, made of plastic).
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| 1.4 | Scientists use observable features and characteristics to group (classify) living and non-living things. Grouping things helps scientists represent and learn how things work and how they might be related. Scientists who work to classify things are called taxonomists. View the video about classifying living things. Ask some of the following questions to check for the students’ understanding.What is classification?How did the teacher classify the things she found on the ground? What other ways might you classify the things? (for example – plant based (leaves and sticks) and rocks, height or width of the items).What are some reasons why you would classify things? Ask the students how might they classify members of their families (for example – eye colour, what music they like, adults/children) |  | [Resource 2 – Lesson 1 - Classifying living things](https://fieldofmar-e.schools.nsw.gov.au/programs/primary-excursions/stage-2/feathers--phasmids-and-leaves/supporting-student-activities.html)[online video - Field of Mars Environmental Education Centre resource] |
| 1.5 | Explain that scientists conduct field studies to learn about the local environment, including living things. Students will conduct a field study of their house, backyard or local neighbourhood (with assistance/supervision from a parent/caregiver) to identify, observe and record their observations. Pose the inquiry question: how can different things be grouped? Discuss ways that students might record their observations. For example, labelled drawings, written descriptions, photos or video recording.Ask students to identify, collect and list 15-20 items from their kitchen or bedroom. **Safety is important**, dangerous items such as sharp knives or electrical appliances should not be included in the collection. Ask students to sort the items into different groups, make lists of the items and number in each group, then explain and justify why they have grouped specific items together. Remind students that they should use observable (external) features and characteristics in their explanation. In the student workbook are some examples of different ways to group items **OR****Safety is important. Remind students of safe practices when outdoors observing living things.** Ask students to explore their backyard or local neighbourhood (with assistance/supervision from a parent/caregiver) to identify, observe and record features of 5-10 different plants. Students observe height, colour, texture (bark/leaves), presence of flowers/fruit/cones/nuts, leaves (colour/shape). Ask students to sort their plant observations into different groups, make lists and number in each group, then explain and justify why they have grouped specific items together. In the student workbook are some examples of different ways to group plant features. |  | Resource 1 – Students workbook – Activity 2 Classifying things |
| 1.6 | **Opportunity for monitoring student learning**Grouping items – student workStudents group household or outdoor items according to their external features and/or characteristics.**What to look for:*** identifies common features and characteristics to group living and non-living things or household items
* justifies why they grouped their items based on external features of their chosen items (for example by their use, materials e.g. metal or plastic, colour/shape of the plants).
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| 1.7 | Aboriginal and Torres Strait Islander Peoples systems of classification are diverse and use observable characteristics to group living things. The complex classification systems reflect deep understanding of living things in their environment and could include external features, behaviours as well as environment, such as land or marine. For example the Eora People of the Sydney Basin in NSW classify the emu as a land animal rather than a bird, as it is unable to fly. (Content elaborations and teacher background information for Foundation to Year 6, p. 118). Many living things were grouped by Aboriginal and Torres Strait Islander Peoples based on their use. **View the video – Chapter 9 Useful plants. In the video Bruce Pascoe identifies some of the plants that were used for food or medicinal purposes. After watching the video ask students if they could identify some of the plants and what they were used for. For example** **Bracken’s root – food (starch, to make pancakes)****Hop bush – medicinal purpose (kept mosquitoes away)****Bulrush (Cumbungi) – food (vegetable and starch to make flour)****Ask students to complete activity 3 in the student workbook.** |  | [Resource 4 – Australian Curriculum: Science Aboriginal and Torres Strait Islander Histories and Cultures](https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/aboriginal-and-torres-strait-islander-histories-and-cultures/)[website – links to PDF of elaborations and teacher background information booklet]Resource 5 – [Chapter 9 Useful plants](https://education.abc.net.au/home#!/digibook/3122184/bruce-pascoe-aboriginal-agriculture-technology-and-ingenuity) (ABC Education)Resource 1 – Student workbook – Activity 3 – Aboriginal plant use |

## Lesson 2 – How can we use a sequence of steps to group (classify) items?

Students are learning to

* develop, describe and follow a sequence of steps and decisions (algorithms), involving branching, to group items (solve a problem)
* represent and communicate observations and ideas, using a classification system, or key (formal representation).

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| Item | Learning experience | Differentiation strategies and/or adjustments | Resources |
| 2.1 | Identify whether students understand the concept of branching as a decision making tool. Students need to understand the basic steps of developing a key (including branching) to complete the next activity. Resource 3 (lesson 3) provides an opportunity to support the development of student understanding of branching. View resource 3 (lesson 3) on how to develop a classification system, or key, using yes/no questions. Ask some of the following questions to check for the students’ understanding: At the beginning, how did the presenter group the items from the pencil case? (things I can draw with, things I cannot draw with)What other ways did the presenter continue to group the items? (what the items are made from, the shape of the item, if it has ink or not, if it has a metal blade or not)Play a game for example 20 questions with your students to demonstrate how to construct yes/no questions.  |  | [Resource 2 – How can we group living things? - Lesson 3 Creating your own classification key](https://sites.google.com/view/feathers-phasmids-and-leaves/students)[online Field of Mars Environmental Education Centre resource] |
| 2.2 | Students choose a category of items to classify. They could use the items identified in the previous lesson or select a different category of items.Students follow a sequence of steps to demonstrate their understanding of the decision-making tool of branching to create a step-by-step process to classify items (as demonstrated in resource 3, lesson 3 – video). Students must first identify patterns amongst their items (as they did in the previous lesson) to be able to construct suitable questions to include in their sequence of steps (algorithm). These questions must be yes/no questions. For example, using kitchen utensils a question could be ‘Is it made of metal?’ or ‘Is it used to mix ingredients?’After creating the branching questions, students use their classification system, or branching key, to classify their items. Students construct their classification system in the student workbook. They could take a photo to upload to a digital classroom. Students use a written explanation or a video recording to explain their reasons for choosing the questions in their classification system.When students return to the classroom peers can trial other student’s keys. Follow up lessons could explore specific characteristics of living things and how scientists classify them into groups using a branching key. |  | [Resource 2 – How can we group living things? - Lesson 3 Creating your own classification key](https://fieldofmar-e.schools.nsw.gov.au/programs/primary-excursions/stage-2/feathers--phasmids-and-leaves/supporting-student-activities.html)[online Field of Mars Environmental Education Centre resource] |
| 2.3 | **Opportunity for monitoring student learning**Grouping key – collection of student work (diagram of classification key)Students choose a category of items such as toys, clothing, pantry items, leaves, animals. They develop their own branching classification system, or key, for peers to use.**What to look for*** develops a sequence of branching steps to correctly group items
* explains their choices for grouping items
* uses a branching key to classify new items.
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**Reflection and evaluation**

These simple questions may help you reflect on your students’ learning and plan for next steps.

What worked well and why?

What didn’t work and why?

What might I do differently next time?

What are the next steps for student learning based on the evidence gathered?