**Part 1: Learning outcomes plan**

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| **Main idea:*** Earthworms are living animals adapted for life in the soil.
 | **Science strand:**Living World: Life processes * Recognise that all living things have certain requirements so they can stay alive.
* Recognise that living things are suited to their particular habitat.
* Recognise that living things can be grouped in different ways.
 | **Level:** 1-2**Year:** 2-4**Teacher:** Angela Schipper |
| **Overarching learning outcomes:** In building understandings about earthworms, students will integrate:* understanding what makes an earthworm a living animal (scientific knowledge)
* an investigation into the characteristics of living things and characteristics of an animal (scientific practice)
* extending their experiences and personal explanations of the natural world (nature of science).
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| **Conceptual learning outcomes**  | **Procedural learning outcomes**  | **Nature of science outcomes**  | **Technical learning outcomes**  |
| Students will understand that:* scientists group or classify living things
* earthworms are living, and all living things share certain life processes
* earthworms are animals, and animals share four key characteristics
* earthworms have common characteristics and adaptations that suit their life in the soil ecosystem
* earthworms’ characteristics vary depending on where they live in the soil ecosystem.
 | Students will be able to:* identify some of the characteristics of living things, with reference to earthworms
* identify some of the characteristics of animals, with reference to earthworms
* observe earthworms (either living specimens or in video clips) and identify and discuss differences between the species.
 | Students will understand and appreciate that:* scientists group or classify organisms to identify them and to see what species they are most closely related to
* scientists have specialist vocabulary to help them communicate effectively.
 | Students will be able to:* use interactives from the Science Learning Hub to explore and discuss the characteristics of living things and the characteristics of animals
* use hand lenses, cameras or other devices to observe earthworm movement and physical characteristics.
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| **Management/materials:*** Resources:
* Equipment for the student activities [Living or non-living?](https://www.sciencelearn.org.nz/resources/27-living-or-non-living) and [Observing earthworms](https://www.sciencelearn.org.nz/resources/28-observing-earthworms)
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| **Assessment:*** Level 1: Complete and print the graphic organisers for Living or not? and Animal or not? in the activity [Living or non-living?](https://www.sciencelearn.org.nz/resources/27-living-or-non-living)
* Level 2: Complete and print the profile [Wormface – social networking for earthworms](https://www.sciencelearn.org.nz/resources/2641-wormface-social-networking-for-earthworms)
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**Part 2: Lesson plan**

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| **Main idea:** Scientists group or classify living things. The broadest groupings are living and non-living.  |
| **Subtasks** | **Resources** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 1**Introduce the concept of grouping or classification.Use this skill to group things into living and non-living. | 1.1 Group image cards into categories of students’ choosing. | * Image cards from [Living or non-living](https://www.sciencelearn.org.nz/resources/27-living-or-non-living) – one set for each group or pair of students

**Teacher reference:*** Article [Characteristics of living things](https://www.sciencelearn.org.nz/resources/14-characteristics-of-living-things)
 | * Prior to working with students, familiarise yourself with the article [Characteristics of living things](https://www.sciencelearn.org.nz/resources/14-characteristics-of-living-things) and some [common student alternative conce](http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/pages/livingthings.aspx)ptions in this area. (See the Useful link at the bottom of the article for URL.)
* In pairs or small groups, students organise the images into categories of their own choosing. There are no right or wrong answers but they must be able to justify why they’ve grouped them in this manner.
* Discuss groupings. Follow up any ideas about living/non-living.
 | * Students will begin to recognise that things share common characteristics and we can group them according to these characteristics.
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| 1.2 Use the Living or not? graphic organiser. | * [Living or non-living](https://www.sciencelearn.org.nz/resources/27-living-or-non-living) graphic organiser Living or not?
 | * Complete the activity. (Only use the Living or not? graphic organiser. Save the Animal or not? for later use.)
 | * Students begin to describe the characteristics of living things.
* Students begin to classify things as living or non-living based on these characteristics.
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| 1.3 Students do a ‘live’ version of the graphic organiser. | * Items from around the classroom or outside
* Camera or other recording device
* Small pieces of paper for each group to make ‘living’ and ‘non-living’ labels
 | * Groups of students gather a number of items from around the classroom or playground to play a ‘live’ version of this activity with their peers.
* They can photograph their groupings for display or for assessment purposes.
 | * Students use their knowledge of the characteristics of living things to challenge their classmates’ understanding of these characteristics.
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| **Main idea:** Earthworms are animals and share common characteristics with other animals. |
| **Subtasks** | **Resources/focal artefacts** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 2**Introduce the concept of animal or not. | 2.1 Circle of animals game. |  | * Seat students in a circle. Going clockwise, each student gives the name of an animal. If an animal name is repeated or the student cannot think of one, the student is out and says ‘beep’ next time it is their turn. (Alternatively, the student can sit out.) End the game when appropriate.
 | * Students’ conceptions of types of animals become more widely known to the teacher.
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| 2.2 The common characteristics of an animal. | **Teacher reference*** Article [Characteristics of living things](https://www.sciencelearn.org.nz/resources/14-characteristics-of-living-things)
 | * Discuss types of animals mentioned in the circle of animals game. Discuss any common characteristics.
* If students did not use fish, insects or humans as examples, discuss characteristics they share with animals from the game.
* Choose one or more key characteristics of animals as listed in the article. Discuss these with the class, asking them to give examples i.e. spiders, dolphins and humans are able to move freely and get their energy by eating other animals or plants.
 | * Students begin to describe the characteristics of animals.
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| 2.3 Using the Animal or not? graphic organiser. | * Activity [Living or non-living?](https://www.sciencelearn.org.nz/resources/27-living-or-non-living)
 | * Complete the activity using the Animal or not? graphic organiser.
 | * Students begin to classify things as animal or not.
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| **Main idea:** Earthworms are living animals. |
| **Subtasks** | **Resources/focal artefacts** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 3**Exploring earthworms as living animals. | 3.1 Watch the video clip Physical adaptations for life underground. | * Video [Physical adaptations for life underground](https://www.sciencelearn.org.nz/videos/3-physical-adaptations-for-life-underground)
* IWB or data projector
 | * Review the characteristics of living things and animals.
* Watch the video clip, asking students to watch and listen for evidence that earthworms are alive and are animals.
 | * Students use their knowledge of animal characteristics to identify that earthworms are animals. The video shows movement, sensitivity, growth and reproduction.
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| 3.2 Use the interactive Earthworms: inside and out.  | * Interactive [Inside of an earthworm](https://www.sciencelearn.org.nz/image_maps/24-inside-of-an-earthworm) and [Outside of an earthworm](https://www.sciencelearn.org.nz/image_maps/27-outside-of-an-earthworm)
* IWB or data projector
 | * Introduce this section by discussing special vocabulary associated with a sport or art. Explain that scientists also use special vocabulary to help them communicate accurately.
* Read through the interactive with the students. The language is sophisticated so take time to discuss the various body parts and how they tie into the characteristics of living things.
* With younger students, concentrate on the outside of the earthworm’s body.
 | * Students learn that scientists have special vocabulary.
* Students begin to use some of this vocabulary.
* Students begin to identify some of the physical characteristics of earthworms and see how these help to determine that earthworms are both alive and animals.
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| 3.3 Observe earthworm movement and anatomy. | * Activity [Observing Earthworms](https://www.sciencelearn.org.nz/resources/28-observing-earthworms)
* Earthworms (refer to the activity for hints on finding, housing and handling earthworms)
* Paper towels or newsprint
* Shallow tray of water
* Plastic tongs (optional)
* Hand lenses or other observational or recording devices

Note: If earthworms are not available, use all three video clips to observe movement and anatomy. | Prior to working with students, read through the activity and determine which portion of the activity is appropriate for your students. For younger students, simply observing earthworm movement is sufficient. If possible, record the observations via photos or video for future discussions, assessment or publication.* In small groups, students observe earthworm anatomy and movement.
* Encourage students to use some of the vocabulary from the interactive.
 | * Students begin to use accurate vocabulary associated with earthworms.
* Students observe and identify some of the characteristics that demonstrate that earthworms are alive and are animals.
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| **Main idea:** Earthworms share similar characteristics but there are also differences.  |
| **Subtasks** | **Resources/focal artefacts** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 4**Earthworm species differ in size, colour and where they live within the soil ecosystem. | 4.1 Although earthworms have much in common, there are many differences. | * Video [Not all the same](https://www.sciencelearn.org.nz/videos/4-not-all-the-same)
* IWB or data projector
 | * Prior to watching the video, remind students that scientists use special vocabulary and introduce any words you think the students will need help with. Note that students do not need to know all of the terminology for this video to be useful.
* Watch the video as a class.
* Highlight some of the differences that may be difficult for the students to visualise, for example, ask students to draw lines on the whiteboard to represent the smallest and largest NZ native earthworms – 1 cm and 1.3 m!
 | * Students will begin to notice similarities and differences between earthworms’ physical characteristics.
* Students will have a simple understanding of the different roles earthworms have within the soil ecosystem.
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| 4.2 Many different earthworms live in New Zealand. | * Slide show [Common New Zealand earthworms](https://www.sciencelearn.org.nz/embeds/93-common-new-zealand-earthworms-slide-show)
* IWB or data projector
 | * View the PowerPoint to discover the differences amongst New Zealand earthworms in size, skin colour and the roles they play in the soil ecosystem.
 | * Students will gain a deeper understanding of earthworms’ similarities and differences and their roles within the soil ecosystem.
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| 4.3 Earthworm poetry. | * Activity [Observing Earthworms](https://www.sciencelearn.org.nz/resources/28-observing-earthworms)
* Slide show [Common New Zealand earthworms](https://www.sciencelearn.org.nz/embeds/93-common-new-zealand-earthworms-slide-show)
* Access to computers
 | * An extension idea within this activity describes how to write a two-word poem. Discuss this type of poetic writing with students.
* Using the photos and text from the PowerPoint as a resource, students write two-word poems. Choose the appropriate level of difficulty. Younger students can simply write two word poems. Older students could be encouraged to keep their poems scientific or to include scientific vocabulary where possible.
 | * Students begin to use scientific vocabulary in their writing.
* Students view images and text to find similarities and differences between earthworm species.
* Students record these similarities and differences in a creative manner.
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| 4.4 Wormface – social networking for earthworms. | * Activity [Wormface – social networking for earthworms](https://www.sciencelearn.org.nz/resources/31-wormface-social-networking-for-earthworms)
* Printer
* Slide show [Common New Zealand earthworms](https://www.sciencelearn.org.nz/embeds/93-common-new-zealand-earthworms-slide-show)
 | Wormface is designed to replicate the creation of an online social networking profile. Decide whether this is appropriate for your students.* Complete a Wormface profile as a class so students understand the process and the vocabulary.
* Encourage students to use their research skills to develop their own profile.
 | Students work individually or in groups to develop their own profile. In doing so, they demonstrate their level of understanding about the physical characteristics and the role their chosen earthworms plays in the soil ecosystem. |

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| **Main idea:** Ethical considerations of keeping earthworms (and all living things) in the classroom. |
| **Subtasks** | **Resources/focal artefacts** | **Planned interactions** | **Key student outcomes** |
| **Meso tasks** | **Micro tasks** |
| **Day 5**Explore our responsibilities when keeping living things in the classroom. | 5.1 What do living things need to survive? | * Whiteboard or paper to record ideas
 | * Discuss what the students need in order to survive (food, water shelter etc.)
* What do they need to make their survival more comfortable? (warm house rather than a tent or hut, a variety of food rather than just bread and fruit)
 | * Students identify survival needs for themselves.
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| 5.2 Students consider the needs of animals. | * Activity [Caring for earthworms in the classroom](https://www.sciencelearn.org.nz/resources/10-caring-for-earthworms-in-the-classroom)
* Copies of the student handout Ethical considerations when keeping earthworms in the classroom (use the handout as it is or modify to suit your needs)
* IWB or similar if working through this as a whole class activity
 | * Prior to doing this activity in the classroom, read through it and decide which portions are most appropriate for your students. For example, younger students may simply work through the first column of the student handout while older students follow the activity as written.
* Work through the activity with students.
 | * Students identify some of the survival needs for animals in general and more specifically, earthworms.
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