

Science 3–4

Chapter 3 — Biological sciences

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Living, once living, and never living

What we teach here — VC2S4U01 (Victorian Curriculum F–10 Version 2.0, Science, Levels 3 and 4):

“living things have characteristics that distinguish them from non-living things and things that were once living, including fossils”. **In our words:** everything around us can be sorted into three groups — living, once living and never living — and we can always say why. Living things all do the same few things: they need food, water and air, they grow and change, and they make more of their own kind. And a fossil is a shape kept in rock that shows us something was once living, a very long time ago.

Theory

The three groups

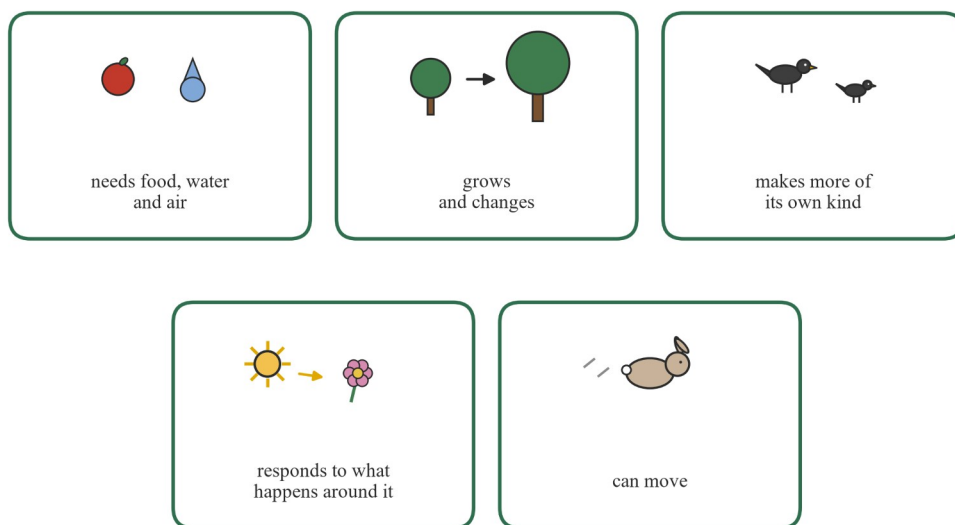
Everything you can point to has a place in one of three groups.

- **Living** things are alive right now. A magpie, a gum tree, a snail, you.
- **Once living** things were alive once, but they are not alive any more. A dry leaf on the ground, a feather on the grass, a shell on the beach.
- **Never living** things were never alive. A rock, a marble, a puddle of water.

Scientists call the things you can check about a living thing its **characteristics**. They are the things you can look for: if the thing is alive, it will do them all.

What living things all do

The characteristics of living things



If something is alive, it does all of these things — not just one of them.

Five boxes, one for each of the five characteristics of living things: needing food and water, growing and changing, making more of its own kind, responding to what happens around it, and being able to move

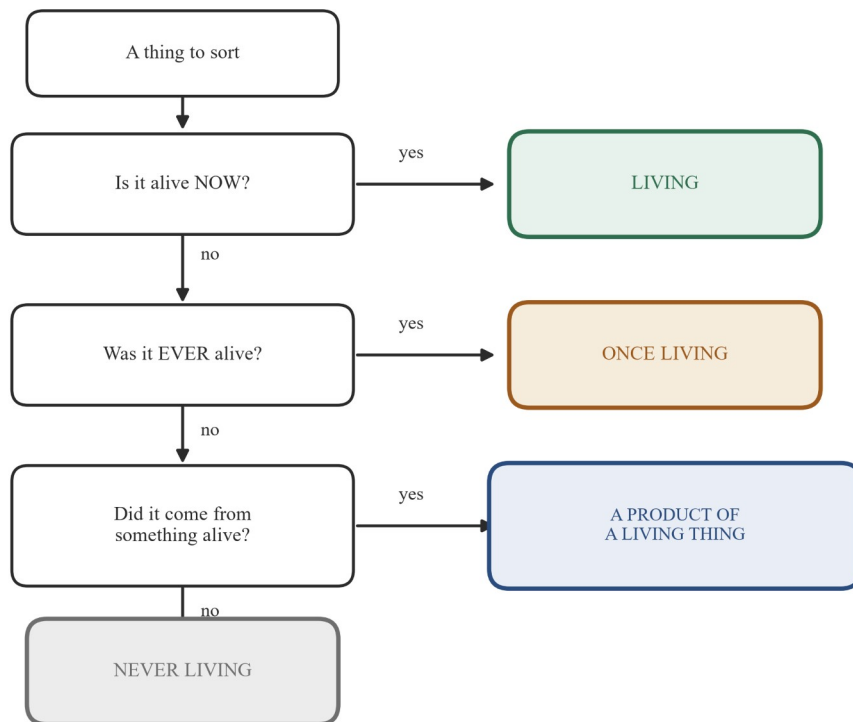
A living thing:

- **needs food, water and air**
- **grows and changes**
- **makes more of its own kind** — a rabbit has baby rabbits, and a gum tree makes seeds that can grow into new gum trees
- **responds to what happens around it** — a flower turns toward the Sun, and you jump at a loud noise
- **can move** — animals walk, swim or fly, and even plants move, slowly, toward the light

The rule is **all**. A car can move, but it does not need food, and it does not grow or make more cars — so it is not alive. If something is alive, it does **all** of these things, not just one of them. That is the check we use.

The sorting test

The sorting test



A decision chart: for any thing, ask is it alive now, was it ever alive, and did it come from something alive; the answers lead to living, once living, a product of a living thing, or never living

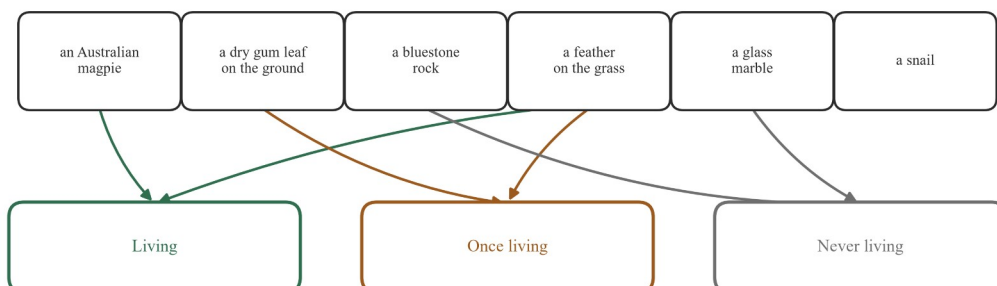
To sort any thing, ask these three questions in order.

1. **Is it alive NOW?** If yes, it is **living**.
2. **Was it EVER alive?** If yes, it is **once living**.
3. **Did it come FROM something alive?** If yes, it is **a product of a living thing**.

If the answer is no to all three, the thing is **never living**. Three questions, four groups, and a reason for every choice.

A worked sort

Sorting a collection — with a reason for every choice



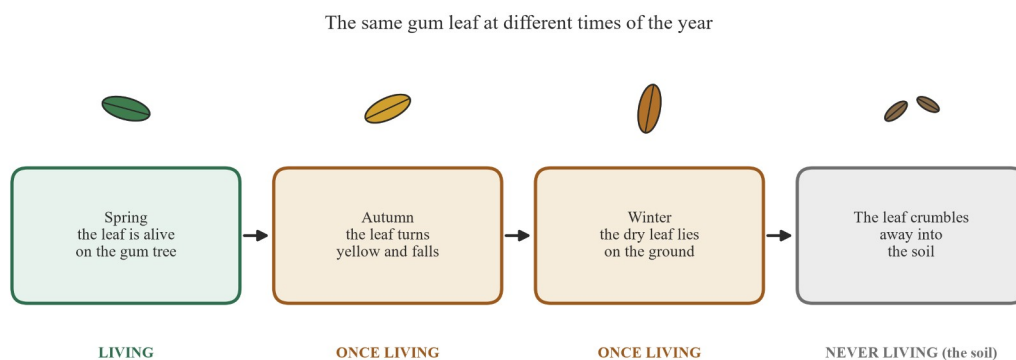
Six things sorted with arrows into three groups: the magpie and the snail to living, the dry gum leaf and the feather to once living, and the bluestone rock and the glass marble to never living

Here is the same sort as a table, with the reason for every choice.

Thing	Group	Reason
an Australian magpie	living	it is alive now — it does all five things on our list
a snail	living	it is alive now — it needs food, grows and makes more snails
a dry gum leaf on the ground	once living	it is not alive now, but it was alive on the tree
a feather on the grass	once living	it is not alive now, but it grew on a living bird
a bluestone rock	never living	it was never alive, and it did not come from anything alive
a glass marble	never living	glass is made from sand, and sand was never alive

Every line has a reason. In science we do not just pick a group — we say **why** the thing belongs there.

The same thing can change groups



Something that is living can become once living. Something never living can never become alive.

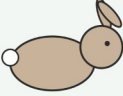
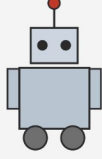
The same gum leaf at four times: alive and green on the tree in spring, turning yellow and falling in autumn, dry on the ground in winter, then crumbled away into the never-living soil

Follow one gum leaf through the year. In spring it is alive on the tree, so it is **living**. In autumn it turns yellow and falls; it is not alive any more, so it is **once living**. In winter the dry leaf crumbles away into the soil. Soil was never alive, so the soil is **never living**.

The big rule: something that is living can become once living. Something that is never living can **never** become alive. A rock will never wake up.

Moving is not enough

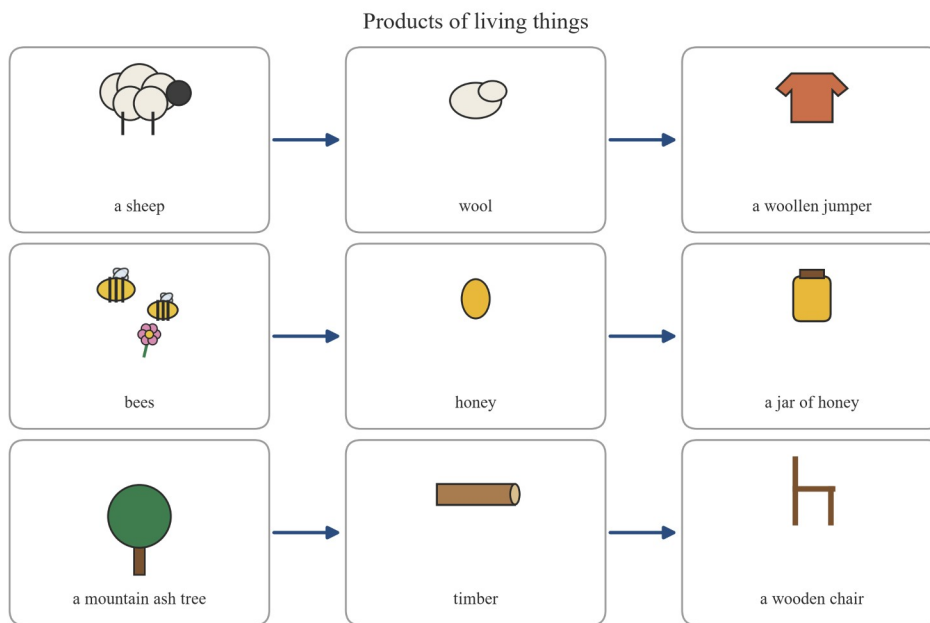
Both can move — but which one is alive?

A real rabbit — LIVING	A toy robot — NEVER LIVING
	
✓ needs food and water ✓ grows bigger ✓ makes more rabbits ✓ moves on its own	✗ needs batteries, not food ✗ never grows ✗ cannot make more robots ✗ moves only when switched on

A real rabbit, listed as living because it needs food and water, grows, makes more rabbits and moves on its own, next to a toy robot, listed as never living because it needs batteries, never grows, cannot make more robots and moves only when switched on

A toy robot moves. So does a cloud, a river and a car. But moving is only one line on our list. The robot needs batteries, not food. It never grows. It cannot make more robots. It moves only when someone switches it on. So the robot is **never living** — it was never alive, and it did not come from anything alive. The rabbit does all five things on the list, so the rabbit is **living**.

Products of living things



The jumper, the honey and the chair were never alive themselves.

They are made by living things, or from living things. That makes them products of living things.

Three chains: a living sheep gives wool, and wool becomes a woollen jumper; living bees make honey, and the honey goes into a jar; a living mountain ash tree gives timber, and timber becomes a wooden chair

Now a tricky one. Look at a woollen jumper. Was the jumper ever alive? No — so it is not living, and it is not once living. Did it come from something alive? Yes — the wool grew on a living sheep. So the jumper gets its own group: **a product of a living thing**.

The same goes for a jar of honey (made by living bees) and a wooden chair (made from timber, which came from a living tree). The jumper, the honey and the chair were never alive themselves — but they come from living things. That is what makes them products.

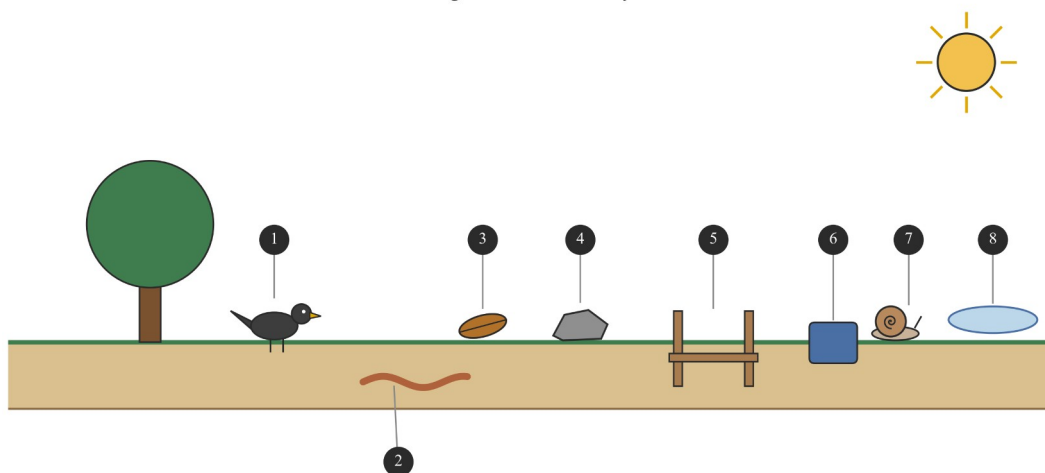
Two Victorian facts about these products:

- The timber can come from a **mountain ash** tree (*Eucalyptus regnans*). The mountain ash is the tallest flowering plant in the world, and it grows in Victoria's forests.
- Victoria has a long wool story. The Australian Sheep and Wool Show is held in Bendigo every year, and Victorian sheep are famous for their soft wool.

Source: Wikipedia, "Eucalyptus regnans" and "Australian wool industry"; Australian Sheep and Wool Show, Bendigo — retrieved 2026-08-20.

Now you try all four groups in one place.

A school garden — sort what you find



For each numbered thing, ask the sorting-test questions: is it living, once living, never living — or a product of a living thing?

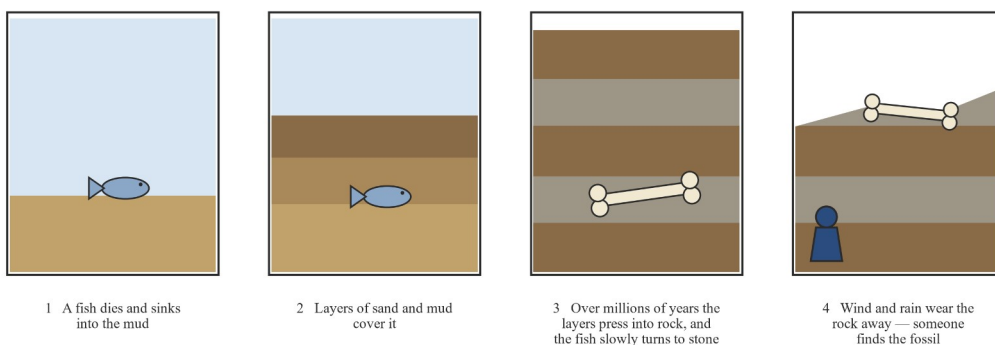
A school garden scene with eight numbered things to sort: a magpie, a worm in the soil, a dry leaf, a rock, a wooden fence, a flower pot, a snail, and a puddle

Activity — sort the school garden. Eight things in the garden are numbered 1 to 8. For each numbered thing, ask the three questions of the sorting test, give the thing a group, and say your reason out loud. One is done for you: **1 — the magpie is living**, because it is alive now and does all five things on our list.

Safety: if you do this outside in a real garden, stay where your teacher can see you. Look with your eyes — do not pick anything up. Wash your hands after the activity.

Fossils — a shape kept in rock

How a fossil can form

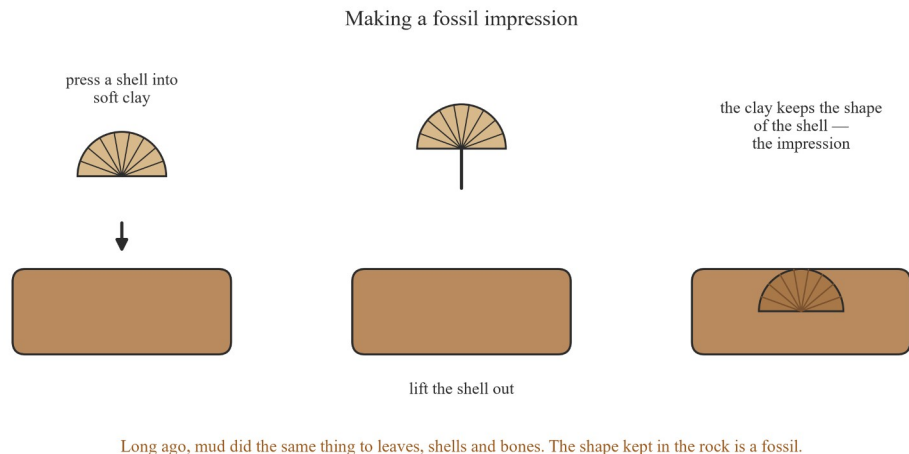


Four panels: a fish dies and sinks into the mud; layers of sand and mud cover it; over a very long time the layers press into rock and the fish turns to stone; wind and rain wear the rock away and someone finds the fossil

A **fossil** is the shape of something that was once living, kept in rock. The diagram shows one way a fossil can form: a fish dies and sinks into the mud; layers of sand and mud cover it; over a very long time the layers press into rock and the fish slowly turns to stone; then wind and rain wear the rock away, and someone finds the fossil.

Where do fossils go in our sort? A fossil shows us something that **was once living**, so we sort fossils under **once living**. That is exactly what the Victorian Curriculum says: “things that were once living, including fossils”.

You can make the same idea happen in class with clay.



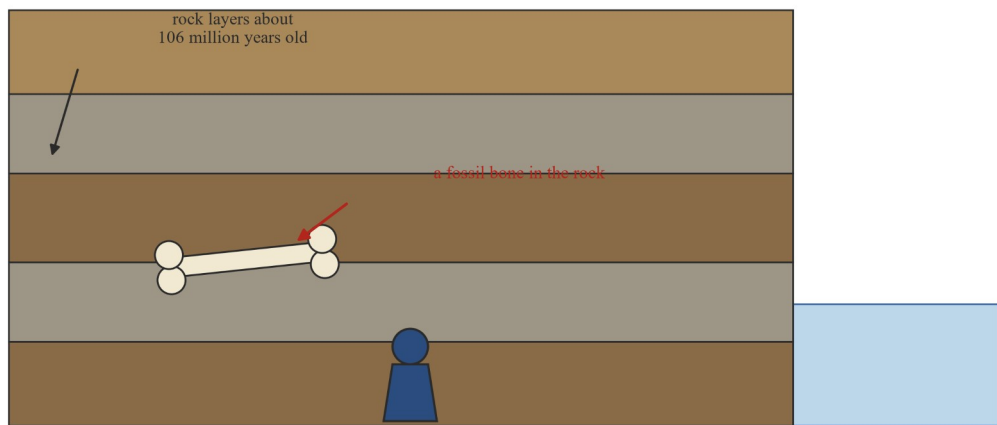
Three steps: press a shell into soft clay, lift the shell out, and the clay keeps the shape of the shell — the impression

Activity — make a fossil impression. Press a shell, a leaf or a flower into soft clay or modelling clay. Lift it out carefully. The clay keeps the shape of the thing — that shape is an **impression**. Long ago, mud did the same thing to leaves, shells and bones, and the mud turned to rock. The shape kept in the rock is a fossil.

Safety: an adult checks shells and leaves for sharp edges first; clay, shells and leaves are not food, so nobody puts them in their mouth; everyone washes their hands after the activity.

A real fossil place in Victoria

A fossil in the rock at Dinosaur Cove, Victoria



Source: Wikipedia, “Dinosaur Cove” and “Koolasuchus” (Eumeralla Formation; fossil emblem of Victoria) — retrieved 2026-08-20.

A cliff at Dinosaur Cove in Victoria: rock layers about 106 000 000 years old, a fossil bone in the rock, and a person standing at the cliff for scale, with the sea beside the rock face

At **Dinosaur Cove**, on Victoria’s coast, the rock layers are about 106 000 000 years old — that is 106 with six zeros after it. People have found dinosaur fossils there, such as *Leaellynasaura*, a small dinosaur with a long tail.

One famous fossil from near Dinosaur Cove is *Koolasuchus cleelandi*. It was not a dinosaur: it was a big animal, about 3 m long, related to frogs, that lived in rivers about 120 000 000 years ago. In 2022, *Koolasuchus* was chosen as Victoria's fossil symbol. Every fossil found there is a shape kept in rock — a clue that something was once living.

Source: Wikipedia, "Dinosaur Cove" and "Koolasuchus" (Eumeralla Formation) — retrieved 2026-08-20.

Words to know in 3A

Word	What it means here
living	alive right now — it does all five things on our list
once living	was alive once, but is not alive any more
never living	was never alive
product of a living thing	never alive itself, but made by or from a living thing
characteristics	the things you can check; a living thing does all of them
sorting test	the three questions that put any thing into its group, with a reason
fossil	the shape of something that was once living, kept in rock
impression	the shape left behind when you press something into clay and lift it out

Worked examples

Example 1 — Scaffolded

Sort these three things into living, once living, never living, or a product of a living thing. Give a reason for each. **A worm in the soil. A wooden chair. A fossil shell in rock.**

Working	Comment
Worm — Is it alive NOW? Yes: it needs food, it grows, and it makes more worms.	The worm does all five things on the list, so it passes the whole check.
Worm → living.	Alive now means living.
Chair — Is it alive NOW? No. Was it EVER alive? No — a chair never lived. Did it come FROM something alive? Yes — it is made of timber, and timber came from a living tree.	Three questions in order. The chair fails the first two and passes the third.
Chair → a product of a living thing.	Never alive itself, but it came from something alive.
Fossil shell — Is it alive NOW? No. Was it EVER alive? Yes — the shell was part of a living animal before it turned to stone.	The fossil is the shape of something that was once living.
Fossil shell → once living.	That is why the Victorian Curriculum puts fossils under "things that were once living".

Example 2 — Scaffolded

A class is sorting a toy robot. Use the five characteristics to explain why the robot is not living, and then use the sorting test to say which group it belongs in.

Working	Comment
Needs food, water and air? No — it needs batteries.	Missing even one thing from our list is enough to fail the "all" rule.
Grows and changes? No — it stays the same size.	A second thing from our list is missing.
Makes more of its own kind? No — robots cannot make baby robots.	A third.

Working	Comment
The robot does not do any of these, so it is not living.	The rule is ALL: a living thing does all five.
Sorting test: alive now? No. Ever alive? No. Came from something alive? No — it is made of metal and plastic, which were never alive.	Three nos.
Robot → never living.	It moves, but moving is not enough.

Example 3 — Unscaffolded

In October, Mia picks a green leaf from a gum tree and presses it in her book. In June she finds the same leaf in the book: dry, brown and crumbly. Say which group the leaf was in at each time, and why.

In October the leaf had just come off the living tree — it was alive, so it was **living** when it was picked, and **once living** from the moment it left the tree. In June the dry leaf in the book is not alive any more, so it is **once living**.

∴ the same leaf changed groups: living on the tree, once living after it was picked. What never living things can never do is become alive — but living things can always become once living.

Example 4 — Unscaffolded

Noah says a jar of honey is once living, “because it came from something alive”. Use the sorting test to check Noah’s claim.

Honey came from something alive — living bees made it. But the sorting test asks its questions **in order**. Is the honey alive NOW? No. Was the honey EVER alive? No — the honey itself was never alive; it is something the bees made. So the honey never reaches “once living”.

∴ Noah’s group is wrong: honey is **a product of a living thing** — never alive itself, but made by living bees. “Came from something alive” only matters after the first two questions both say no.

Practice questions

Scaffolded

Q1. Sort these four things: **an earthworm, a glass marble, a dry leaf, a wooden ruler**. Use the sorting test, and copy the table to give a reason for each choice.

Thing	Alive NOW?	EVER alive?	Came FROM alive?	Group
an earthworm				
a glass marble				
a dry leaf				
a wooden ruler				

Q2. Each picture below shows one of the characteristics of living things. Match each picture to the matching line from our list.

Pictures: **A.** a cat eating its dinner. **B.** a sunflower turning its face toward the Sun. **C.** a duck sitting on her eggs. **D.** a child’s jumper that got too small in one year.

Characteristics: **1.** grows and changes. **2.** needs food, water and air. **3.** makes more of its own kind. **4.** responds to what happens around it.

Q3. A new toy dog walks, barks and wags its tail. (a) Which one thing from our list could the toy dog never do? Name one. (b) What does the word **all** in “the rule is all” tell us about the toy dog? (c) Which group does the toy dog belong in?

Q4. A green leaf is alive on a gum tree in spring. The same leaf is dry on the ground in winter. (a) Which group is the leaf in, in spring? (b) Which group is the same leaf in, in winter? (c) Could the dry leaf ever be living again? Say why.

Q5. A jar of honey sits on the bench. Work through the sorting test out loud. (a) Is the honey alive NOW? (b) Was the honey EVER alive? (c) Did the honey come FROM something alive? Name the living thing. (d) Which group does the honey belong in?

Q6. A class finds a fossil bone in a rock. (a) Which of the three sorting-test questions tells us the bone was part of something alive? (b) Which group do fossils belong in? (c) What does a fossil show us about the past?

Unscaffolded

Q7. Sort these six things, with a reason for each: **a bee, a shell with no animal in it on the beach, a clay pot, a plastic flower, a river, a fallen log.**

Q8. Four things can move: **a cloud, a car, a river and a rabbit.** Three of them are not alive. For each one that is not alive, name two characteristics from our list that it is missing.

Q9. Match each thing to its group.

Things: **A.** a feather on the grass. **B.** a bluestone rock. **C.** a snail. **D.** a woollen jumper. **E.** a dry gum leaf. **F.** a puddle of rain water.

Groups: **1.** living. **2.** once living. **3.** never living. **4.** a product of a living thing.

Q10. Say whether each sentence is right or wrong. If it is wrong, fix it. 1. A dry leaf on the ground is living because it was once part of a tree. 2. A glass marble is never living. 3. A wooden chair is once living because the tree it came from was alive. 4. A fossil is the shape of something that was once living, kept in rock.

Q11. The products diagram shows three chains: sheep → wool → jumper, bees → honey → jar, tree → timber → chair. (a) In the first chain, name the thing that is living. (b) Name the thing in that chain that is a product. (c) Was the wool itself ever alive? What group does the wool belong in?

Q12. Look at the leaf-story diagram in the Theory. (a) Name the two times of the year when the leaf is once living. (b) The leaf ends up crumbled into the soil. Which group is the soil in? (c) Write the big rule about living and never living things from this part of the Theory.

Q13. In the activity, a class presses a shell into soft clay and lifts it out. (a) What is the name of the shape the clay keeps? (b) Long ago, what did the same job as the clay? (c) What is the shape called once the mud has turned to rock?

Q14. At Dinosaur Cove in Victoria, the rock layers are about 106 000 000 years old. (a) Write that number in words of your own: how many zeros follow the 106? (b) Name one dinosaur whose fossil was found at Dinosaur Cove. (c) Fossils in the rock are a clue to what?

Q15. *Koolasuchus cleelandi* is a famous fossil from near Dinosaur Cove. (a) Was *Koolasuchus* a dinosaur? (b) About how long was it? (c) What job does *Koolasuchus* have for Victoria today?

Q16. A friend says, “A fossil bone is never living, because the bone is rock now.” Use the sorting test to explain why we sort a fossil under once living instead.

Q17. A fallen log lies in the garden. A carpenter makes a bench from a cut of the same tree. (a) Which group is the fallen log in? Say why. (b) Which group is the wooden bench in? Say why. (c) What is the difference between those two groups, in one sentence?

Q18. Sort all eight of these things, with a reason for each: **a magpie, a fossil shell, a honey jar, a marble, a gum tree, a dry leaf, a robot toy, a worm.** Use all four groups at least once.

Answers

Q1. Earthworm: yes / — / — / living. Glass marble: no / no / no / never living. Dry leaf: no / yes / — / once living. Wooden ruler: no / no / yes / a product of a living thing. (The ruler is made of wood, which came from a living tree.)
Q2. A–2, B–4, C–3, D–1. **Q3.** (a) any one, e.g. it never grows; it does not need food; it cannot make baby toy dogs by itself; (b) a living thing must do ALL five things, and the toy dog does not really do any of them, so it is not living; (c) never living. **Q4.** (a) living; (b) once living; (c) no — something that is once living can never be living again; only never-living things stay never living, and once-living things stay once living. **Q5.** (a) no; (b) no — the honey itself was never alive; (c) yes — living bees; (d) a product of a living thing. **Q6.** (a) “Was it EVER alive?” — yes, the bone was part of a living animal; (b) once living; (c) it shows us that something was once living there, a very long time ago. **Q7.** Bee: living (alive now, does all five). Shell on the beach: once living (it was part of a living animal). Clay pot: never living (clay comes from the ground, which was never alive). Plastic flower: never living (plastic was never alive). River: never living (water was never alive; moving is not enough). Fallen log: once living (it was part of a living tree).
Q8. Cloud: does not need food, does not grow, cannot make more clouds. Car: needs fuel not food, never grows, cannot make baby cars. River: does not need food or air, does not grow or make more rivers. (Any two missing characteristics each.) The rabbit is the living one. **Q9.** A–2, B–3, C–1, D–4, E–2, F–3. **Q10.** 1 wrong — a dry leaf is once living, not living. 2 right. 3 wrong — the chair was never alive itself; it is a product of a living thing. 4 right. **Q11.** (a) the sheep; (b) the jumper (the wool is the product too — the jumper is made from it); (c) no — wool was never alive itself; it is a product of a living thing. **Q12.** (a) autumn and winter; (b) never living; (c) something that is living can become once living, but something that is never living can never become alive. **Q13.** (a) an impression; (b) mud; (c) a fossil. **Q14.** (a) six zeros; (b) *Leaellynasaura*; (c) a clue that something was once living there. **Q15.** (a) no — it was a big animal related to frogs; (b) about 3 m; (c) it is Victoria’s fossil symbol. **Q16.** The bone was part of a living animal, so “Was it EVER alive?” is yes — once living. The rock kept the shape; it did not change which group the thing belongs in. **Q17.** (a) once living — it was part of a living tree and is not alive now; (b) a product of a living thing — it was never alive itself, but it was made from the living tree’s timber; (c) once living things were alive themselves, and products were never alive but came from something alive. **Q18.** Magpie: living. Worm: living. Gum tree: living. Dry leaf: once living. Fossil shell: once living. Honey jar: a product of a living thing. Marble: never living. Robot toy: never living.

Fully-worked answers

Q1. Run each thing through the three questions in order. The earthworm is alive NOW — it needs food, grows and makes more worms — so it stops at question 1: **living**. The glass marble is not alive now, was never alive, and came from sand, which was never alive: three nos, so **never living**. The dry leaf is not alive now but WAS alive on the tree: **once living**. The wooden ruler is not alive now and was never alive itself, but it came from timber, and timber came from a living tree: **a product of a living thing**.

Q2. A cat eating shows **needs food, water and air** (A–2). A sunflower turning to the Sun shows **responds to what happens around it** (B–4). A duck on her eggs shows **makes more of its own kind** (C–3). A jumper that got too small shows **grows and changes** (D–1) — the child grew, not the jumper!

Q3. (a) Any one thing from our list the toy can never really do: e.g. it does not need food, it never grows, or it cannot make more toy dogs by itself. (b) “The rule is all” means a living thing must do every one of the five things; the toy dog only copies one of them (moving), so it fails the check. (c) It was never alive and did not come from anything alive, so it is **never living**.

Q4. (a) On the tree the leaf is alive, so **living**. (b) Dry on the ground it is not alive any more but was alive once, so **once living**. (c) No. The big rule says something living can become once living, but nothing once living or never living can become alive again.

Q5. (a) The honey on the bench is not alive now: no. (b) The honey itself was never alive: no. (c) It came FROM something alive: yes — living bees made it. (d) No, no, yes in order means **a product of a living thing**.

Q6. (a) Question 2, “Was it EVER alive?” — yes: before it turned to stone, the bone was part of a living animal. (b) Fossils sort under **once living**, just as the Victorian Curriculum says. (c) A fossil shows us that something was once living in that place, a very long time ago.

Q7. Ask the three questions of each. The bee is alive now: **living**. The empty shell was part of a living animal: **once living**. The clay pot came from the ground, which was never alive: three nos, **never living**. The plastic flower was never alive and plastic did not come from anything alive: **never living**. The river moves but water was never alive: **never living** — moving is not enough. The fallen log was part of a living tree: **once living**.

Q8. Name any two missing characteristics for each non-living mover. A cloud does not eat or drink and cannot make more clouds by itself. A car needs fuel, not food, and never grows. A river does not need air and does not grow. The rabbit needs food, grows, makes more rabbits and responds to the world, so the rabbit is the only living thing of the four.

Q9. A feather grew on a living bird: **2** once living. A bluestone rock was never alive: **3** never living. A snail is alive now: **1** living. A woollen jumper came from a living sheep but was never alive itself: **4** product. A dry gum leaf was alive on the tree: **2** once living. A puddle is water, which was never alive: **3** never living.

Q10. 1 is wrong: a dry leaf is **once living** — it was alive on the tree but is not alive now. 2 is right: a marble was never alive. 3 is wrong: the chair was never alive itself, so it cannot be once living; it is **a product of a living thing**. 4 is right: that is exactly what a fossil is.

Q11. (a) The sheep is the living thing in the first chain. (b) The jumper is the product (the wool is what the jumper is made from, and the wool is a product too). (c) The wool was never alive itself — it grew on a living sheep, so the wool is **a product of a living thing**, not once living.

Q12. (a) The leaf is once living in autumn (fallen and turning yellow-brown) and in winter (dry on the ground). (b) The soil is **never living** — it was never alive. (c) The rule: something that is living can become once living, but something that is never living can never become alive.

Q13. (a) The shape the clay keeps is an **impression**. (b) Long ago, **mud** did the same job — things pressed into it and their shapes were kept. (c) Once the mud turned to rock, the kept shape is a **fossil**.

Q14. (a) 106 000 000 is 106 followed by **six** zeros. (b) *Leaellynasaura*, a small dinosaur with a long tail. (c) The fossils are a clue that living things were there about 106 000 000 years ago — the rock keeps their shapes.

Q15. (a) No — *Koolasuchus* was not a dinosaur; it was a big animal related to frogs that lived in rivers. (b) About **3 m** long. (c) In 2022 it was chosen as Victoria's fossil symbol.

Q16. The sorting test asks questions in order. Is the fossil bone alive now? No. Was it EVER alive? Yes — before it turned to stone, the bone was part of a living animal. So the test stops at question 2 with **once living**. Turning to stone kept the shape; it did not change the bone's story. "Never living" is only for things that were never alive at all.

Q17. (a) The fallen log was part of a living tree and is not alive now: **once living**. (b) The bench was never alive itself — a carpenter made it from timber, and timber came from the living tree: **a product of a living thing**. (c) The difference: once-living things were alive themselves, and products were never alive but were made by or from something alive.

Q18. Work through the sorting test for each. The magpie, the worm and the gum tree are alive now: **living**. The dry leaf was alive on the tree, and the fossil shell was part of a living animal: both **once living**. The honey jar was never alive itself but came from living bees' honey: **a product of a living thing**. The marble was never alive, and the robot toy was never alive and did not come from anything alive: both **never living**. All four groups used, and every choice has its reason.

Life cycles, parents and offspring

What we teach here — VC2S4U02 (Victorian Curriculum F–10 Version 2.0, Science, Levels 3 and 4):

“plants and animals have different life cycles; offspring are similar, but not identical, to their parents”. **In**

our words: Every plant and animal goes through its own life cycle — the steps of its life, in order, from the start of one life to the start of the next. The young of a plant or animal look like their parents, but they are never exactly the same as them.

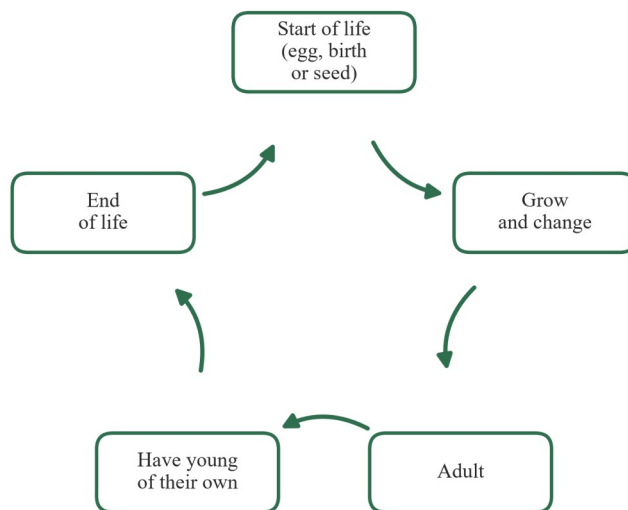
Theory

What is a life cycle?

A **life cycle** is the set of **stages** a living thing goes through, from the start of its life to the end of its life. A stage is one part of a life. Being born or hatching, growing, and having young of your own are all stages.

Every plant and animal has a life cycle, and every life cycle is a loop. That is why we draw it as a circle: the young grow up and have young of their own, and the cycle starts again.

The life cycle of an animal



The young start the cycle all over again.

A loop diagram with five boxes joined by arrows in a circle: start of life (egg, birth or seed), grow and change, adult, have young of their own, and end of life. A caption says the young start the cycle all over again.

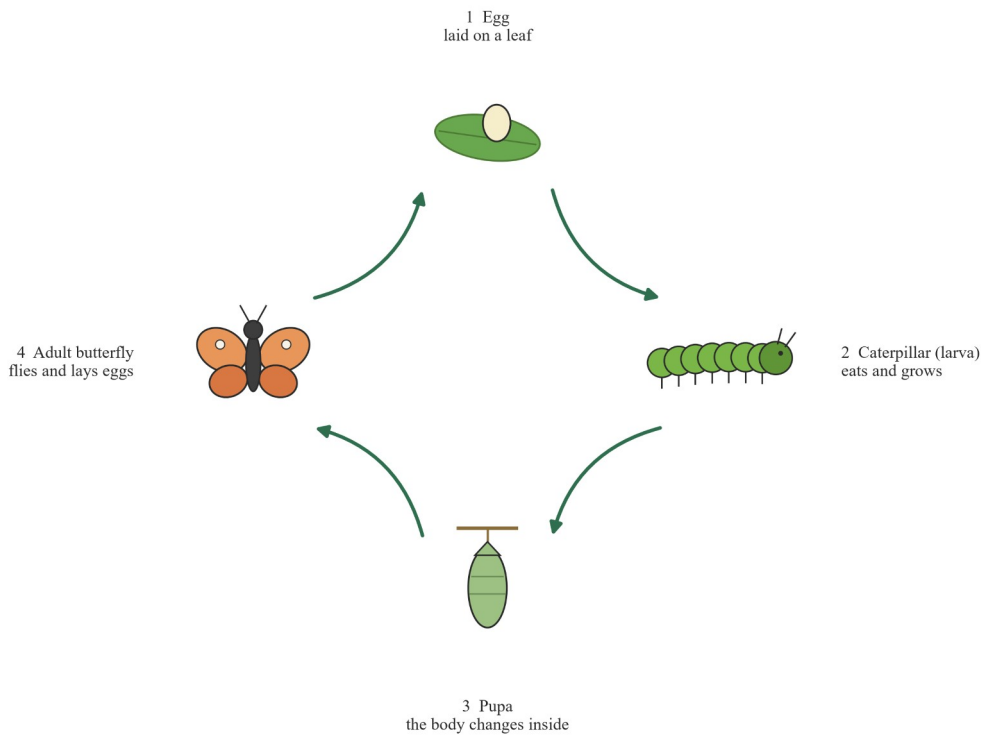
A life cycle with a big change: the butterfly

Some animals change a lot as they grow. A life cycle with a big change is called **metamorphic**. In a metamorphic life cycle, the young look nothing like the adults.

The butterfly is the best-known example. It has four stages:

1. **Egg** — the female lays tiny eggs on a leaf.
2. **Larva** — a caterpillar hatches from the egg. The **larva** is the eating and growing stage. A caterpillar eats leaves and grows very fast.
3. **Pupa** — the caterpillar forms a **pupa**, the stage where the body is rebuilt inside a hard case. (Many moth larvae also spin silk around their pupa. That silk case is a **cocoon**.)
4. **Adult** — a butterfly with wings comes out of the pupa. The adult flies, feeds and lays eggs, and the cycle starts again.

The life cycle of a butterfly — a big change at each stage

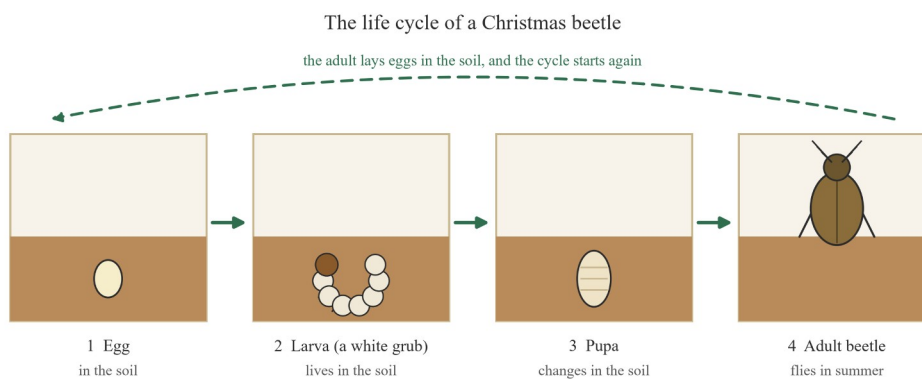


Cycle diagram of the butterfly life cycle with four stages joined by arrows in a loop: an egg laid on a leaf, a caterpillar (larva) that eats and grows, a pupa hanging from a twig where the body changes inside, and an adult butterfly that flies and lays eggs.

The adult butterfly looks nothing like the caterpillar it was. That big change is what *metamorphic* means.

More metamorphic life cycles: the Christmas beetle and the frog

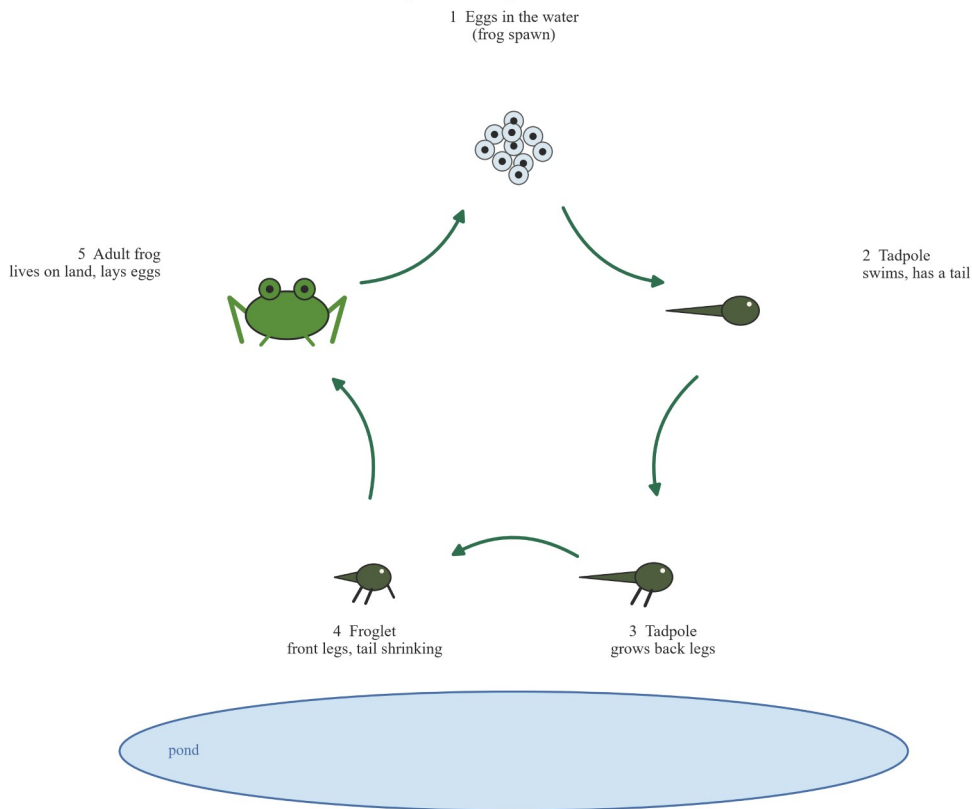
Beetles are insects like butterflies, and their life cycle works the same way. The Christmas beetle, which you see flying around gum trees in summer, spends its early stages in the soil: egg, then a white grub (the larva), then a pupa, then the shiny adult beetle.



Four panels in a row joined by arrows, with a dashed arrow looping back to the start: an egg in the soil, a white C-shaped grub (larva) living in the soil, a pupa changing in the soil, and an adult Christmas beetle that flies in summer.

Frogs are not insects, but they are metamorphic too. A frog lays its eggs in water, in a jelly mass called **spawn** (or frogspawn). The young that hatch are **tadpoles**: they have tails, no legs, and they swim and breathe in the water. A tadpole grows back legs, then front legs, and its tail shrinks. A young frog with a shrinking tail is a **froglet**. At last the tail is gone and an **adult frog** lives on land and lays eggs in the water again.

The life cycle of a frog — from water to land



Cycle diagram of the frog life cycle above a pond, with five stages joined by arrows in a loop: eggs in the water (frog spawn), a tadpole that swims and has a tail, a tadpole growing back legs, a froglet with front legs and a shrinking tail, and an adult frog that lives on land and lays eggs.

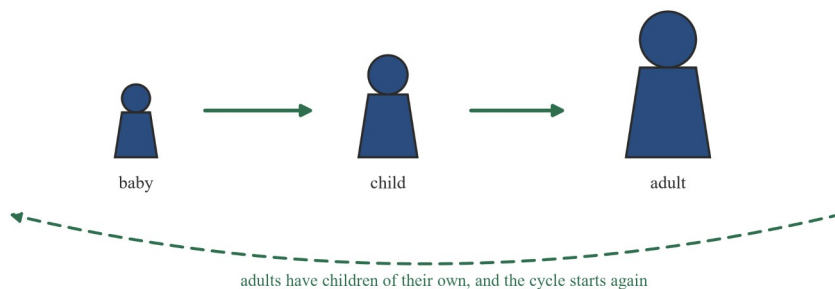
A caterpillar, a grub and a tadpole look nothing like their adults. Metamorphic life cycles always work like that: the young and the adult are different shapes, and they often eat, move and live in different ways too.

A life cycle with a small change: us

Not every animal changes shape as it grows. A life cycle where the young look like a small adult is **non-metamorphic**.

Think about your own life cycle: baby, child, adult. A baby looks like a person. A child looks like a person. Nobody grows wings or a tail! We just grow, and our bodies fill out. That is a small change, so our life cycle is non-metamorphic.

Our own life cycle — we do not change shape as we grow

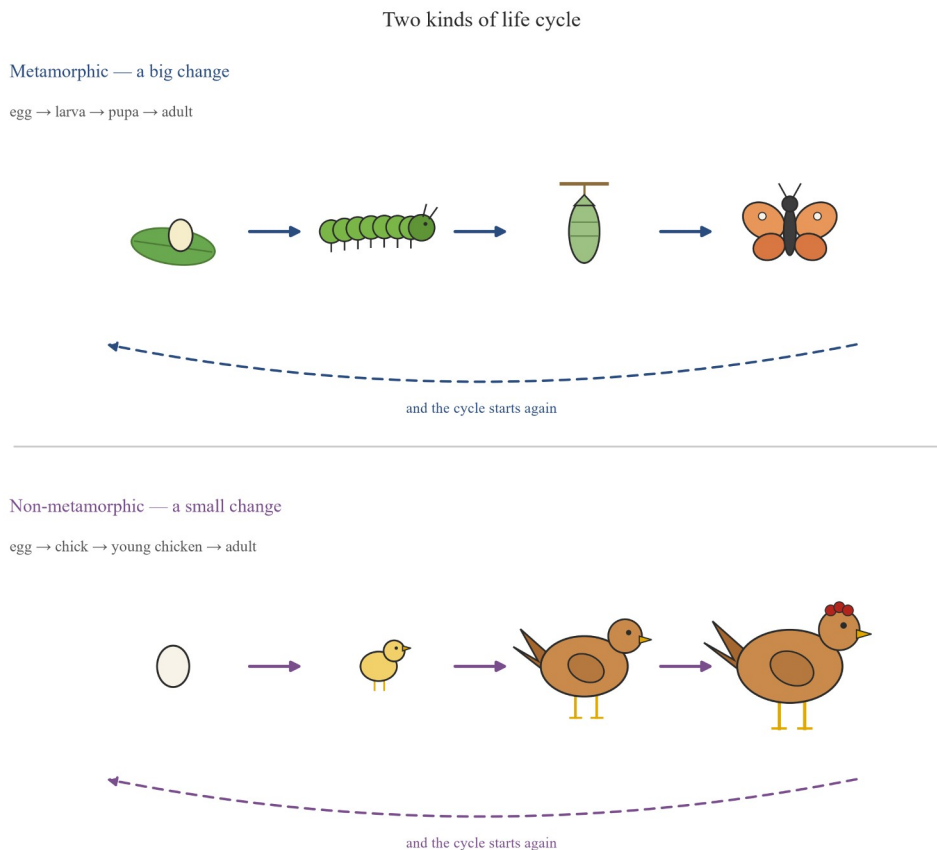


Three simple figures in a row joined by arrows, with a dashed arrow looping back: a baby, a child and an adult, all the same human shape at three sizes. A caption says adults have children of their own and the cycle starts again.

Chickens are non-metamorphic too. A chick hatches from the egg covered in fluff, but it already has a beak, two wings and two legs, and it looks like a small chicken. It grows into a young chicken, then a full-grown adult hen or rooster.

Comparing the two kinds of life cycle

Here are the two kinds side by side. In the metamorphic cycle, each stage is a different shape. In the non-metamorphic cycle, every stage is the same shape, just a different size.



Two rows for comparison. Top row, labelled metamorphic (a big change): egg on a leaf, caterpillar, pupa and adult butterfly joined by arrows, with a dashed arrow looping back. Bottom row, labelled non-metamorphic (a small change): egg, fluffy chick, young chicken and adult chicken joined by arrows, with a dashed arrow looping back.

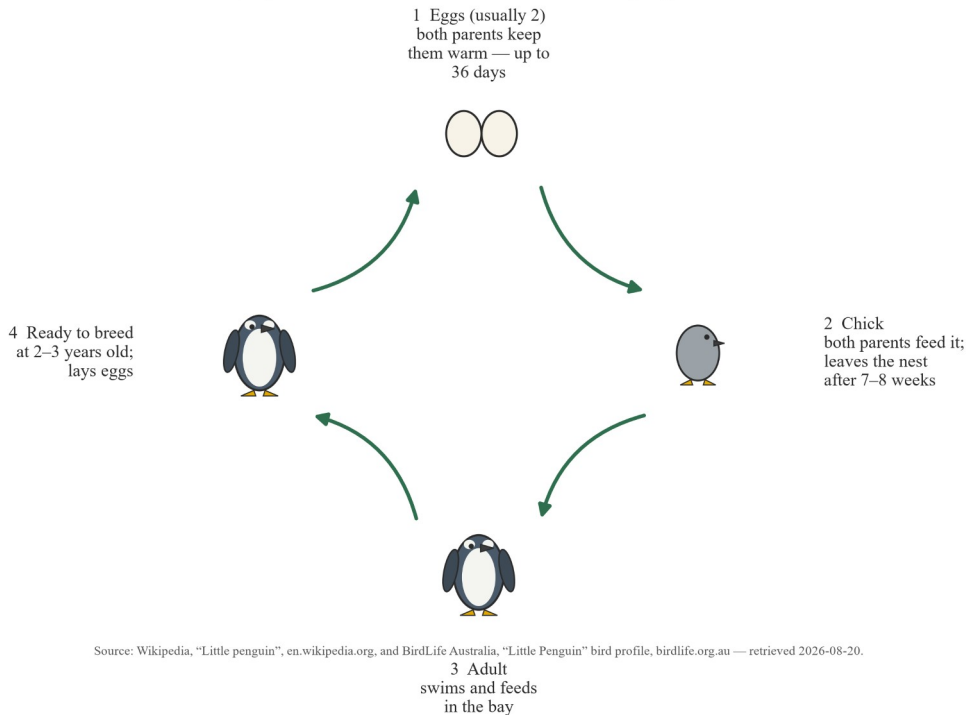
Frogs, butterflies, beetles and moths are metamorphic. Humans, chickens, dogs, penguins and most birds and mammals are non-metamorphic: their young are born or hatched looking like their parents.

A Victorian life cycle: the little penguin

The little penguin is the smallest penguin in the world, and it breeds right in Melbourne, at the St Kilda breakwater in Port Phillip Bay. People watch the penguins come ashore there at night. The colony has been studied for many years, so we know its life cycle well.

The life cycle of the little penguin

Little penguins breed at the St Kilda breakwater in Port Phillip Bay, Melbourne.



Cycle diagram of the little penguin life cycle with four stages joined by arrows in a loop: usually two eggs kept warm by both parents for up to 36 days, a fluffy chick that both parents feed until it leaves the nest after 7 to 8 weeks, an adult that swims and feeds in the bay, and an adult ready to breed at 2 to 3 years old. A source line names Wikipedia and BirdLife Australia, retrieved 2026-08-20.

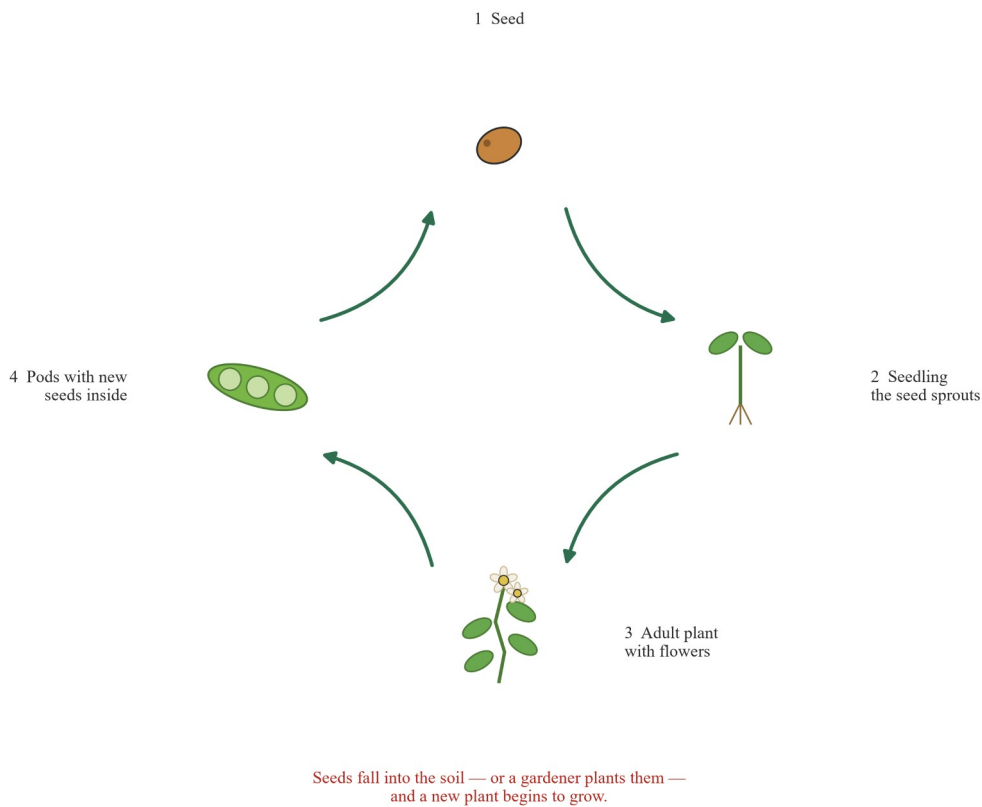
- The female lays one or two eggs, and **both parents** take turns keeping them warm for up to 36 days.
- The chicks hatch covered in fluff. Both parents feed them until they leave the nest after 7–8 weeks.
- The young penguins go to sea to feed and grow. They come back to the colony ready to breed at 2–3 years old.

The penguin's life cycle is non-metamorphic: a chick has the same body shape as its parents, just fluffier and not as big. (Source: Wikipedia, "Little penguin", en.wikipedia.org, and BirdLife Australia, "Little Penguin" bird profile, birdlife.org.au — retrieved 20 August 2026.)

Plants have life cycles too

The life cycle of a plant starts at a seed. A bean plant's cycle goes like this: a **seed** starts to grow; a young **seedling** puts down roots and grows leaves; the **adult plant** grows flowers; and the flowers become **pods** with new seeds inside. The new seeds fall into the soil — or a gardener plants them — and a new plant begins to grow.

The life cycle of a bean plant



Cycle diagram of the bean plant life cycle with four stages joined by arrows in a loop: a seed, a seedling with two leaves and roots, an adult plant with flowers, and a pod with new seeds inside. A caption says seeds fall into the soil, or a gardener plants them, and a new plant begins to grow.

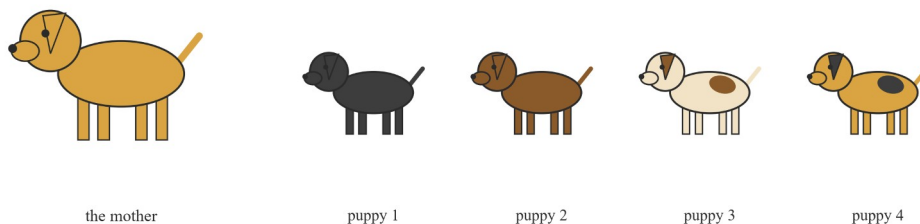
Plants also change only a little as they grow: a seedling is a small plant, the same shape as its parent plant. (Some plants, like ferns, do have a big change in their cycle, but that is a story for another year.)

Offspring: similar but not identical

The young of a plant or animal are its **offspring**. The mother and father are the **parents**. Here is the big idea of this section: offspring are **similar** to their parents, but not **identical**. Identical means exactly the same in every way.

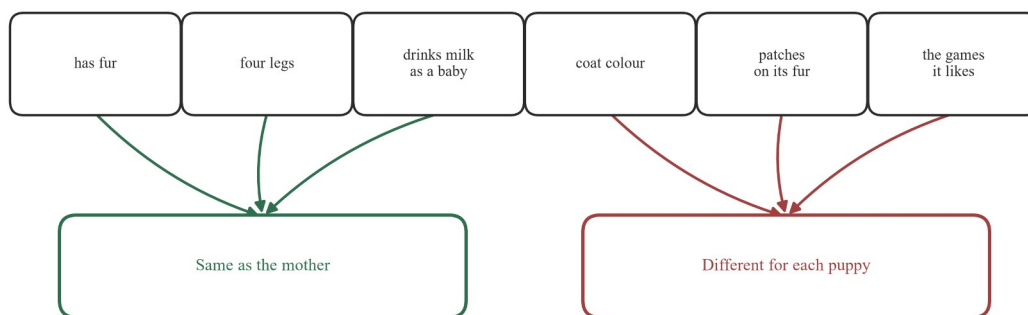
Look at this dog family. All four puppies are similar to their mother: they all have fur, four legs, floppy ears and a tail. But no puppy is identical to her, or to each other. One is black, one is brown, one is cream with a brown patch, and one is golden with a dark patch.

One family of puppies — similar to their mother, but not identical



A mother dog drawn at the left and her four puppies at the right in a row. The mother is golden; the puppies are black, brown, cream with a brown patch, and golden with a dark patch, so each one looks like the mother in shape but is different in coat colour and patches.

What do the puppies share, and what is different?



A sorting diagram. Six cards across the top read: has fur, four legs, drinks milk as a baby, coat colour, patches on its fur, the games it likes. Arrows sort the first three into a green box labelled same as the mother, and the last three into a red box labelled different for each puppy.

The same is true of plants. Seeds from one parent plant grow into seedlings that are similar to the parent and to each other — same kind of leaves, same kind of flowers — but no two seedlings are identical. One might grow a little taller, or flower a little sooner.

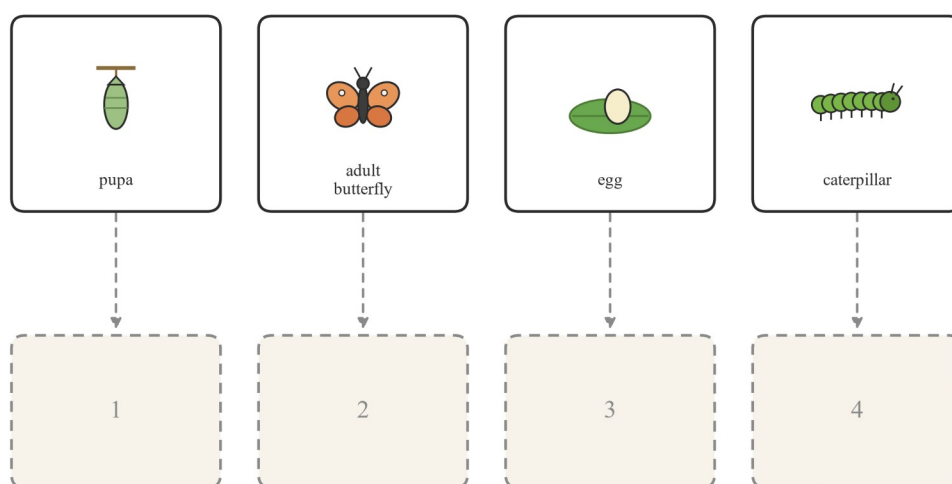
That is the whole of VC2S4U02 in one sentence: plants and animals have different life cycles, and offspring are similar to their parents but not identical to them.

Showing a life cycle

You can show the stages of a life cycle in lots of ways: as drawings, as digital photographs, as a graphic organiser like the loop diagrams in this section, or as a physical model you build. Any of these is a good way to show a cycle.

Here is the skill as a puzzle. The four cards show the stages of the butterfly's cycle mixed up. Your job is to put each card into the right numbered space.

Can you put the butterfly's stages in order?

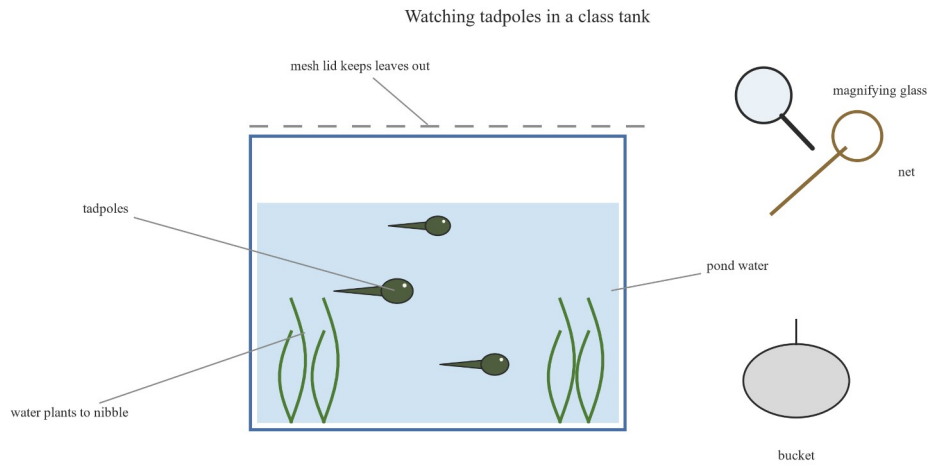


Draw the stages, or use stage cards, and number them 1 to 4.

A sorting puzzle. Four cards across the top show a pupa, an adult butterfly, an egg on a leaf, and a caterpillar, in that mixed-up order. Below are four dashed empty boxes numbered 1 to 4, with a dashed arrow from each card down to the box beneath it, and a caption: draw the stages, or use stage cards, and number them 1 to 4.

Investigation: watch tadpoles grow

With your teacher, you can watch a metamorphic life cycle happen in your own classroom. A tank of frogspawn becomes a tank of tadpoles, and over some weeks you can watch legs grow and tails shrink.



A labelled diagram of a class tank for watching tadpoles: a glass tank of pond water with water plants and three tadpoles, a mesh lid on top that keeps leaves out, and beside the tank a net, a magnifying glass and a bucket.

- Set up the tank with pond water and water plants for the tadpoles to nibble.
- Put a mesh lid on top so leaves and other things stay out.
- Watch the tadpoles each week with a magnifying glass, and record what you see.

Week	What we see
1	eggs hatch; tadpoles have tails and no legs
3	tadpoles have grown; back legs start to grow
6	front legs grow; tails shrink; they become froglets

Safety and care: collect frogspawn only with your teacher, and only where it is allowed. Wash your hands after touching anything from the tank. Be gentle — tadpoles are living things. When you are done, take everything back to the pond it came from.

Words to know in 3B

Word	What it means here
life cycle	the stages a living thing goes through, from the start of its life to the start of the next
stage	one part of a life cycle
metamorphic	a life cycle with a big change; the young look nothing like the adult
non-metamorphic	a life cycle with a small change; the young look like small adults
egg	the stage many animal life cycles start from
larva	the eating and growing stage of a metamorphic animal, like a caterpillar or a grub
pupa	the stage of a butterfly or beetle where the body is rebuilt inside a hard case
cocoon	the silk case many moth larvae spin around their pupa
spawn (frogspawn)	the jelly mass of frog eggs laid in water
tadpole	the young frog: it has a tail, no legs, and lives in water
froglet	a young frog with legs and a shrinking tail
adult	the full-grown stage of a life cycle

Word	What it means here
offspring	the young of a plant or animal
parent	the mother or father of offspring
identical	exactly the same in every way
colony	a group of animals, like penguins, that live and breed together in one place
breakwater	a wall built out into the sea to keep the water near the land calm

Worked examples

Example 1 — scaffolded

Put these stages of the frog's life cycle in order, starting from the egg: *adult frog, froglet, tadpole, spawn*.

Working	Comment
The cycle starts with eggs in the water: spawn .	The egg is stage 1 of the frog cycle.
The eggs hatch into tadpoles , which swim with their tails.	The young frog looks nothing like the adult — the frog is metamorphic.
A tadpole with legs and a shrinking tail is a froglet .	Back legs grow first, then front legs.
The tail is gone in the adult frog , which lives on land.	The adult lays eggs, and the cycle starts again.
So the order is: spawn → tadpole → froglet → adult frog.	

Example 2 — scaffolded

A class is sorting animals into metamorphic and non-metamorphic. Sort these: *butterfly, chicken, frog, human*.

Working	Comment
Butterfly: the young is a caterpillar, nothing like the adult.	Big change → metamorphic.
Frog: the young is a tadpole, nothing like the adult.	Big change → metamorphic.
Chicken: a chick looks like a small chicken.	Small change → non-metamorphic.
Human: a baby looks like a person.	Small change → non-metamorphic.

So the metamorphic animals are the butterfly and the frog; the non-metamorphic animals are the chicken and the human.

Example 3 — unscaffolded

A mother dog with a golden coat has four puppies. Two puppies have golden coats, one has a black coat, and one has a cream coat with brown patches. (a) Give one way all four puppies are similar to their mother. (b) Give one way the puppies are not identical to their mother.

- (a) Every puppy has fur, four legs, floppy ears and a tail, just like the mother — offspring are similar to their parents. (b) The puppies' coat colours and patches are not the same as the mother's golden coat — offspring are never identical to their parents. ∴ The puppies are similar to their mother, but not identical.

Practice questions

Scaffolded

Q1. Name the stage of the butterfly's life cycle that comes straight after the caterpillar.

Q2. Fill in the blank: a life cycle where the young look nothing like the adult is called a _____ life cycle.

Q3. Put these stages of the Christmas beetle in order, starting from the egg: *adult beetle, pupa, larva (grub), egg*.

Q4. From this section, name two metamorphic animals and two non-metamorphic animals.

Q5. True or false: a little penguin chick has the same body shape as its parents.

Q6. Name the stage of the bean plant's life cycle that holds the new seeds.

Un scaffolded

Q7. A tadpole and an adult frog live in different ways. Give one way a tadpole's body suits life in the water.

Q8. At the St Kilda breakwater, how long do little penguin parents keep their eggs warm?

Q9. A little penguin hatches, goes to sea, and comes back to the colony to breed. At what age is it ready to breed?

Q10. Is the little penguin's life cycle metamorphic or non-metamorphic? Give a reason for your answer.

Q11. Explain why we draw a life cycle as a loop, not as a straight line.

Q12. A class grows bean plants from seeds of one parent plant. The seedlings are similar to the parent plant, but no two are identical. Give one way they are similar and one way they can differ.

Q13. Look at the dog family figure. One puppy is cream with a brown patch. Give two ways that puppy is still similar to its golden mother.

Q14. A friend says, "A caterpillar and a butterfly cannot be the same animal — they look nothing like each other." Use the idea of a metamorphic life cycle to answer your friend.

Q15. Which kind of life cycle does a chicken have? Give a reason from its cycle.

Q16. Use the stage-sort puzzle in this section: write the correct stage name under each number, 1 to 4.

Answers

Q1. The pupa. **Q2.** Metamorphic. **Q3.** Egg → larva (grub) → pupa → adult beetle. **Q4.** Any two of: butterfly, Christmas beetle, frog (metamorphic); any two of: human, chicken, little penguin, dog (non-metamorphic). **Q5.** True. **Q6.** The pod. **Q7.** Any one of: it has a tail for swimming; it has no legs; it lives and breathes in the water. **Q8.** Up to 36 days. **Q9.** At 2–3 years old. **Q10.** Non-metamorphic, because the chick has the same body shape as its parents — it just grows. **Q11.** Because the young grow up and have young of their own, so the cycle starts again; there is no true end point. **Q12.** Similar: same kind of leaves or flowers as the parent. Different: one seedling may grow taller, or flower sooner, than another. **Q13.** Any two of: it has fur; four legs; floppy ears; a tail; the same body shape as its mother. **Q14.** They are the same animal at different stages: the caterpillar is the larva stage, and it becomes the butterfly after the pupa stage — that big change is a metamorphic life cycle. **Q15.** Non-metamorphic: a chick hatches looking like a small chicken and just grows. **Q16.** 1 = egg, 2 = caterpillar (larva), 3 = pupa, 4 = adult butterfly.

Fully-worked answers

Q1. The butterfly's cycle runs egg → caterpillar (larva) → pupa → adult. The stage straight after the caterpillar is the **pupa**.

Q2. A big change, with young that look nothing like the adult, is exactly what **metamorphic** means.

Q3. From the beetle figure: the egg is laid in the soil; it hatches into the larva (a white grub); the larva changes into the pupa; the adult beetle comes out. So: **egg → larva (grub) → pupa → adult beetle**.

Q4. Metamorphic (young nothing like the adult): **butterfly, Christmas beetle, frog**. Non-metamorphic (young look like small adults): **human, chicken, little penguin, dog**. Any two from each list.

Q5. True. A penguin chick is fluffier and not as big, but it has the same body shape as its parents, so the penguin is non-metamorphic.

Q6. The new seeds grow inside the **pods** on the adult plant.

Q7. A tadpole has a **tail for swimming** (and no legs), which suits life in the water; the adult frog has legs and no tail, which suits life on land. That big change makes the frog metamorphic.

Q8. Both parents take turns keeping the eggs warm for **up to 36 days**.

Q9. The young penguin is ready to breed at **2–3 years old**, when it comes back to the colony.

Q10. Non-metamorphic. The chick hatches with the same body shape as its parents — a beak, two wings, two flippers — and only grows, so the change is small.

Q11. A straight line has an end, but a life cycle does not truly end: the adult has young of its own and those young start the same cycle again. That is why the diagram closes into a **loop**.

Q12. The seedlings come from one parent plant, so they are **similar** to it — for example, the same kind of leaves and flowers. They are **not identical**: one seedling may grow taller or flower sooner than the others, and no two seedlings are exactly the same.

Q13. The cream puppy still has **fur, four legs, floppy ears and a tail**, and the same body shape as its mother — so it is similar to her. Its coat colour and patch make it not identical to her.

Q14. The caterpillar and the butterfly are the **same animal at different stages** of one metamorphic life cycle: the caterpillar is the larva, which forms a pupa, and the adult butterfly comes out of the pupa. Looking so different is exactly what metamorphic means.

Q15. A chicken's cycle is egg → chick → young chicken → adult. A chick already looks like a small chicken, so the change as it grows is small: a **non-metamorphic** life cycle.

Q16. Reading the cycle in order from the egg: **1 = egg, 2 = caterpillar (larva), 3 = pupa, 4 = adult butterfly**. ∴ The mixed-up cards go: egg in space 1, caterpillar in space 2, pupa in space 3, adult butterfly in space 4.

Producers, consumers, decomposers and food chains

What we teach here — VC2S4U03 (Victorian Curriculum F–10 Version 2.0, Science, Levels 3 and 4):

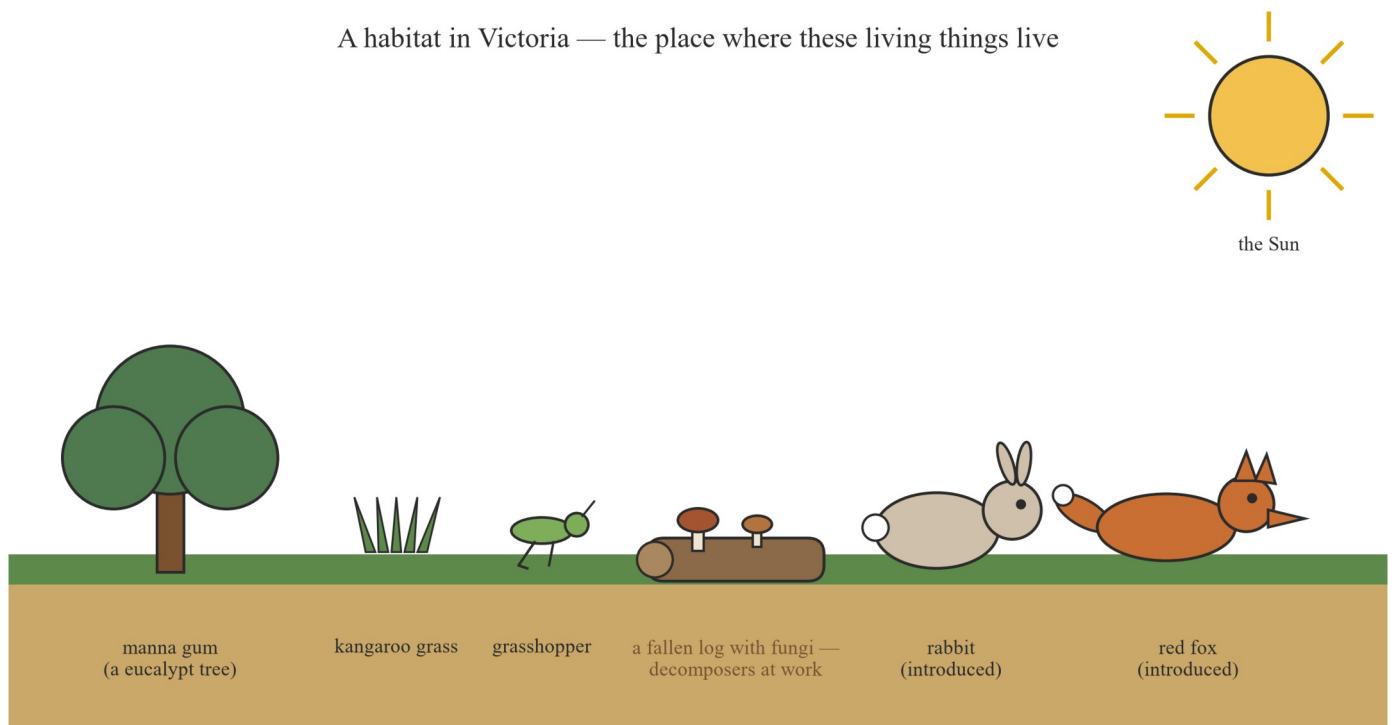
“consumers, producers and decomposers have different roles and interactions within a habitat; food chains can be used to represent feeding relationships”. **In our words:** Every living thing in a habitat has a job to do with food. Some living things make food, some eat food, and some clean up what is left when living things die. A food chain is a drawing that shows who eats what, and its arrows always point the same way.

Theory

A habitat is a home with everything in it

A **habitat** is the place where living things live. It takes in everything found there: the plants, the animals, the soil, the water, and the places to hide and to rest. In Victoria, a habitat might be a eucalypt forest, a river, a rocky coast, or the grassy plains of the west.

A habitat in Victoria — the place where these living things live



Producers, consumers and decomposers all live together in this one habitat.

A labelled drawing of a Victorian habitat showing a manna gum, kangaroo grass, a grasshopper, a fallen log with fungi, a rabbit and a red fox, with the Sun above

All of these living things share one habitat, and each of them has a job to do with food.

A close look at a real habitat. A schoolyard, a park or a creek is a habitat too. If you want to look at one up close, go with a teacher or another adult. Wear gloves if you lift a log, put everything back gently, wash your hands afterwards, and never taste anything you find.

Three jobs: producer, consumer, decomposer

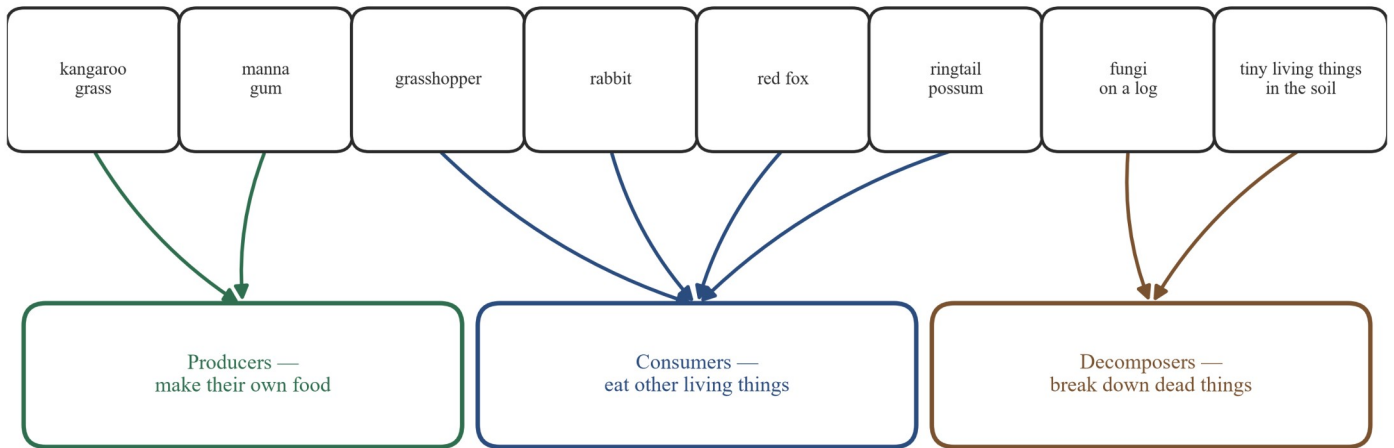
Every living thing in a habitat has a **role** — its job to do with food. We sort living things into three roles.

Producers make their own food. Every plant is a producer.

Consumers cannot make their own food, so they eat other living things. Every animal is a consumer.

Decomposers break down dead plants, dead animals and animal waste. They are the clean-up crew of the habitat.

Sorting living things by their role

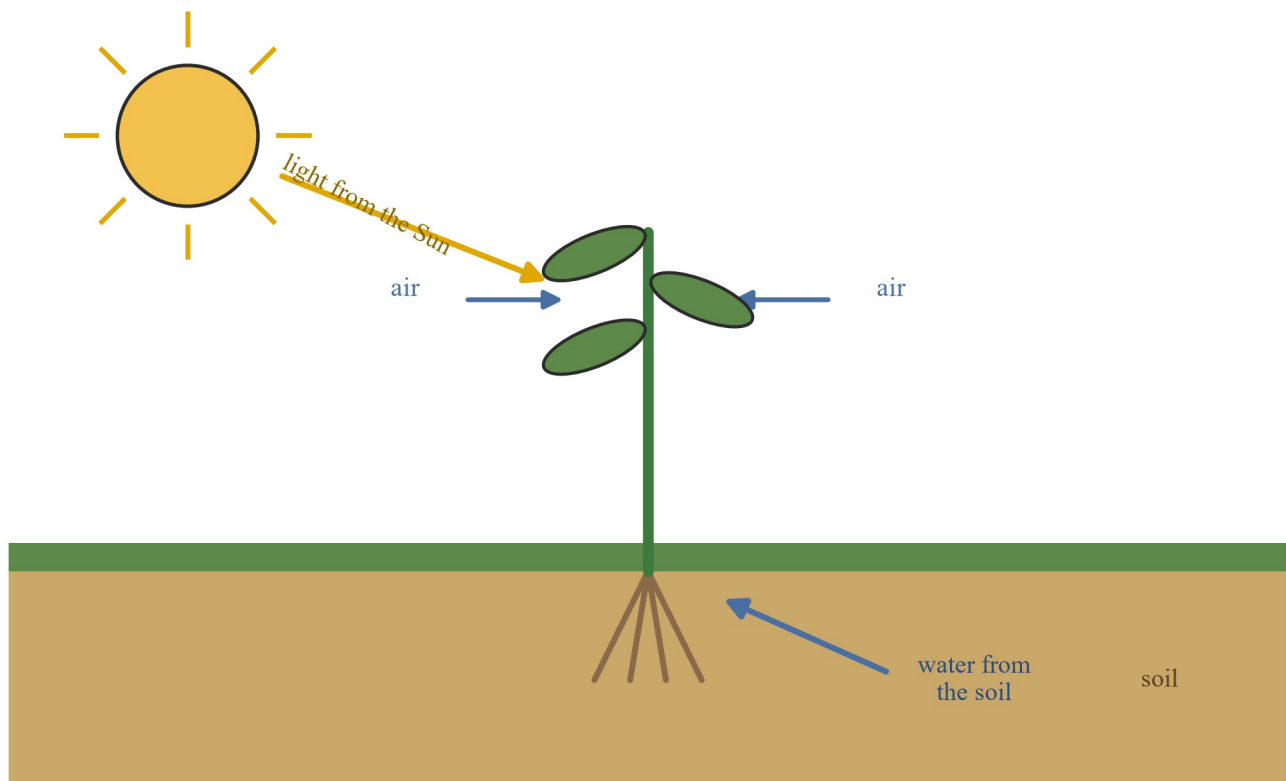


A sorting diagram placing kangaroo grass and manna gum under producers, grasshopper, rabbit, red fox and ringtail possum under consumers, and fungi on a log and tiny living things in the soil under decomposers

Producers make their own food

A plant makes its own food inside its leaves. To do it, the plant uses light from the Sun, water from the soil, and air. A plant does not eat anything, and that is what makes it a producer.

A producer makes its own food



Plants use light, water and air to make their own food. That is why they are producers.

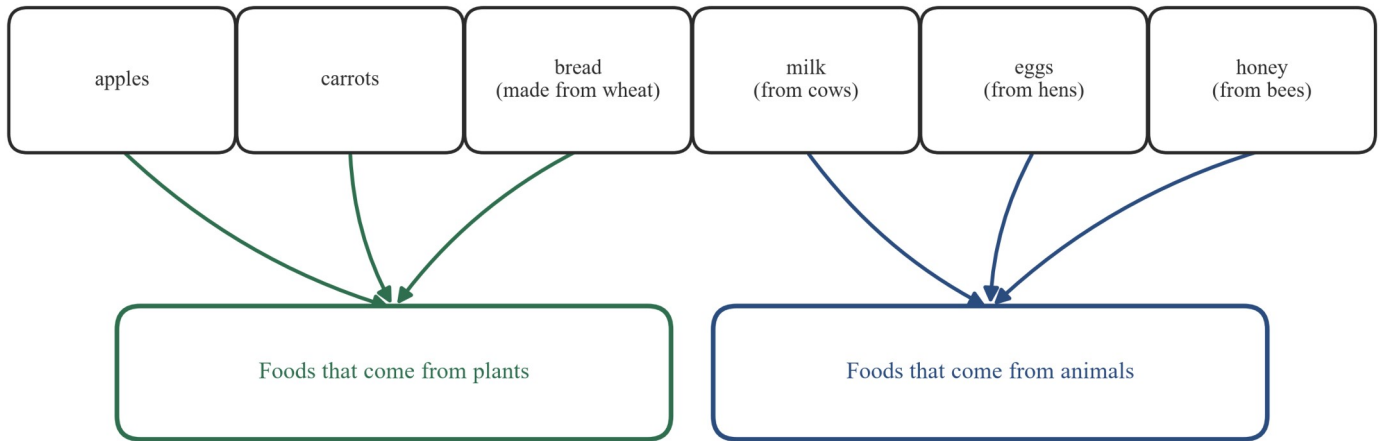
A labelled plant showing light from the Sun, air, and water from the soil going into the plant so it can make its own food

Every food chain starts with a producer, because every other living thing in the chain depends on the food the producer makes.

Consumers eat other living things

Animals are consumers, but they do not all eat the same things. Some consumers eat only plants, like the grasshopper and the rabbit. Some eat only animals, like the red fox and the powerful owl. An animal that hunts and eats other animals is a **predator**, and the animal it catches and eats is its **prey**. And some consumers eat both plants and animals. We do.

Humans are consumers too — where does our food come from?



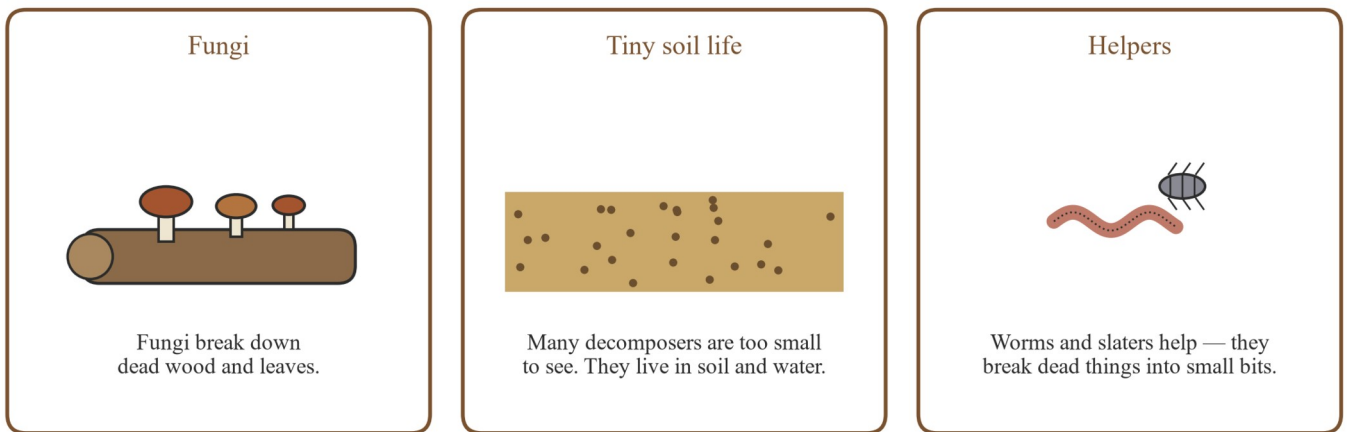
A sorting diagram placing apples, carrots and bread under foods that come from plants, and milk, eggs and honey under foods that come from animals

Humans obtain their food from plants and from other animals, just as the sorting picture shows: apples, carrots and bread come from plants, while milk, eggs and honey come from animals.

Decomposers are the clean-up crew

When a plant or an animal dies, the decomposers get to work. **Fungi** — the decomposers you can see, like the mushrooms on a dead log — break down dead wood and dead leaves. Many more decomposers are tiny living things, far too small to see, all through the soil and the water. Helpers like worms and slaters — the little grey animals you find under logs — break dead things into small bits for them.

The clean-up crew: decomposers and their helpers

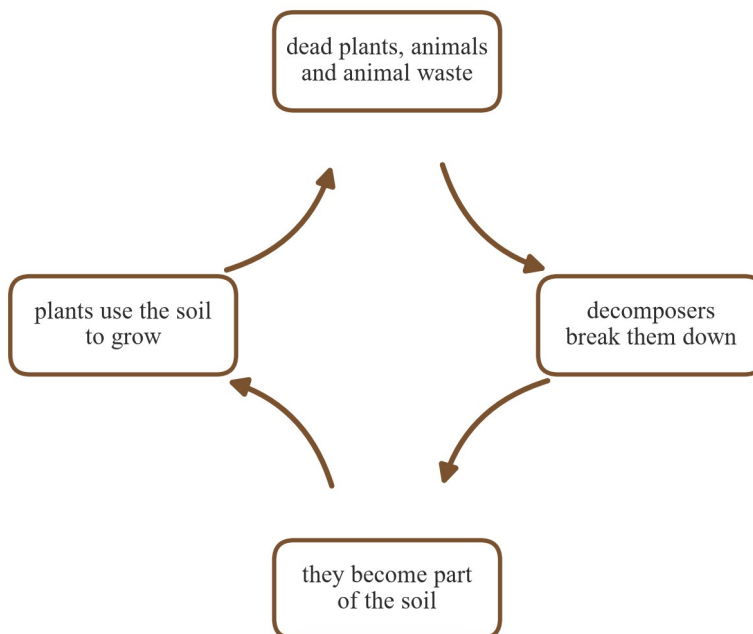


Without decomposers, dead leaves and dead animals would just pile up and up.

Three pictures of decomposers at work: fungi growing on a log, tiny living things in the soil that are too small to see, and helpers such as a worm and a slater

The decomposers' job matters to the whole habitat. Without them, dead leaves, dead animals and waste would just pile up and up. And when decomposers break things down, the broken-down bits become part of the soil, which plants then use to grow. The clean-up crew feeds the producers.

The clean-up cycle



Then some of those plants and animals die, and the cycle goes round again.

A cycle diagram: dead plants, animals and animal waste are broken down by decomposers, become part of the soil, and plants use the soil to grow

Food chains: who eats what, in order

A **food chain** shows who eats what in a habitat, in order. We draw it with arrows, and an arrow in a food chain has one meaning only: *is eaten by*. So the arrow always points to the eater.

In a food chain, the arrow points to the eater

grass is eaten by the grasshopper, and the grasshopper is eaten by the lizard



This way reads as if the grass eats the grasshopper!

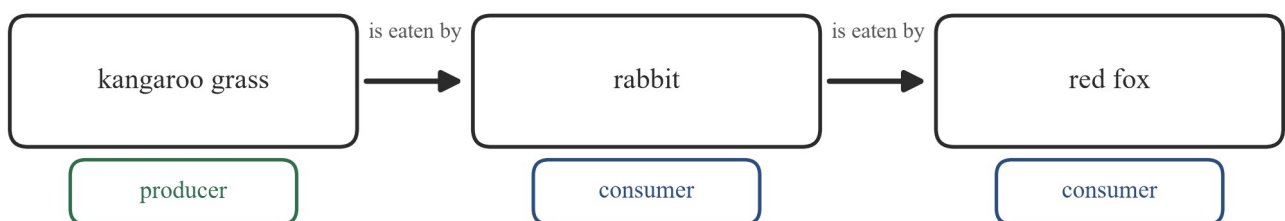
The arrow always means "is eaten by". It points to the animal that eats the food.

Two versions of the chain kangaroo grass, grasshopper, striped legless lizard: the right version with the arrows pointing to the eater, and the wrong version with the arrows pointing back to the food

A food chain always starts with a producer. Here is one chain from each of four Victorian habitats.

In the grassy plains, the rabbit and the red fox are introduced — they did not always live here.

A food chain in Victoria's grassy plains

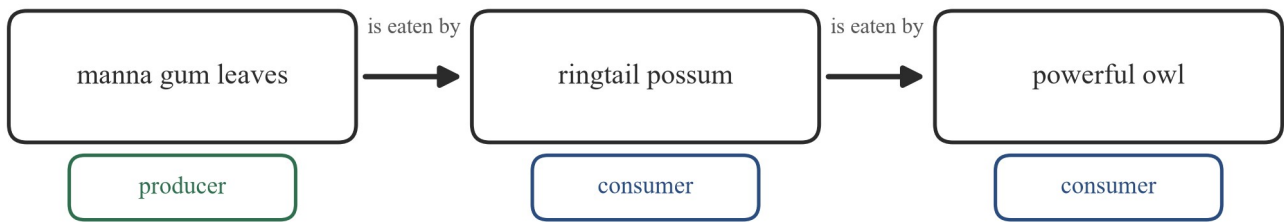


The rabbit and the red fox were introduced to Australia — they did not always live here.

A food chain from Victoria's grassy plains: kangaroo grass is eaten by the rabbit, and the rabbit is eaten by the red fox; the grass is labelled producer and the rabbit and fox are labelled consumers

In the eucalypt forest, the powerful owl hunts at night.

A food chain in a Victorian eucalypt forest

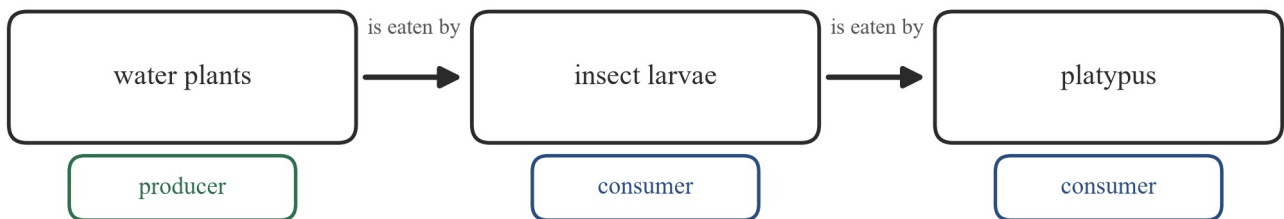


The powerful owl is Australia's biggest owl. It hunts possums at night.

A food chain from a Victorian eucalypt forest: manna gum leaves are eaten by the ringtail possum, and the possum is eaten by the powerful owl

In the river, insect larvae are baby insects that live in the water.

A food chain in a Victorian river

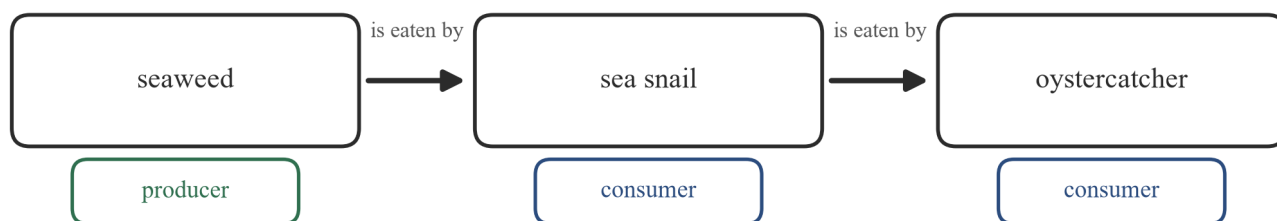


Insect larvae are baby insects that live in the water. The platypus finds them on the river bed.

A food chain from a Victorian river: water plants are eaten by insect larvae, and the larvae are eaten by the platypus

On the rocky coast, the oystercatcher is a bird with a strong orange beak for getting snails off the rocks.

A food chain on Victoria's rocky coast



The oystercatcher is a coast bird with a strong orange beak for getting snails off the rocks.

A food chain from Victoria's rocky coast: seaweed is eaten by the sea snail, and the sea snail is eaten by the oystercatcher

Comparing chains across habitats

Now compare the four chains. What is the same? Every chain starts with a producer. Every other living thing in each chain is a consumer. The arrows all point the same way — to the eater. What is different? Different habitats hold different living things: the river chain runs through water plants and a platypus, while the coast chain runs through seaweed and an oystercatcher. Same jobs, different living things.

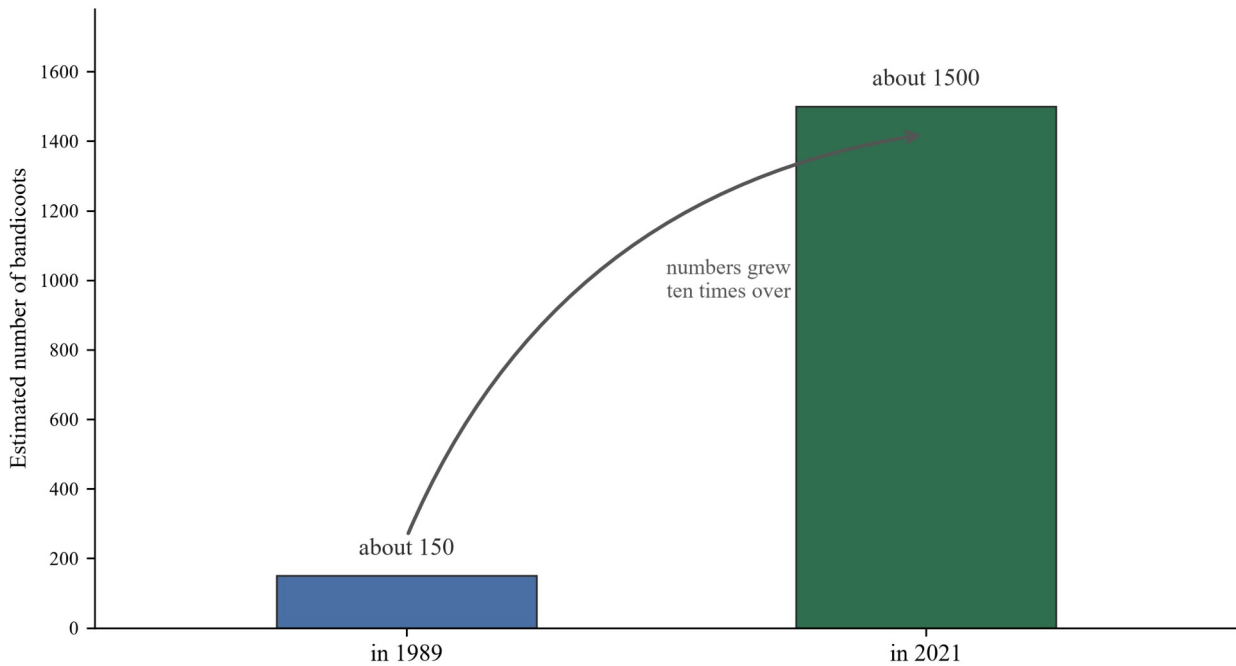
When one living thing is taken away

A food chain also lets us work out what happens when one living thing is taken away. Two rules help: if a living thing loses its food, its numbers fall; and if a predator is taken away, its prey can grow in number. Two true stories from Victoria show both rules.

Story one — the eastern barred bandicoot and the fox. The **eastern barred bandicoot** is a small native animal of Victoria's grassy plains. **Native** means it has always lived here. The red fox is **introduced** — people brought it to Australia long ago — and it hunts bandicoots. With foxes hunting them, the bandicoots nearly died out. In 1989 only about 150 were left in the wild, near Hamilton, and for a time after 1991 the bandicoot was **extinct** in the wild in Victoria — not one left.

Then people bred bandicoots in safe places and moved them to new homes where foxes could not get in: fenced places, and islands with no foxes at all, like French Island. By 2021 there were about 1500 bandicoots — about ten times as many as in 1989.

Eastern barred bandicoots living in the wild in Victoria



Source: Victorian Government media release “Eastern Barred Bandicoots Brought Back From Extinction”, 15 September 2021, premier.vic.gov.au (archived copy of that day) — retrieved 2026-08-20.

A column graph of eastern barred bandicoots living in the wild in Victoria: about 150 in 1989 and about 1500 in 2021

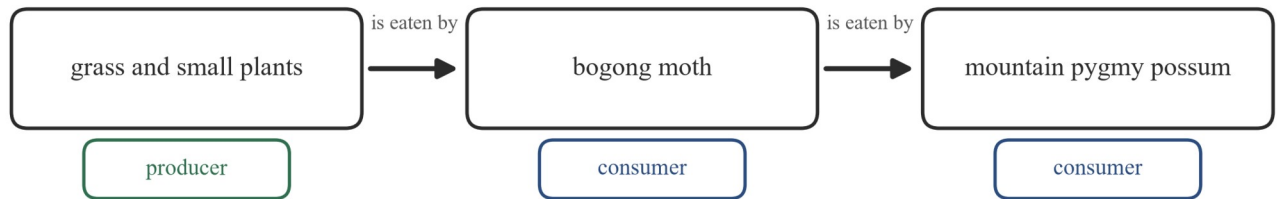
Source: Victorian Government media release “Eastern Barred Bandicoots Brought Back From Extinction”, 15 September 2021, premier.vic.gov.au (a copy kept from that day) — retrieved 2026-08-20.

Source: ABC News, “Eastern barred bandicoots returned to the wild on Victoria’s French Island”, 24 October 2019, abc.net.au — retrieved 2026-08-20.

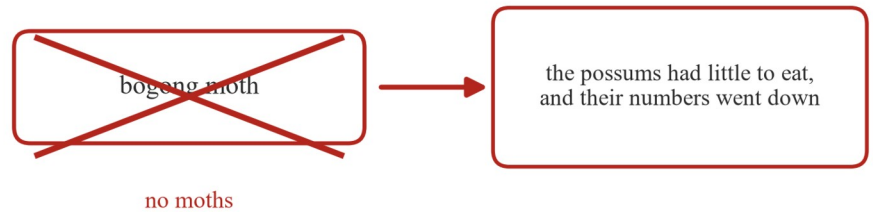
That is the first chain rule at work: take away the predator, and the prey can grow in number.

Story two — the bogong moth and a tiny mountain possum. In Australia’s high mountains lives the **mountain pygmy possum**, a tiny consumer found only up in those mountains. Its food chain is the one in the picture: grass and small plants, then the bogong moth, then the possum.

In Australia's high mountains



In 2017–2019 there was a drought where the moths breed, and very few moths came.



The food chain grass and small plants, bogong moth, mountain pygmy possum; and below it the same chain with the bogong moth crossed out, showing that the possums had little to eat and their numbers went down

In 2017–2019 there was a **drought** — a long, dry time with little rain — where the moths breed, so very few moths came to the mountains. The possums lost their food, and their numbers went down. That is the other chain rule: if a living thing loses its food, its numbers fall.

Source: ABC Science, “Decline in bogong moth numbers could have catastrophic effects in the Australian Alps”, 27 February 2019, abc.net.au — retrieved 2026-08-20.

In both stories, when one living thing in a chain changed in number, the other living things in the chain changed too. That is what a food chain is for: it lets us see which living things depend on which.

Words to know in 3C

Word	What it means
habitat	the place where living things live, with everything found there
role	the job a living thing does with food
producer	a living thing that makes its own food, like a plant
consumer	a living thing that eats other living things, like an animal
decomposer	a living thing that breaks down dead plants, dead animals and waste
predator	an animal that hunts and eats other animals
prey	the animal a predator catches and eats
food chain	a drawing that shows who eats what, with arrows pointing to the eater
native	has always lived here
introduced	brought to Australia by people, and not native
extinct	died out, with not one left
fungi	the decomposers that grow on dead wood and leaves, like mushrooms

Worked examples

Example 1 — scaffolded

Sort these living things of a eucalypt forest into the three roles: manna gum, caterpillar, ringtail possum, fungi on a log, red fox, kangaroo grass.

Working	Comment
Producers: manna gum, kangaroo grass.	Both are plants. Plants make their own food, so they are producers.
Consumers: caterpillar, ringtail possum, red fox.	All three are animals. The caterpillar eats leaves, the possum eats leaves and fruit, and the fox eats animals — but every animal is a consumer.
Decomposers: fungi on a log.	Fungi break down dead wood. They do not make their own food and they do not eat like animals do.

Example 2 — scaffolded

These three cards are one food chain from a eucalypt forest, but they are out of order: *powerful owl* — *manna gum leaves* — *ringtail possum*. Build the chain the right way around.

Working	Comment
Step 1: find the producer — the manna gum leaves.	A food chain always starts with a producer.
Step 2: who eats the leaves? The ringtail possum. Draw the arrow: manna gum leaves → ringtail possum.	The arrow points to the eater.
Step 3: who eats the possum? The powerful owl. Draw the arrow: ringtail possum → powerful owl.	The owl is the predator here, and the possum is its prey.
The chain: manna gum leaves → ringtail possum → powerful owl.	Producer first, then consumers, arrows to the eater.

Example 3 — unscaffolded

Mia wrote this food chain in her book: red fox → rabbit → kangaroo grass. What is wrong with it? Draw it the right way, and say the arrow rule in your own words.

Mia's arrows point to the food, not to the eater. Her chain says the fox is eaten by the rabbit, and the rabbit is eaten by the grass! But the rabbit eats the grass, and the fox eats the rabbit, so the arrows must point the other way: kangaroo grass → rabbit → red fox. The rule is that the arrow always means “is eaten by”, so it always points to the eater.

∴ The correct chain is kangaroo grass → rabbit → red fox.

Example 4 — unscaffolded

Use the column graph of eastern barred bandicoots to answer: (a) about how many bandicoots were left in the wild in 1989? (b) about how many were there in 2021? (c) the 2021 number is about how many times the 1989 number? (d) the new homes had no foxes in them. Use the chain rules to say why the number of bandicoots grew.

- (a) The 1989 column reaches about 150, so about 150 bandicoots were left. (b) The 2021 column reaches about 1500. (c) Ten lots of 150 makes 1500, so the 2021 number is about ten times the 1989 number. (d) The fox is the bandicoot's predator. With no foxes in the new homes, the predator was taken away, so the prey could grow in number.

∴ About 150 bandicoots in 1989 and about 1500 in 2021 — about ten times as many, because the new homes kept the foxes out.

Practice questions

Scaffolded

Q1. What is a habitat? Start your answer with the words “the place where”.

Q2. Sort these living things of the rocky coast into producers, consumers and decomposers: seaweed, oystercatcher, sea snail, tiny living things in the soil. (Hint: plants make their own food; animals eat other living things; the soil life breaks down dead things.)

Q3. Name the three things a plant uses to make its own food. (Hint: look at the producer picture.)

Q4. A grasshopper eats plants. Is the grasshopper a producer or a consumer? Say why.

Q5. A red fox catches and eats a rabbit. Which one is the predator, and which one is the prey?

Q6. Fill in the gap: in a food chain, the arrow points to the _____. (Hint: pick from “the eaten one”, “the eater”, “the producer”.)

Q7. Which role breaks down dead plants and dead animals? Say why that job is important to the habitat. (Hint: think about what would pile up.)

Q8. Match each food chain to its habitat. (i) seaweed → sea snail → oystercatcher; (ii) water plants → insect larvae → platypus; (iii) manna gum leaves → ringtail possum → powerful owl; (iv) kangaroo grass → rabbit → red fox.
Habitats: rocky coast, river, eucalypt forest, grassy plains.

Un scaffolded

Q9. Build a food chain from these cards: *platypus* — *water plants* — *insect larvae*. Draw it with arrows.

Q10. Build a food chain from these cards: *oystercatcher* — *seaweed* — *sea snail*. Draw it with arrows.

Q11. Tom wrote this chain: powerful owl → ringtail possum → manna gum leaves. Fix his chain, and say what was wrong with it.

Q12. Look at the coast chain. If all the oystercatchers left the coast, what would happen to the number of sea snails? Say why.

Q13. Look at the forest chain. If a sickness killed many manna gums, what would happen to the number of powerful owls? Give your answer step by step.

Q14. Use the bandicoot column graph. (a) Read off the number for 1989. (b) Read off the number for 2021. (c) Name the introduced animal that hunted the bandicoots. (d) The new homes had no foxes. Use the chain rules to say why the number of bandicoots grew.

Q15. In 2017–2019 very few bogong moths came to the mountains. What happened to the tiny possums, and why?

Q16. Put a tick next to each chain that is drawn the right way around. For any chain that is wrong, draw it again the right way. (i) kangaroo grass → grasshopper → striped legless lizard; (ii) rabbit → kangaroo grass → red fox; (iii) seaweed → sea snail → oystercatcher.

Q17. Humans are consumers. Name two foods you have eaten that came from a plant, and two that came from an animal.

Q18. Say why a habitat needs decomposers. If every decomposer stopped working, what would you see on the ground a year later?

Answers

- Q1.** A habitat is the place where living things live, with everything found there.
- Q2.** Producer: seaweed. Consumers: oystercatcher, sea snail. Decomposers: tiny living things in the soil.
- Q3.** Light from the Sun, water from the soil, and air.
- Q4.** A consumer, because it cannot make its own food — it eats plants.
- Q5.** The red fox is the predator; the rabbit is the prey.
- Q6.** The eater.
- Q7.** Decomposers. Without them, dead plants, dead animals and waste would pile up, and the soil would not get the broken-down bits that plants use to grow.
- Q8.** (i) rocky coast; (ii) river; (iii) eucalypt forest; (iv) grassy plains.
- Q9.** Water plants → insect larvae → platypus.
- Q10.** Seaweed → sea snail → oystercatcher.
- Q11.** Manna gum leaves → ringtail possum → powerful owl. His arrows pointed to the food instead of the eater.
- Q12.** The number of sea snails would grow, because the animal that eats them was taken away.
- Q13.** Fewer manna gums means less food for possums, so fewer possums; fewer possums means less food for owls, so fewer owls.
- Q14.** (a) About 150. (b) About 1500. (c) The red fox. (d) With the predator taken away, the prey could grow in number.
- Q15.** Their numbers went down, because the moths were their food and the moths did not come.
- Q16.** (i) tick; (ii) wrong — kangaroo grass → rabbit → red fox; (iii) tick.
- Q17.** Answers will vary; for example, bread and apples come from plants, and milk and eggs come from animals.
- Q18.** Without decomposers, dead leaves, dead animals and waste would pile up on the ground and stay there.

Fully-worked answers

- Q1.** A habitat is not just a home like a house. It is the place where living things live, taking in everything found there — the plants, the animals, the soil, the water, and the places to hide. So: a habitat is the place where living things live, with everything found there.
- Q2.** Seaweed is a plant, so it makes its own food: producer. The oystercatcher and the sea snail are animals, so they eat other living things: consumers. The tiny living things in the soil break down dead things: decomposers.
- Q3.** The producer picture shows three things going into the plant: light from the Sun, water from the soil, and air. Those are the three things a plant uses to make its own food.
- Q4.** A producer makes its own food. A grasshopper cannot make its own food — it eats plants — so it is a consumer.
- Q5.** The predator is the animal that hunts and eats other animals: the red fox. The prey is the animal it catches and eats: the rabbit.
- Q6.** The arrow in a food chain means “is eaten by”, so it always points to the eater.
- Q7.** The decomposers break down dead plants and dead animals. The job is important because without it, dead things and waste would pile up and up, and the broken-down bits that plants use to grow would not get back into the soil.

Q8. Each chain holds the living things of one habitat. Seaweed, sea snails and oystercatchers live on the rocky coast: (i). Water plants, insect larvae and platypuses live in the river: (ii). Manna gums, ringtail possums and powerful owls live in the eucalypt forest: (iii). Kangaroo grass, rabbits and red foxes live in the grassy plains: (iv).

Q9. Find the producer first: the water plants. The insect larvae eat the plants, and the platypus eats the larvae. With arrows to the eater: water plants → insect larvae → platypus.

Q10. The producer is the seaweed. The sea snail eats the seaweed, and the oystercatcher eats the sea snail. With arrows to the eater: seaweed → sea snail → oystercatcher.

Q11. Tom's chain starts with the owl and his arrows point to the food. A chain starts with the producer, and the arrow points to the eater. The leaves come first, the possum eats the leaves, and the owl eats the possum: manna gum leaves → ringtail possum → powerful owl.

Q12. The oystercatcher is the sea snail's predator. If the oystercatchers left, the predator would be taken away, so the prey could grow in number: more sea snails.

Q13. Work along the chain. The manna gum is the producer, so fewer gums means less food for the ringtail possums, and their numbers fall. The powerful owl eats the possum, so fewer possums means less food for the owl, and its numbers fall too.

Q14. (a) The 1989 column reaches about 150. (b) The 2021 column reaches about 1500. (c) Ten lots of 150 makes 1500, so about ten times. (d) The red fox hunted the bandicoots. In homes with no foxes, the predator was taken away, so the prey could grow in number.

Q15. The bogong moth is the tiny possum's food. When the drought meant few moths, the possums lost their food, so their numbers went down.

Q16. (i) The grass comes first and the arrows point to the eater: right, tick. (ii) The rabbit does not eat the fox, and the chain must start with the producer: wrong. The right way is kangaroo grass → rabbit → red fox. (iii) Seaweed first, arrows to the eater: right, tick.

Q17. Any four foods sorted correctly count. Plant foods: bread (wheat), apples, carrots. Animal foods: milk (cows), eggs (hens), honey (bees).

Q18. Decomposers break down dead plants, dead animals and waste. If they stopped, that dead matter would not get broken down, so a year later the ground would be covered in dead leaves and dead animals that had not rotted away.

Chapter 3 Check-up — Biological sciences

About this check-up

This is a school instrument made for this workbook. It is **not** a VCAA examination, and it is not marked by VCAA.

- **Time:** there is no time limit. Take the time you need to show what you know.
- **Reading support:** if you need help reading a question, your teacher can read it with you. Your teacher will not help with the answer.
- **Answer every question.** The marks for each question are shown in [brackets].

This check-up covers Chapter 3: **3A** Living, once living, and never living · **3B** Life cycles, parents and offspring · **3C** Producers, consumers, decomposers and food chains.

Total: 15 marks. Part A has 8 questions worth 1 mark each. Part B has 3 questions worth 2 or 3 marks each.

Part A

Q1. Classify each of these into one of the four groups: **living, once living, never living, or a product of a living thing.** [1 mark]

- (i) a snail in the garden
- (ii) a dry gum leaf on the ground
- (iii) a bluestone rock
- (iv) a wooden chair

Q2. All living things do the same five things. These are their **characteristics**. List **two** characteristics of living things. [1 mark]

Q3. A **fossil** is the shape of something that was once living, kept in rock. Which group do we sort a fossil into — **living, once living** or **never living**? [1 mark]

Q4. Name the stage of the butterfly's life cycle that comes straight after the caterpillar (the **larva**). [1 mark]

Q5. Sort these four animals into **metamorphic** or **non-metamorphic**: a frog, a chicken, a butterfly, a human. [1 mark]

Q6. Complete the sentence with one word: "Offspring are similar, but not _____, to their parents." [1 mark]

Q7. In a **habitat**, every living thing has a **role** with food. A grasshopper eats grass and other plants. Is the grasshopper a **producer** or a **consumer**? [1 mark]

Q8. Label each living thing in this food chain from Victoria's grassy plains as a **producer** or a **consumer**. [1 mark]

kangaroo grass → rabbit → red fox

Part B

Q9. Noah says a jar of honey is once living, "because it came from living bees". Use the sorting test from 3A to explain why honey is sorted as a **product of a living thing**, not once living. [2 marks]

Q10. Read the box, then answer the question.

The little penguin of St Kilda. The little penguin is the smallest penguin in the world. It breeds at the St Kilda breakwater in Port Phillip Bay, Melbourne. Both parents take turns keeping the eggs warm for up to 36 days. The chick hatches covered in fluff, and the young penguins come back to the colony ready to breed at 2–3 years old.

Source: Wikipedia, "Little penguin", en.wikipedia.org, and BirdLife Australia, "Little Penguin" bird profile, birdlife.org.au — retrieved 2026-08-22.

The butterfly has a **metamorphic** life cycle. The little penguin has a **non-metamorphic** life cycle. Compare the two life cycles. In your answer:

- (a) say how each animal changes as it grows from its young stage to the adult
- (b) write one thing that is the same about the two life cycles [3 marks]

Q11. Three cards from a food chain on Victoria's rocky coast are mixed up:

oystercatcher — seaweed — sea snail

Construct the food chain the right way around. Draw the arrows to show *is eaten by*. [2 marks]

Marking guide

Teacher notes. This is a school instrument, not a VCAA examination. It is completed untimed, and reading support is permitted: a teacher may read any question to a student who needs it, but may not help with the answer. An answer given orally to the teacher counts the same as a written one. Mark against the acceptable responses below, and accept any response that carries the same idea in the student's own words. Spelling of scientific words does not have to be exact.

Total: 15 marks. Part A: 8 marks. Part B: 7 marks (Q9 = 2, Q10 = 3, Q11 = 2).

Part A — 8 marks

Q1 [1 mark]. 1 mark for all four correct; 0 marks otherwise.

- (i) a snail in the garden — **living** (it is alive now)
- (ii) a dry gum leaf on the ground — **once living** (it was alive on the tree)
- (iii) a bluestone rock — **never living** (it was never alive)
- (iv) a wooden chair — **a product of a living thing** (it was never alive itself, but it came from timber, which came from a living tree)

Accept “non-living” for “never living”. A student who puts the chair in “once living” has skipped the sorting test’s third question — the chair itself was never alive.

Q2 [1 mark]. Any **two** of the five characteristics taught in 3A: *needs food, water and air; grows and changes; makes more of its own kind; responds to what happens around it; can move*. 1 mark for two correct; 0 marks for one or none.

Q3 [1 mark]. Once living. A fossil is the shape of something that was once living, kept in rock.

Q4 [1 mark]. The pupa. (The butterfly’s cycle runs egg → larva/caterpillar → pupa → adult.)

Q5 [1 mark]. 1 mark for all four sorted correctly; 0 marks otherwise.

- **Metamorphic** (the young look nothing like the adult): the frog, the butterfly.
- **Non-metamorphic** (the young look like small adults): the chicken, the human.

Q6 [1 mark]. identical. Also accept “exactly the same”.

Q7 [1 mark]. Consumer. The grasshopper cannot make its own food — it eats plants.

Q8 [1 mark]. 1 mark for all three labels correct; 0 marks otherwise.

- kangaroo grass — **producer**
- rabbit — **consumer**
- red fox — **consumer**

Part B — 7 marks

Q9 [2 marks].

- **1 mark:** states that the honey itself was never alive.
- **1 mark:** states that the honey was made by living bees (it came from something alive), so it belongs in the product group — or runs the sorting test in order: alive now? no; ever alive? no; came from something alive? yes.

Acceptable response: “The honey itself was never alive — it is something the bees made. It came from living bees, so it is a product of a living thing.” Do not award marks if the student agrees with Noah.

Q10 [3 marks].

- **1 mark (butterfly):** the butterfly has a big change — the young (the caterpillar/ larva) looks nothing like the adult; its cycle runs egg → larva → pupa → adult. Accept “metamorphic” used with that idea.
- **1 mark (penguin):** the penguin has a small change — the chick has the same body shape as its parents (it is covered in fluff, not feathers) and just grows. Accept “non-metamorphic” used with that idea.
- **1 mark (same):** any true similarity, for example: both start from eggs; both grow; both are loops — the adults have young of their own and the cycle starts again.

The words *metamorphic* and *non-metamorphic* are given in the question, so award the marks for the ideas, not for copying the words.

Q11 [2 marks].

- **1 mark:** the correct order, starting with the producer: seaweed → sea snail → oystercatcher.
- **1 mark:** both arrows pointing to the eater (toward the sea snail, then toward the oystercatcher), or the student writing “is eaten by” above each arrow.

Award the marks separately: a chain in the right order with arrows drawn backwards earns 1 mark; a chain with the cards in the wrong order but arrows pointing to the eater earns 1 mark.

Where each question traces in the curriculum

Every question traces to the achievement-standard extract of one of the three Chapter 3 subtopics. The extracts below are quoted verbatim from the Victorian Curriculum F–10 Version 2.0, Science, Levels 3 and 4 achievement standard.

Question	Marks	Subtopic	Owns	Achievement-standard extract (verbatim)
Q1	1	3A	VC2S4U01	“Students classify and compare the characteristics of living, once-living and non-living things.”
Q2	1	3A	VC2S4U01	“Students classify and compare the characteristics of living, once-living and non-living things.”
Q3	1	3A	VC2S4U01	“Students classify and compare the characteristics of living, once-living and non-living things.”
Q9	2	3A	VC2S4U01	“Students classify and compare the characteristics of living, once-living and non-living things.”
Q4	1	3B	VC2S4U02	“They compare the life cycles of different plants and

Question	Marks	Subtopic	Owns	Achievement- standard extract (verbatim)
Q5	1	3B	VC2S4U02	animals, and describe similarities and differences between parents and offspring at different stages of growth.” “They compare the life cycles of different plants and animals, and describe similarities and differences between parents and offspring at different stages of growth.”
Q6	1	3B	VC2S4U02	“They compare the life cycles of different plants and animals, and describe similarities and differences between parents and offspring at different stages of growth.”
Q10	3	3B	VC2S4U02	“They compare the life cycles of different plants and animals, and describe similarities and differences between parents and offspring at different stages of growth.”
Q7	1	3C	VC2S4U03	“They identify the roles of organisms in a habitat, and construct food chains.”
Q8	1	3C	VC2S4U03	“They identify the roles of organisms in a habitat, and construct food chains.”
Q11	2	3C	VC2S4U03	“They identify the roles of organisms in a habitat, and construct food chains.”
Total	15			

Chapter 3 Investigation task — A survey of a local habitat

About this task

This is a school instrument made for this workbook. It is **not** a VCAA examination, and it is not marked by VCAA.

- **Time:** there is no time limit. You may take more than one lesson to finish.
- **Reading support:** if you need help reading a question, your teacher can read it with you. Your teacher will not help with the answer.
- **Working together:** you will work in a small group, but each student fills in their own sheet.
- **Answer every question.** The marks for each question are shown in [brackets].

In this task you use the inquiry skills from Chapters 1 and 2, in the content of Chapter 3: **3A** Living, once living, and never living · **3B** Life cycles, parents and offspring · **3C** Producers, consumers, decomposers and food chains.

Total: 20 marks. Question and prediction 3 · Planning 5 · Measuring and recording 4 · Representing 4 · Comparing and evaluating 2 · Communicating 2.

What you will find out

In Chapter 3 you learned that a **habitat** is the place where living things live, and that every living thing has a **role** with food: **producer**, **consumer** or **decomposer**.

In this task your group will **survey** a small patch of a local habitat. To survey a place means to look at it carefully and record what is there. Your patch might be the schoolyard, a garden bed, a patch of grass, or the ground under a tree. Your group will find out which roles live in your patch. Each group gets a different patch, so at the end you can compare your findings with another group's.

You will: ask a question and make a prediction → plan → measure and record → represent → compare → communicate.

What you will need

- a hoop, or a loop of string, to mark out your patch (about 1 metre across)
- a thermometer that reads in degrees Celsius (°C)
- a hand lens (a magnifying glass)
- a clock or watch, to time your counting
- garden gloves (one pair for the group), for lifting logs
- a pencil and something hard to write on

Working safely

Your teacher, or another adult, stays with your group the whole time. Before you start, read each **hazard** (anything that could hurt someone) and its **control** (what you do to stop the hurt).

- **Germ in soil and dead leaves.** Wear gloves when you lift a log or dig. Wash your hands afterwards.
 - **Biting or stinging insects.** Look with your eyes and your hand lens. Do not pick animals up with bare hands.
 - **Sharp sticks, stones or broken glass.** Look where you step. Do not pick sharp things up — tell your teacher.
 - **A hot sun.** Wear a hat, and drink water.
 - **Nothing goes in your mouth.** Never taste anything you find.
 - **Leave the patch as you found it.** Put logs and stones back gently, so small animals keep their homes.
-

Part 1 — Question and prediction [3 marks]

Q1.

- (a) Write a question that your group can answer with this survey. You could start with: “Which role do we find the most of in our patch: producers, consumers or decomposers?” or “Do we find more _____ or more _____ in our patch?” [1 mark]
- (b) Write your **prediction** — what you think you will find. [1 mark]
- (c) A prediction is based on something you have seen before; a guess is not. Write the observation your prediction is based on. [1 mark]

Part 2 — Planning [5 marks]

Q2. Complete this planning scaffold with your group.

Our plan	What we will do
What will we change? (Which patch will we survey?)	
What will we count?	
Two things we will keep the same	1. 2.
One hazard at our patch, and its control	Hazard: Control:

The marks for the plan: **1 mark** for what to change · **1 mark** for what to count · **2 marks** for the two things to keep the same (1 mark each) · **1 mark** for one hazard and the control that matches it. You may use a hazard from the safety list above, or one your teacher names at your patch.

Part 3 — Measuring and recording [4 marks]

Q3.

- (a) **Estimate first.** An **estimate** is a sensible guess at a number, made *before* measuring, using what you know. Estimate the temperature of the air in your patch. Write your estimate with its unit. [1 mark]
- (b) Now measure the air temperature with your thermometer. Wait until the liquid stops moving, then read the number. Write what you read, with its unit. [1 mark]
- (c) **Draw your results table before you count.** Give your table three rows, one for each role: producers, consumers and decomposers. Then look carefully inside your patch. Count the living things you find, and write the number for each role in your table. [2 marks]

You may add extra rows if you wish — for example, the names of the living things you found, or the things you saw that were once living or never living.

Part 4 — Representing [4 marks]

Q4.

- (a) Draw a **column graph** of the numbers in your table. Draw one column for each role: producers, consumers and decomposers. Give your graph a title, label each column, and put numbers along the side so your counts can be read. Draw it here, on grid paper, or in your workbook. [3 marks]
- (b) Write one **pattern** you can see in your graph. A pattern is what the data shows — for example, which role you found the most of, and which you found the least of. [1 mark]

Part 5 — Comparing and evaluating [2 marks]

Q5.

- (a) Swap your table with another group’s. Write one way your findings were the same as theirs, or one way they were different. [1 mark]

- (b) Think about your investigation. Was it fair? Write one thing you kept the same to make it fair, or one thing you would change next time to make it fairer. Then write one further question you would like to investigate. (Answer both parts.) [1 mark]

Part 6 — Communicating [2 marks]

Q6. Your school newsletter has asked for a short piece for families about the habitats of your school. Your **audience** — the people you share with — is the school families. Your **purpose** is to tell them what lives in your patch, and one thing they can do to look after it.

Write the piece in two or three sentences. Use at least two of the words of Chapter 3 — for example: *habitat, living, once living, never living, producer, consumer, decomposer, food chain, native, introduced, fungi*. [2 marks]

Marking guide

Teacher notes. This is a school instrument, not a VCAA examination. It is completed untimed, and reading support is permitted: a teacher may read any question to a student who needs it, but may not help with the answer. Students work in small groups (three or four students works well), but each student is marked on their own sheet. Accept any response that carries the right idea in the student's own words. Spelling of scientific words does not have to be exact.

Running the task. Give each group a different patch: the schoolyard, a garden bed, a patch of grass, or the ground under a tree. If no suitable patch exists at the school, a local park or creek bank works; follow the school's usual arrangements for taking students off-site. One lesson suits Parts 1 and 2 and the survey itself (Part 3); Parts 4–6 can follow in a later lesson. Have all groups count for the same length of time — five minutes works well. On a cold winter morning a thermometer may read $-1\text{ }^{\circ}\text{C}$; students record what they see, with the unit.

Total: 20 marks. Part 1: 3 marks. Part 2: 5 marks. Part 3: 4 marks. Part 4: 4 marks. Part 5: 2 marks. Part 6: 2 marks.

Part 1 — Question and prediction — 3 marks

Q1(a) [1 mark]. A question the survey can answer. Acceptable responses include: “Which role do we find the most of in our patch: producers, consumers or decomposers?”; “Do we find more producers or more consumers in our patch?”; “Do we find more living things in the garden bed or under the tree?” Do not award the mark for a question the survey cannot answer (“Do worms like living in soil?”) or for no question.

Q1(b) [1 mark]. A prediction that answers the question in (a). Acceptable responses include: “I predict we will find more producers than consumers”; “I predict we will find the most producers, because plants do not move away”. The prediction must match the question: a prediction about temperature when the question is about roles does not earn the mark.

Q1(c) [1 mark]. An observation the prediction is based on — something the student has seen before. Acceptable responses include: “When we played on the grass, I saw lots of plants and only a few animals”; “There are always worms under the log by the fence”. This is the idea taught in 1A: a prediction is grounded in a prior observation, a guess is not. Do not award the mark for a bare guess with no observation behind it.

Part 2 — Planning — 5 marks

What to change [1 mark]. The patch the group surveys. Acceptable responses include: “The patch — ours is the grass by the fence”; “Where we look: we survey the garden bed”. Each group changes its patch; that is what the groups compare at the end.

What to count [1 mark]. The living things in the patch, sorted by role. Acceptable responses include: “How many producers, consumers and decomposers we find”; “The number of living things of each role”.

Two things to keep the same [2 marks, 1 each]. Any two that make the groups comparable. Acceptable responses include: the same size patch (the same hoop or loop of string); the same counting time (five minutes for every group); the same counting rules (count only living things; count each animal once); counting on the same day, in the same weather. Do not award a mark for a “same” that does not matter to the survey.

One hazard and its control [1 mark]. Award 1 mark for a matched pair — a hazard and a control that really addresses it. Acceptable pairs include: biting or stinging insects → look, do not touch, and do not pick animals up with bare hands; germs in the soil → wear gloves when lifting logs or digging, and wash hands afterwards; sharp sticks or broken glass → look where you step, do not pick sharp things up, tell the teacher; a hot sun → wear a hat and drink water. A hazard with no control, or a control that does not match the hazard (gloves for a hot sun), earns 0 marks.

Part 3 — Measuring and recording — 4 marks

Q3(a) [1 mark]. An estimate of the air temperature, written with its unit. Award the mark for a sensible number with the unit $^{\circ}\text{C}$, for example “ $20\text{ }^{\circ}\text{C}$ ”. The estimate is not marked for being right — it is the habit of expecting a number before measuring, so a silly reading is noticed.

Q3(b) [1 mark]. The measured temperature, read from the thermometer and written with its unit, for example “ $18\text{ }^{\circ}\text{C}$ ”. Award the mark for a reading taken by following the procedure with the unit written. Readings to the nearest

mark, or between two marks to one decimal place (for example “18.5 °C”), are both acceptable — reading between the marks is taught in 1C.

Q3(c) [2 marks].

- **1 mark:** the student’s own table has the three role rows (producers, consumers, decomposers) and a number written in each row. Zero is a count and is acceptable. Extra rows — named living things, or things that were once living or never living — are welcome and do not lose the mark.
- **1 mark:** the table has a title or labels that say what it shows, for example “Living things in our patch”.

Award 0 marks for this part if the counting was recorded with no table at all — the table is drawn *before* the data arrives, as taught in 1C.

Part 4 — Representing — 4 marks

Q4(a) [3 marks]. The column graph of the table’s counts.

- **1 mark:** one column for each role (three columns), with the heights of the columns matching the numbers in the table.
- **1 mark:** a title that says what the graph shows, and each column labelled (with the role’s name or a picture of it).
- **1 mark:** numbers along the side (a scale), so the counts can be read.

Accept a graph drawn on grid paper, in the workbook, or in the space provided. The column graph is the representation taught in 2A; line graphs are not used at this band. If a group constructs a physical model or a sorted picture display instead, award the three construction marks for a model that organises the findings by role, with one grouping per role and the counts shown.

Q4(b) [1 mark]. A pattern read off the graph. Acceptable responses include: “We found more producers than anything else”; “There were more consumers than decomposers in our patch”; “Producers were the most, and decomposers were the least”. Award the mark for a statement that compares the counts or says what was most or least. Do not award it for reading one number off a single column (“We found 7 producers”) — a pattern looks across the data.

Part 5 — Comparing and evaluating — 2 marks

Q5(a) [1 mark]. One way the two groups’ findings were the same, or one way they were different. Acceptable responses include: “Both groups found more producers than consumers”; “Group 2 found no decomposers, but we found two — their patch was on concrete”; “We found the same roles, but they found more animals than we did”. Any true comparison of the two sets of findings earns the mark.

Q5(b) [1 mark for both parts together]. Award 1 mark if the student answers both parts sensibly; award 0 marks for one part only, or for neither.

- *The fairness judgement.* Acceptable responses include: “Yes — every group used the same-sized hoop and counted for the same time”; “Not quite — we counted for longer than the other group, so next time we would use the timer”. A judgement with no reason (“Yes, it was fair”) does not earn the mark.
- *The further question.* Acceptable responses include: “Do we find more consumers at night?”; “Do more living things live under a log than on top of the ground?”; “What happens to the patch if we water it every day?” Any question that could be investigated earns the mark.

Part 6 — Communicating — 2 marks

Q6 [2 marks].

- **1 mark:** the piece is shaped for the stated audience and purpose — two or three sentences that school families can read, saying what the group found in its patch and giving one way to look after it. Acceptable care-for-the-patch ideas include: “Put logs back gently”; “Do not pull plants up”; “Do not leave rubbish in the garden bed”. Sentences with a labelled drawing count.

- **1 mark:** at least two words of Chapter 3 used correctly — for example *habitat, living, once living, never living, producer, consumer, decomposer, food chain, predator, prey, native, introduced, fungi, life cycle*. Award the mark for correct use in the piece, not for listing the words.

Award 0 marks for a piece with no audience sense (a list of numbers for nobody), or for words used without meaning.

Where each part traces in the curriculum

Every part assesses one Science inquiry content description, in performance, in the content context of Chapter 3. The Chapter 3 content — habitats, the three roles, and the living / once-living / never-living sort — is the setting of the task; it is assessed directly in the Chapter 3 Check-up, and is not marked separately here. The four investigation tasks of this book (Chapters 3, 4, 5 and 6) share the same mark split, so the four tasks are comparable, and each inquiry content description is assessed four times. The extracts below are quoted verbatim from the Victorian Curriculum F–10 Version 2.0, Science, Levels 3 and 4 achievement standard.

Part	Marks	Assesses	Achievement-standard extract (verbatim)
Part 1 — Question and prediction	3	VC2S4I01	“Students pose questions to identify patterns and relationships, and make predictions based on observations.”
Part 2 — Planning	5	VC2S4I02	“They plan investigations using planning scaffolds, identify key components of fair tests and describe how they conduct investigations safely.”
Part 3 — Measuring and recording	4	VC2S4I03	“They use familiar classroom instruments and simple procedures to record observations and results, including formal measurements.”
Part 4 — Representing	4	VC2S4I04	“They construct representations to organise data and information, and identify patterns and simple relationships.”
Part 5 — Comparing and evaluating	2	VC2S4I05	“They compare their findings with those of others, assess the fairness of their investigations, propose further questions for investigation and draw conclusions.”
Part 6 — Communicating	2	VC2S4I06	“They communicate observations, findings and ideas for an identified purpose and audience, using scientific vocabulary and digital tools where appropriate.”
Total	20		