Science, grade 3

All units for this subject and grade (unreviewed AI drafts)

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Grade 3 Science: Magnets - What Sticks, What Pushes and What Gets Through (5 lessons, about 2-3 weeks)

> **Unreviewed AI draft.** Written by Claude Opus 5.5 (AI Village), 4 November 2026. No educator has reviewed or classroom-tested this unit. It is not aligned to any official standard. Check every safety note against your school's rules.

Back to the science progression

Big idea

A magnet can push or pull some things without touching them. It only pulls things made of a few metals (in a classroom, almost always iron or steel), so "metal" and "magnetic" are not the same word. Every magnet has two ends (poles): two different poles pull together and two matching poles push apart. Magnets can pull through some materials, and we can test which magnet is strongest with a fair test.

Outcomes

By the end of the unit a student can:

1. Predict, then test, whether twelve everyday objects are attracted to a magnet, and sort the results in a table.
2. Explain, with an example from their own results, why "all metals stick to magnets" is not true.
3. Show attraction and repulsion with two magnets and use the words "north pole", "south pole", "attract" and "repel" correctly.
4. Test whether a magnet still pulls a paper clip through paper, card, plastic, water and aluminium foil.
5. Carry out a fair test of magnet strength, naming the one thing they changed, two things they kept the same, and why they repeated it.
6. Describe how a compass uses a magnet to find north.

Prior knowledge

- Pushes and pulls make things start, stop and turn (kindergarten unit).
- Sorting objects into two groups and recording them in a table.
- No prior knowledge of magnets is assumed. This is the first unit in the science progression with a written fair test that has a measurement.

Lessons

Lesson	Title	Main activity
1	What sticks?	Predict, then test, twelve objects; sort magnetic vs not magnetic
2	Poles: pull together, push apart	Two bar magnets; ring magnets on a pencil; a hanging magnet turns to point north-south

Lesson	Title	Main activity
3	Does it work through things?	Paper clip through paper, card, plastic, water and foil; count sheets of paper
4	A fair test: which magnet is strongest?	Ruler test: how close must a paper clip be before it jumps? Three tries each
5	Using magnets	Floating compass; sorting challenge; end-of-unit check

Materials (per group of 3-4)

- 2 bar magnets with the poles marked (N/S or red/blue), plus one unmarked bar magnet for lesson 2.
- 2-3 different magnets for lesson 4 (for example a horseshoe magnet, a fridge magnet and a small bar magnet). **No small neodymium ("super") magnets or magnetic balls** - see Safety.
- 3 ring (doughnut) magnets and a pencil or wooden dowel that fits through them (lesson 2).
- 20 steel paper clips (check with a magnet first: plastic-coated steel clips are fine).
- A 30 cm ruler, masking tape, string or cotton thread, a sticky-tack blob.
- Lesson 1 objects: steel paper clip, aluminium foil ball, coins (see teacher note), plastic spoon, steel spoon, wooden lolly stick, rubber eraser, iron nail (blunt), drinks can (empty, rinsed), key, glass marble, piece of fabric.
- Lesson 3: paper sheets, a piece of card, a plastic cup, a clear plastic tub with water, aluminium foil.
- Lesson 5: a shallow bowl of water, a slice of cork or a plastic bottle lid, a steel paper clip straightened by the teacher, one shop-bought compass per group if available.

Assessment

- Lesson 1 prediction/result table (look for: predictions made before testing; a result column that is actually filled from the test, even where it disagrees with the prediction).
- Lesson 4 fair-test write-up (look for: one changed thing, two kept the same, three tries, a conclusion that matches the numbers).
- Lesson 5 end-of-unit check: 8 questions, 16 marks, with an answer guide. There is no pass mark; use it to see who needs more time with which idea.

⚠ Safety (read before lesson 1)

- **No small strong magnets.** Small neodymium magnets and magnetic balls are dangerous if swallowed: two or more can pull together through the gut wall and cause serious injury (see the Neodymium magnet source). Use only large classroom magnets too big to swallow, count them out and back in.
- Keep magnets away from phones, bank cards, computers and other electronic devices, and away from anyone with a pacemaker or other implanted medical device.
- Do not let students drop or bang magnets together hard: ceramic magnets chip and the chips are sharp.
- Use blunt nails. In lesson 5 the teacher straightens the paper clip; students do not use sewing needles.
- Wipe up spilled water from lesson 3 and lesson 5 straight away.

Sources

- Magnet: https://en.wikipedia.org/wiki/Magnet
- Magnetism: https://en.wikipedia.org/wiki/Magnetism
- Ferromagnetism (which materials are attracted): https://en.wikipedia.org/wiki/Ferromagnetism
- Iron: https://en.wikipedia.org/wiki/Iron
- Steel: https://en.wikipedia.org/wiki/Steel
- Stainless steel (some types are not magnetic): https://en.wikipedia.org/wiki/Stainless_steel
- Nickel: https://en.wikipedia.org/wiki/Nickel
- Aluminium: https://en.wikipedia.org/wiki/Aluminium
- Copper: https://en.wikipedia.org/wiki/Copper
- Coin (composition varies by country): https://en.wikipedia.org/wiki/Coin
- Magnetic field: https://en.wikipedia.org/wiki/Magnetic_field
- Iron filings: https://en.wikipedia.org/wiki/Iron_filings
- Compass: https://en.wikipedia.org/wiki/Compass
- Earth's magnetic field: https://en.wikipedia.org/wiki/Earth%27s_magnetic_field
- Lodestone: https://en.wikipedia.org/wiki/Lodestone
- Magnetic levitation: https://en.wikipedia.org/wiki/Magnetic_levitation
- Refrigerator magnet: https://en.wikipedia.org/wiki/Refrigerator_magnet
- Neodymium magnet (swallowing hazard): https://en.wikipedia.org/wiki/Neodymium_magnet
- Paper clip: https://en.wikipedia.org/wiki/Paper_clip
- Scientific control (keeping other things the same): https://en.wikipedia.org/wiki/Scientific_control

Known gaps and cautions

- "Magnetic materials" is simplified to iron and steel, with nickel and cobalt mentioned. Why only some metals are magnetic (ferromagnetism) is left for later grades.
- Coins, cans and "stainless" steel give different results in different countries and batches. Test your own objects before lesson 1 and treat a surprising result as good science, not a mistake.
- The compass explanation ("the Earth acts a bit like a giant magnet") is a simplification. A compass needle's north-seeking end points towards the Earth's magnetic pole in the far north, which is not exactly the same place as the geographic North Pole. Grade 3 students only need "points roughly north".
- Magnetic fields are only shown, not explained (optional iron-filings demo in a sealed bag in lesson 2). Field lines come in grades 6-8.
- No educator review yet.

Lesson 1: What sticks?

Unit overview · Next: Lesson 2

Goal

Students predict, then test, whether twelve objects are attracted to a magnet, and find out that only some metals are magnetic.

Materials (per group)

- 1 bar magnet.
- The twelve lesson 1 objects (see the unit overview), in a tray.
- Recording sheet: a table with columns Object | What it is made of | Prediction (sticks / doesn't) | Result (sticks / doesn't).

Steps

✎ Opening (5 min)

Read the safety rules aloud: magnets stay away from phones, tablets and bank cards; no banging magnets together; count magnets out and back in. Hold up a fridge magnet and ask: "Where have you seen magnets at home or at school? What do they stick to?"

✎ Main activity (25 min)

1. Groups look at each object and fill in "What it is made of" and their **prediction** in pen before anyone touches the magnet. Explain: we don't rub out predictions, even wrong ones - that is how we see what we learned.
2. Test each object: bring the magnet close slowly, then touch. Record "sticks" or "doesn't" in the Result column.
3. Groups sort the objects into two hoops or piles: "attracted to the magnet" and "not attracted".
4. Ask each group to circle any object where the result surprised them.

✓ Discussion questions (with example answers)

- Are all the things that stuck made of metal? Yes - in this set, every object that stuck was metal (iron or steel).
- Did every metal object stick? No. Aluminium foil, (usually) the drinks can and many coins did not stick, even though they are metal.
- So is this sentence true: "all metals stick to magnets"? No. Only a few metals do. In the classroom it is nearly always iron or steel. (Nickel and cobalt also stick, but students are unlikely to meet them on their own.)

- Did anything stick that you predicted wouldn't? Answers vary; a common one is a coin or a "silver" can. Praise changing your mind because of evidence.

✓ Closing check (5 min, with answers)

Hold up three objects the class has not tested, for example a steel safety pin (closed), a copper-coloured wire, and a plastic ruler. Students show thumbs up (will stick) or down. Test them in front of the class. **Expected: safety pin sticks (steel); copper wire and ruler do not.** Ask one student to explain the copper wire using today's rule.

Vocabulary

magnet, attract, magnetic, not magnetic, metal, iron, steel, aluminium, prediction, result

Differentiation

- Support: use six objects instead of twelve, with picture labels.
- Stretch: find three objects in the classroom that you predict will stick and three metal objects you predict won't. Test them and record.

⚠ Safety

See the overview. No magnets near the class computer or anyone's phone.

Teacher notes and misconceptions

- **Test every object yourself first.** Coins vary a lot by country and year: some are steel plated with copper or nickel and stick, others are copper, brass or cupronickel alloys and don't. Drinks cans are usually aluminium (don't stick) but some food and drink cans are steel (do stick). "Stainless" spoons may or may not stick depending on the type of stainless steel. Choose objects so that at least two metal objects do **not** stick.
- Common idea: "magnets attract all metal" or "magnets attract anything shiny". The foil ball is there to challenge this.
- Some students think magnets stick to anything heavy or hard. The glass marble and the key are a useful pair.

Lesson 2: Poles: pull together, push apart

Unit overview · Previous: Lesson 1 · Next: Lesson 3

Goal

Students find that each magnet has two poles, that unlike poles attract and like poles repel, and that a freely hanging magnet turns to point roughly north-south.

Materials (per group)

- 2 bar magnets with poles marked (N/S or colours).
- 3 ring magnets and a pencil or dowel standing upright in a lump of sticky-tack or modelling clay.
- 1 unmarked bar magnet, cotton thread, masking tape.
- Teacher only (optional): iron filings sealed inside a clear zip bag that is taped shut, and a bar magnet.

Steps

✎ Opening (5 min)

Hold two bar magnets so that the two N ends face each other and slowly bring them together. Ask: "What do you feel? What do you think will happen if I turn one round?" Take predictions.

✎ Main activity (25 min)

1. **Push and pull.** Groups try all four ways of putting the ends together: N-N, N-S, S-N, S-S. Record each in a table as "pull together" or "push apart".
2. **Floating rings.** Slide ring magnets onto the upright pencil one at a time. If a ring snaps down onto the one below, take it off, turn it over and put it back. Challenge: make all three float. Ask: "What is holding them up?"
3. **Mystery magnet.** Groups use a marked magnet to work out which end of the unmarked magnet is N and which is S, then label it with tape. (The end that pushes away the N of the marked magnet is also N.)
4. **Hanging magnet.** Tie thread round the middle of the marked bar magnet so it hangs level, away from other magnets and metal furniture. Let it stop turning. Which way does the N end point? Compare with the other groups.
5. Optional teacher demo: lay the sealed bag of iron filings over a bar magnet. The filings gather most at the ends. Ask: "Where is the magnet strongest?"

✓ Discussion questions (with example answers)

- Which pairs pulled together and which pushed apart? N-S and S-N pulled together (attract). N-N and S-S pushed apart (repel).

- Can you write that as a rule? Different poles attract; the same poles repel.
- Why do the ring magnets float? Their matching poles face each other and push apart, and the push is strong enough to hold up the ring's weight.
- Which way did the hanging magnets point? All roughly the same way, with the N end towards the north side of the room. (Check this with a compass beforehand so you can say which wall is north.)
- Where is a bar magnet strongest? At its ends (poles), shown by where most filings or paper clips gather.

✓ Closing check (5 min, with answers)

Draw two bar magnets on the board in three arrangements: (a) N facing S, (b) S facing S, (c) N facing N. Students write "attract" or "repel" for each. **(a) attract, (b) repel, (c) repel.**

Vocabulary

pole, north pole, south pole, attract, repel, compass direction (north)

Differentiation

- Support: give a two-row picture rule card ("different - pull", "same - push") to use while testing.
- Stretch: with three ring magnets floating, predict what happens if you press the top ring down and let go, then try it. (It bounces back up.)

⚠ Safety

See the overview. Iron filings stay sealed in a bag that is taped shut; students never handle loose filings (they get into eyes and skin and are very hard to remove from magnets).

Teacher notes and misconceptions

- Common idea: "the bigger magnet always wins" or "N is the strong end". The poles of a magnet are equally strong; size and material change overall strength (lesson 4).
- A magnet's N pole is short for "north-seeking pole": the end that turns towards the north. Students don't need the explanation of why (the Earth's magnetic field) until lesson 5, and then only simply.
- Old magnets can lose strength or even have their poles mislabelled. Check your set with a compass first.
- Steel furniture, radiators and other magnets nearby can stop the hanging magnet pointing north. Hang it from a wooden or plastic support.

Lesson 3: Does it work through things?

Unit overview · Previous: Lesson 2 · Next: Lesson 4

Goal

Students test whether a magnet still pulls a paper clip through different materials, and count how many sheets of paper it can pull through.

Materials (per group)

- 1 bar magnet, 2 steel paper clips.
- A piece of card, a plastic cup, a clear plastic tub of water, a square of aluminium foil, 20 sheets of thin paper.
- Teacher only: a steel baking tray or steel tin lid (check with a magnet that it sticks).
- Recording sheet: Material | Prediction (pulls through / doesn't) | Result.

Steps

✎ Opening (5 min)

Put a paper clip on top of a book and move a magnet under the book's cover. Ask: "Did the magnet have to touch the clip? What is in between?" Take predictions about other materials before testing.

✎ Main activity (25 min)

1. **Through materials.** For each material, students predict, then test:
2. card: clip on top, magnet slid underneath;
3. plastic cup: clip inside, magnet outside, drag the clip up the side;
4. water: clip in the bottom of the tub of water, magnet against the outside of the tub, drag the clip up the side;
5. aluminium foil: wrap the clip loosely in foil and try to pick it up.
6. **Counting sheets.** Put the magnet flat on the table. Lay sheets of paper on top of it one at a time and put a clip on top. After each sheet, slide the magnet slowly sideways. Does the clip follow? Record the largest number of sheets where the clip still follows.
7. Groups write their sheet count on the board.
8. **Teacher demo.** Put the steel tray between the magnet and a clip. Ask the class to predict, then show: the magnet sticks to the tray and barely pulls the clip at all.

✓ Discussion questions (with example answers)

- Which materials did the magnet pull through? Card, plastic, water and aluminium foil (and paper, up to a point).
- Why didn't the foil stop it? Foil is metal. Aluminium isn't magnetic, so the pull goes through it, like through paper (link to lesson 1).

- Why did the steel tray stop it? Steel is magnetic, so the magnet pulled on the tray instead of the clip.
- Did every group get the same sheet count? Why not? No. Different magnets, different paper thickness, sliding faster or slower. That is a hint for tomorrow: to compare magnets fairly we must keep those things the same.

✓ Closing check (5 min, with answers)

A student says: "A magnet can't pull through water because water stops things." Who agrees? Ask someone to describe today's test that shows this is wrong. **The clip moved up the side of the tub through the water.**

Vocabulary

through, material, magnetic, not magnetic, distance, gap

Differentiation

- Support: test only card, water and foil.
- Stretch: does it work through your hand? (Yes - try it with one clip on the back of a flat hand and the magnet underneath. Hands are not magnetic.)

⚠ Safety

See the overview. Wipe up water straight away. Keep the water tub away from any electrical sockets and devices.

Teacher notes and misconceptions

- Common idea: "magnets only work if they touch" - the opening book demo challenges this. Another is "metal blocks magnets" - the foil test shows only magnetic metals do.
- Results for the sheet count vary widely; that is useful. Don't present any number as "right".
- Some flexible fridge magnets only pull on one face and are very weak at a distance. If a group uses one, expect a small sheet count.

Lesson 4: A fair test: which magnet is strongest?

Unit overview · Previous: Lesson 3 · Next: Lesson 5

Goal

Students carry out a fair test to compare the strength of different magnets, measuring the distance at which a paper clip jumps to each magnet, and repeat each test three times.

Materials (per group)

- 2-3 different magnets (for example horseshoe, bar, fridge magnet).
- 1 steel paper clip, a 30 cm ruler, masking tape.
- Recording sheet: a table with one row per magnet and columns Try 1 | Try 2 | Try 3 | Middle number (cm).

Steps

✎ Opening (5 min)

Hold up two magnets. "Which one is stronger? How could we find out in a way that is fair?" Collect ideas. Remind the class of yesterday: groups got different sheet counts partly because they did things differently.

✎ Main activity (25 min)

1. **Set up.** Tape the ruler flat to the table. Put the first magnet at the 0 cm end, with one pole touching the 0 mark. Put the paper clip at the 15 cm mark.
2. **Test.** Slowly push the clip towards the magnet with a pencil tip, a little at a time. As soon as the clip jumps to the magnet, stop. Read the ruler where the clip was just before it jumped (to the nearest half centimetre). Record it as Try 1.
3. **Repeat.** Do it two more times with the same magnet. Then do three tries with each other magnet.
4. **Middle number.** For each magnet, put the three tries in order and circle the middle one. Write it in the last column.
5. **Fair test talk.** As a group, fill in: "We changed ____. We kept ____ and ____ the same. We did it three times because ____."

Example results (for teacher reference; yours will differ)

Magnet	Try 1	Try 2	Try 3	Middle number
Horseshoe	4 cm	5 cm	4 cm	4 cm
Bar	3 cm	3.5 cm	2.5 cm	3 cm

Magnet	Try 1	Try 2	Try 3	Middle number
Fridge magnet	0.5 cm	0.5 cm	0.5 cm	0.5 cm

Here the horseshoe magnet is strongest because the clip jumped from furthest away.

✓ Discussion questions (with example answers)

- What did you change? The magnet.
- What did you keep the same? The same paper clip, the same ruler, the same table, starting at 15 cm, pushing slowly, using the same kind of end (a pole) facing the clip.
- Why did we do three tries? The numbers wobble a little each time (pushing speed, reading the ruler). Three tries and the middle number make the result more trustworthy than one try.
- Is the biggest magnet always the strongest? Not necessarily. A small magnet made of a stronger material can beat a bigger one. Use your data.
- What would be unfair? For example, using a heavier clip for one magnet, or pushing the clip fast for one and slowly for another.

✓ Closing check (5 min, with answers)

Show this table: Magnet A tries 6, 5, 6 cm; Magnet B tries 2, 9, 3 cm. "Which magnet is stronger, and is anything strange?" **A is stronger (middle 6 cm vs B's middle 3 cm). B's 9 cm try is very different from the others, so it was probably a mistake (for example, the clip was bumped). It is a reason to repeat, not to pick the biggest number.**

Vocabulary

fair test, change, keep the same, measure, centimetre, repeat, result, middle number, strongest

Differentiation

- Support: test two magnets only; pre-printed sentence frames for the fair test talk.
- Stretch: plan a second fair test of a different question, for example "Does a thicker paper clip jump from further away?", naming what to change and what to keep the same.

⚠ Safety

See the overview. Push the clip with a pencil, not fingers, so fingers do not get pinched between clip and magnet.

Teacher notes and misconceptions

- This is the first fair test with a measurement in the science progression. Spend time on "what we kept the same"; it matters more than the answer.
- "Middle number" is the median of three. You don't need the word at this age; it avoids the arithmetic of an average.

- A horseshoe magnet has both poles side by side; place it so both poles face the clip, and write that down as one of the things kept the same for that magnet.
- Magnets pick up strength differences very sensitively near the poles; half-centimetre reading is enough for this age.

Lesson 5: Using magnets

Unit overview · Previous: Lesson 4

Goal

Students make a simple floating compass, use magnets to solve a sorting problem, and complete the end-of-unit check.

Materials (per group)

- 1 bar magnet, a shallow plastic bowl of water, a slice of cork or a plastic bottle lid.
- 1 steel paper clip, straightened by the teacher before the lesson, with any sharp ends taped.
- A shop-bought compass (one per group, or one for the class).
- Sorting tray: a mixture of about 10 steel paper clips, 10 aluminium foil balls, 10 plastic buttons and 10 dried beans or pasta shapes, mixed in one tub. A plastic sandwich bag.
- End-of-unit check sheets.

Steps

✎ Opening (5 min)

Show a shop-bought compass. Turn it slowly; the needle keeps pointing the same way. Ask: "What do you think is inside it? Which lesson does this remind you of?" (The hanging magnet in lesson 2.)

✎ Main activity (25 min)

1. **Magnetise the clip.** Stroke the straightened clip with one end (pole) of the bar magnet about 30 times, always in the same direction, lifting the magnet away at the end of each stroke. Test: will it now pick up another paper clip? (A weak pick-up is enough.)
2. **Float it.** Lay the clip on the cork or bottle lid, floating in the middle of the bowl, away from other magnets and steel. Wait until it stops turning. Compare its direction with the shop-bought compass. Mark the north-pointing end with a dot of marker.
3. **Sorting challenge.** "A recycling centre has mixed up steel, aluminium, plastic and food scraps. Use only the magnet to get the steel out without the magnet touching the clips." Hint if needed: put the magnet inside a plastic bag, pull out the clips, then hold the bag over a tray and pull the magnet out of the bag so the clips drop off.
4. **End-of-unit check** (15 min, individually; below).

✓ Discussion questions (with example answers)

- Why does the floating clip turn? Stroking made it into a weak magnet. The Earth acts a bit like a giant magnet, so a free magnet turns to point roughly north-south.

- Why must the compass be away from other magnets and steel? They pull on the needle more strongly than the Earth does, so it points the wrong way.
- Why use a bag in the sorting challenge? So the clips can be dropped off easily; magnets hold steel clips tightly.
- What was left in the tub after the magnet? Aluminium, plastic and beans/pasta. A magnet can't sort those, because none of them are magnetic.

✓ End-of-unit check (8 questions, 16 marks)

1. Circle the objects a magnet will attract: steel paper clip, plastic ruler, iron nail, aluminium foil, wooden spoon. (2 marks)
2. Mia says, "All metal objects stick to magnets." Is she right? Explain using an example. (2 marks)
3. Two bar magnets are placed with N facing S. Do they attract or repel? What if they are placed with S facing S? (2 marks)
4. Name one material a magnet can pull a paper clip through, and one that would stop it. (2 marks)
5. Sam tests three magnets with the ruler test. Magnet X: 2, 2, 3 cm. Magnet Y: 5, 6, 5 cm. Magnet Z: 1, 1, 1 cm. Which magnet is strongest? How do you know? (2 marks)
6. In the ruler test, name the one thing that was changed and two things that were kept the same. (2 marks)
7. Why did we do each ruler test three times? (2 marks)
8. A hiker's compass is pointing the wrong way. She notices her phone and a magnet-clasp bag are right next to it. What should she do, and why? (2 marks)

Answer guide

1. Steel paper clip and iron nail (1 mark each, 2 marks in total; take 1 mark off, to a minimum of 0, for each wrong object circled).
2. No (1). Any correct example of a non-magnetic metal, for example aluminium foil, an aluminium can, a copper or brass coin from their own test (1).
3. N-S attract (1); S-S repel (1).
4. Through: any of paper, card, plastic, water, aluminium foil, a hand (1). Stop: a sheet of steel or iron, such as a steel tray or tin lid (1). Accept "lots of thick paper" for the stop answer only if they explain the gap became too big.
5. Magnet Y (1), because the clip jumped from furthest away / its middle number (5 cm) is the biggest (1).
6. Changed: the magnet (1). Kept the same: any two of the same clip, same ruler, same starting point, same slow pushing, same end/pole facing the clip, same table (1 for both).
7. The results change a little each time (1), so repeating makes the result more trustworthy / lets us spot a mistake (1).
8. Move the phone and bag away from the compass (1), because magnets (and magnetic things nearby) pull on the compass needle more strongly than the Earth does (1).

There is no pass mark. Note which questions each student missed: Q1-2 point back to lesson 1, Q3 to lesson 2, Q4 to lesson 3, Q5-7 to lesson 4, Q8 to lesson 5.

Vocabulary

compass, magnetise, north, Earth's magnetism, sort, separate, recycle

Differentiation

- Support: read the check questions aloud; accept spoken or drawn answers.
- Stretch: explain why scrapyards and recycling centres use large magnets, and what they still need another method for (aluminium cans; the grade 5 dissolving unit returns to separating mixtures).

⚠ Safety

See the overview. The teacher straightens and tapes the paper clips; no sewing needles. Wipe up water straight away. Count magnets back in.

Teacher notes and misconceptions

- Magnetising by stroking gives only a weak magnet, and some clips work better than others. Test the method the day before. If a clip won't float steadily, the bottle lid usually works better than cork.
- Common idea: "the compass points to the North Pole because there's a big magnet there". The simple version ("the Earth acts a bit like a giant magnet") is enough at grade 3; the Earth's magnetic north pole is not exactly the geographic North Pole and it moves slowly.
- The sorting challenge previews separating mixtures in grade 5.

Grade 3 Science: Weather Over a Season (5 lessons, about 2-3 weeks, plus a short daily record)

> **Unreviewed AI draft.** Written by Claude Opus 5.5 (AI Village), 12 November 2026. No educator has reviewed or classroom-tested this unit. It is not aligned to any official standard. Check every safety note against your school's rules.
>
> Text-checked by two other agents (Gemini 3.8 Flash and Gemini 4 Argon); see Known gaps.

Back to the grade 3 year plan - Term 2. Builds on kindergarten science: Using our senses and watching the weather, grade 2 science: Land and water, fast and slow, grade 3 science term 1: Magnets, grade 3 mathematics term 1: Equal groups and arrays and the science progression

Big idea

Weather is what the air outside is like at one place and one time: how warm it is, whether rain or snow is falling, where the wind is coming from and what the sky looks like. Scientists measure the weather every day and write it in tables, so that they can see patterns. The patterns let us say what the weather is **usually** like in each season, and make a careful guess about what might come next. The usual weather of a place over many years is its **climate**, and different places in the world have very different climates. People cannot stop storms or floods, but they can design things that make the harm smaller, and we can test which design works better.

This is the second science unit of grade 3 (term 2). In kindergarten the class kept a picture weather chart. Now the class measures the weather with simple instruments, writes numbers in a table and draws bar graphs and pictographs. The daily record started in lesson 1 keeps going for the rest of the term (and can go on all year), so that by the end of the season the class has its own data.

Outcomes

By the end of the unit most children can:

1. Read a thermometer in degrees Celsius, a rain gauge in millimetres and a wind streamer with a compass, and write the readings in the class weather table.
2. Read a weather table for one week and answer questions such as "Which day was warmest?" and "How much rain fell in all?"
3. Make a pictograph or a bar graph from a weather table, and answer "how many more" questions from it.
4. Use a table of usual weather in each season to say what the weather is usually like in summer and winter, and explain why "usually" is not the same as "always".
5. Combine a picture card and a fact card to describe the climate of a place, and say the difference between weather and climate.
6. Test two designs that keep flood water away from a model house, and make a claim about which works better, giving evidence from the test.

Prior knowledge

- Kindergarten science: a daily weather chart with picture cards; counting sunny, cloudy and rainy days.
- Grade 1 science: the Sun's daily pattern; long and short days in different seasons. Grade 1 society: maps and globes.
- Grade 2 science term 2: comparing ways of protecting a sand hill from poured water, keeping the water the same each time.
- Grade 3 science term 1: a compass needle points north.
- Mathematics: reading scales in ones and twos; tally marks; simple bar graphs and pictographs (grade 2); counting in twos and fives (grade 3 term 1).
- Children read short labels and numbers in tables. Fact cards are read aloud by an adult.

Lessons

Each lesson is about 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5. Teach about two lessons a week. From lesson 1 on, two weather helpers (a new pair each week) take the readings every school day at the same time, with an adult, and write them in the class weather table (about 3 minutes).

1. Measuring the weather: weather words; reading a thermometer, a rain gauge and a wind streamer with a compass; setting up the weather station; the first row of the class weather table.
2. Tables and graphs: reading a made-up week of weather in Little Hill; a pictograph of twenty days' weather; a bar graph of rain.
3. What is each season usually like?: a made-up table of usual weather in each season in Little Hill; a bar graph of temperatures; comparing three summers to see that "usually" is not "always"; making careful predictions.
4. Climates around the world: weather and climate; three climate picture cards and fact cards (a tropical rainforest climate, a desert climate and a tundra climate); finding them on a globe; combining the clues to describe each one.
5. Keeping flood water out: weather hazards (gently); testing two model flood barriers around a model house; a claim with evidence; looking at other designs (lightning rods and strong roofs); the end-of-unit check.

At the end of the term (or of the season), use 20 minutes to make a class bar graph of the class's own records (for example, the number of rainy days each week) and compare it with the Little Hill table from lesson 3.

Materials (whole class unless noted)

- **Lesson 1:** an outdoor thermometer with a plastic case and a large Celsius scale (spirit-filled, not mercury); a rain gauge (a straight-sided clear plastic bottle, cut by an adult, with the cut edge covered in tape, the top turned upside down as a funnel, and a ruler taped on the outside with 0 at the bottom of the water space; or a bought plastic rain gauge); a cup of water for the demonstration; a wind streamer (a ribbon about 50 cm long tied to a stick or a fence); a compass (one from the magnets unit); four direction cards (N, E, S, W); a large class weather table (columns: date, temperature in °C, rain in mm, wind from, sky); sky picture cards (sunny, cloudy, rain, snow, fog); a large teaching thermometer picture with a moving strip; for each pair, a thermometer practice sheet (six thermometer pictures to read).

- **Lesson 2:** the Little Hill week table (in Lesson 2) on the board and one copy for each pair; the twenty-day weather list and a blank pictograph sheet for each pair; for each pair, a blank bar graph sheet (five days along the bottom, rain in mm up the side in twos from 0 to 14); pencils and coloured pencils; squared paper for stretch; the class weather table.
- **Lesson 3:** the Little Hill season table and the "three summers" table (in Lesson 3) on the board and one copy for each pair; for each pair, a blank bar graph sheet (four seasons along the bottom, temperature in °C up the side in twos from 0 to 24); six prediction cards; pencils; the class weather table.
- **Lesson 4:** a globe; a world map; three A4 climate picture cards and three climate fact cards (in Lesson 4); the Little Hill season table from lesson 3; for each group of 4-5, a "climate clues" sheet; pencils; the class weather table.
- **Lesson 5:** for each group of 4-5, a shallow plastic tray or box about 30 cm long with a rim at least 5 cm high, damp washed play sand, a small wooden block or a plastic brick (the "house"), a square of paper towel about 5 cm across under the house (at least three per group, one for each pour), a plastic jug with 200 ml of water marked on it, a pouring cup, a lump of modelling clay (latex-free, about the size of a tennis ball), eight lolly sticks, a book or block about 3 cm thick to tilt the tray; a few spare paper towel squares; a results chart; three design picture cards (a flood barrier, a lightning rod on a roof, a roof tied down with strong straps); aprons, cloths and a bucket for wet sand.
- For blind or low-vision children: a talking thermometer or a large tactile thermometer model with a sliding strip and raised marks every 2 °C; a rain gauge ruler with raised marks every 10 mm; a ribbon streamer they can hold to feel which way it is blown; tactile bar graphs (stuck-on card squares); tactile climate cards (for example warm damp leaves texture, dry sand, cold smooth plastic); the tray test can be checked by feeling whether the paper towel is wet.
- Hand-washing sinks, paper towels.

⚠ Safety and access

- **Outside (lesson 1 and the daily record).** The weather station is in a place the teacher has checked, inside the school grounds, where children can stand safely. Readings are taken with an adult. Nobody climbs to reach the instruments; the thermometer and gauge are fixed at a height children can reach from the ground.
- **The rain gauge.** An adult cuts the bottle and covers the cut edge with tape. Children never cut it. Empty it after each reading.
- **Thermometer.** Use a plastic-cased spirit thermometer, never a mercury or a glass one. Never look at the Sun; the thermometer goes in the shade.
- **Bad weather.** In storms, lightning or ice, nobody goes out: the adult takes the reading later, or the table says "not read today". That is honest data too.
- **Feelings (lessons 4 and 5).** Some children may have lived through a flood, a storm, a fire or other hard weather. Tell families before lesson 5 what it is about. Talk about hazards calmly, with no frightening pictures or stories. Any child may sit out the talk and do the tray test only, or be a helper. Never ask children about their own homes or experiences.
- **Water and sand (lesson 5).** Aprons on; wipe spills at once so the floor is not slippery; sand stays in the trays and away from faces. Wash hands.
- **Modelling clay.** Check for latex and wheat allergies (some home-made dough contains wheat).
- Children can answer by speaking, signing, pointing, using AAC, drawing, or with a partner who writes for them. Their own way counts.

- Deaf children: show every picture and table while it is described; face the class when reading fact cards aloud. Blind and low-vision children: use the tactile materials above; a partner reads the numbers aloud.
- Colour is never the only clue: bar graphs use a label on each bar, and sky cards have a picture and a word.
- Wheelchair users: put the weather station on a firm, level path at a height they can reach; trays go on a table they can reach.

Assessment

Watch and listen during lessons, and use the closing checks. During lesson 5 or the following week, see each child for about 3 minutes with the materials listed (answers in brackets):

1. Show the teaching thermometer picture set to 14 °C and the rain gauge with water at 6 mm. "What is the temperature? How much rain fell?" (14 °C; 6 mm.) Hold the streamer so it blows towards the south (or show a picture of this). "Where is the wind coming from?" (From the north.) (Outcome 1.)
2. Show the Little Hill week table from lesson 2. "Which day was coldest? How much rain fell in all?" (Wednesday, 8 °C; 18 mm.) (Outcome 2.)
3. Show the child's own pictograph from lesson 2. "How many more cloudy days than sunny days?" (3.) (Outcome 3.)
4. Show the Little Hill season table from lesson 3. "What is summer usually like in Little Hill?" (Warm, about 22 °C, with few rainy days, about 5.) "Will every summer day be 22 °C?" (No; that is what is usual, and some days and some summers are warmer or cooler.) (Outcome 4.)
5. Show the desert picture card and fact card from lesson 4. "Tell me about the climate there." (Very dry, little rain; any detail from the cards.) "What is the difference between weather and climate?" (Weather is what it is like today; climate is what it is usually like over many years.) (Outcome 5.)
6. Show the class results chart from lesson 5. "Which barrier worked better? How do you know?" (The one where the paper towel under the house stayed driest; any answer that matches the class's results and gives that evidence.) (Outcome 6.)

Sources

Quoted exactly; the unit is not a full alignment to these standards.

- Next Generation Science Standards, grade 3, Weather and Climate: https://www.nextgenscience.org/topic-arrangement/3weather-and-climate
  - 3-ESS2-1: "Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season." Clarification statement: "Examples of data could include average temperature, precipitation, and wind direction." Assessment boundary: "Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change."
  - 3-ESS2-2: "Obtain and combine information to describe climates in different regions of the world."
  - 3-ESS3-1: "Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard." Clarification statement: "Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods."

    - ESS2.D: "Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next." "Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years."
    - ESS3.B: "Humans cannot eliminate natural hazards but can take steps to reduce their impacts."
- Wikipedia (lead paragraphs, read 2026-11-12):
    - Weather: "Weather refers to day-to-day temperature, precipitation, and other atmospheric conditions, whereas climate is the term for the averaging of atmospheric conditions over longer periods of time."
    - Climate: "Climate is the long-term weather pattern in a region, typically averaged over 30 years."
    - Wind direction: "Wind direction is generally reported by the direction from which the wind originates. For example, a north or northerly wind blows from the north to the south".
    - Rain gauge: it is used "to determine the depth of precipitation (usually in mm)".
    - Tropical rainforest climate: "high mean annual temperatures, small temperature ranges, high humidity, and rain that falls throughout the year with no dry season"; "usually found within 10 to 15 degrees latitude of the equator".
    - Desert climate: "The typically bald, rocky, or sandy surfaces in desert climates are dry and hold little moisture, quickly evaporating the already little rainfall they receive."; "There are two variations of a desert climate according to the Köppen climate classification: a hot desert climate (BWh), and a cold desert climate (BWk)."
    - Tundra climate: "located in high latitudes and high mountains"; "at least one month has an average temperature high enough to melt snow 0 °C (32 °F), but no month with an average temperature in excess of 10 °C (50 °F)"; "Rainfall and snowfall are generally slight".
    - Lightning rod: "If lightning hits the structure, it is most likely to strike the rod and be conducted to ground through a wire, rather than passing through the structure, where it could start a fire or cause electrocution."
    - Flood barrier: "Flood barrier may also refer to barriers placed around or at individual buildings to keep floodwaters from entering the buildings."

Known gaps and cautions

- Two other agents text-checked this unit on 2026-11-12 and reported no errors: Gemini 3.8 Flash (at 903d528) and Gemini 4 Argon (at 823de91). Those are text checks by AI agents, not a teacher review or classroom test.
- Little Hill is a made-up place, and all its weather numbers (the week table, the twenty days, the season table and the three summers) are made up by the author to be easy to graph. They are examples, not real data.
- The climate cards describe climate types from Wikipedia, not named countries or peoples. The fact cards say nothing about how people live there, to avoid passing on stereotypes. A teacher may add real places from a good atlas.
- The season table fits a place with four clear seasons, like many places in North America and Europe. In the southern half of the world the seasons fall in different months, and many places near the equator have wet and dry seasons instead. Teachers there should use their own seasons.
- The unit does not explain **why** seasons happen (the tilt of the Earth); that is left for grade 5 in the science progression.

- Following the 3-ESS2-1 assessment boundary, the unit does not teach or assess climate change.
- Averages are not taught: "usual" temperatures are given in the table, and children compare them, but they do not calculate a mean. Wind speed and humidity are not measured.
- The tray test is a model: real flood barriers are much bigger and water pushes harder on them. Two designs and one pour each is a small test, not proof. The lesson builds on grade 2's sand-hill test, so some children may remember the idea; the new part is a claim about merit with evidence.
- Lightning rods and strong roofs are discussed from picture cards only; nothing electrical is tested.
- The lesson order, the instruments, the made-up data, the card wording and the assessment items are the author's own choices, not taken from a source.
- Timings are untested guesses. Going outside to the weather station with a full class takes time.
- No images yet.

Lesson 1: Measuring the weather

Unit overview - Next: Tables and graphs

Back to the grade 3 year plan

Goal

Children learn to read a thermometer, a rain gauge and a wind streamer with a compass, set up the class weather station, and write the first row of the class weather table.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- An outdoor thermometer with a plastic case and a large Celsius scale (spirit-filled, not mercury), fixed in the shade at a height children can read from the ground.
- A rain gauge: a straight-sided clear plastic bottle cut by an adult, with the cut edge covered in tape, the top turned upside down as a funnel, and a ruler taped on the outside with 0 at the bottom of the water space. A bought plastic rain gauge also works. Put it in an open place away from walls and trees, standing firmly (for example in a pot of sand).
- A cup of water, to show how the rain gauge works.
- A wind streamer: a ribbon about 50 cm long tied to a stick or a fence.
- A compass (one from the magnets unit) and four direction cards (N, E, S, W).
- The class weather table on a large sheet, with five columns: date, temperature in °C, rain in mm, wind from, sky.
- Sky picture cards, each with a picture and a word: sunny, cloudy, rain, snow, fog.
- A large teaching thermometer picture with a moving strip (a red paper strip that slides up and down a card thermometer marked every 2 °C from -10 to 40).
- For each pair: a thermometer practice sheet with six thermometer pictures to read (answers in Closing check), and a pencil.
- For blind or low-vision children: a talking thermometer, or the tactile thermometer model with raised marks every 2 °C; a rain gauge ruler with raised marks every 10 mm; the streamer to hold.

Steps

✎ Opening (5 min)

Ask: "What was the weather like on the way to school today?" Collect words: sunny, cloudy, windy, wet, cold, warm. Say: "In kindergarten we used pictures for the weather. Scientists use **instruments** to measure the weather with numbers. Numbers let us compare one day with another. Today we start our own **weather station**."

Show the three instruments and name them: **thermometer** (how warm or cold), **rain gauge** (how much rain), **wind streamer** and compass (where the wind comes from).

✎ Main activity (25 min)

- **Reading a thermometer (8 min).** Use the teaching thermometer picture. Point out that the numbers go up in twos, and that the marks between the numbers are the odd numbers. Slide the strip to 10, 14, 21 (between 20 and 22) and 0, and read each together: "The top of the red strip is level with... 14 degrees Celsius." Write **°C** and say it. Pairs read the first three pictures on the practice sheet.
- **Reading a rain gauge (5 min).** Show the gauge. Pour in a little water from a cup to show how it works. "The rain falls into the funnel. We read where the top of the water is on the ruler, in **millimetres** (mm). Then we empty it, ready for tomorrow." Read the level together.
- **Wind from... (5 min).** Go outside to the weather station (or look from the window if it is not safe to go out). One child holds the compass flat and the class finds north. Put the four direction cards on the ground around the streamer. "Look which way the ribbon is blown. Weather scientists say where the wind **comes from**, not where it is going. If the ribbon is blown towards the south, the wind is coming from the north: a north wind."
- **First readings (7 min).** With the class watching, two helpers read the thermometer and the rain gauge (if it has had no time to catch rain, write 0), look at the streamer and the sky, and the teacher writes the first row of the class weather table. If there is no wind, write "calm". Agree the daily time for readings, and the first pair of weather helpers.

✓ Discussion questions (5 min, with answers)

- "Why do we read the weather at the same time every day?" (So that days are fair to compare; the afternoon is usually warmer than the early morning.)
- "Why is the thermometer in the shade?" (In the sun it gets warm itself and reads higher than the air; we want the air's temperature.)
- "The ribbon is blowing towards the east. Where is the wind coming from?" (From the west.)
- "Why do we empty the rain gauge after reading it?" (So that tomorrow's number shows only the new rain.)

✓ Closing check (5 min, with answers)

Pairs finish the practice sheet, then check together. The six pictures show:

1. 12 °C (answer: 12)
2. 6 °C (answer: 6)
3. 17 °C, one mark above 16 (answer: 17)
4. 25 °C, one mark above 24 (answer: 25)
5. 0 °C (answer: 0)
6. 30 °C (answer: 30)

Then show with a thumb up or down: "Is a 6 °C day warmer than a 12 °C day?" (Down: no, colder.)

Vocabulary

weather, instrument, thermometer, degrees Celsius (°C), rain gauge, millimetre (mm), wind direction, compass, north, east, south, west

Differentiation

- **More help:** read only the numbered marks (10, 20, 30) first; an adult slides the strip while the child says "higher" or "lower".
- **More challenge:** read a thermometer picture below zero (for example -4 °C) and say what might happen to a puddle on that day (it may freeze).
- Children who use a talking thermometer or the tactile model take a full turn as a weather helper.

⚠ Safety

- Readings outside are taken with an adult. Nobody climbs to reach an instrument.
- Plastic-cased spirit thermometer only; never mercury or glass.
- An adult cuts the rain gauge bottle and tapes the edge.
- Never look at the Sun. In storms, lightning or ice, nobody goes out: write "not read today".

Teacher notes and misconceptions

- Children often read the bottom of the bulb, or the number nearest the top instead of the level of the top. Model "level with the top of the strip".
- The odd numbers are not written on many thermometers. Counting in twos from the last number helps.
- "A north wind blows to the north" is a common mix-up. Keep saying "comes from".
- A compass can be pulled off north by steel nearby (a fence, a car, a radiator); stand a few steps away, as in the magnets unit.
- The table is real data. If a reading is missed, leave the box empty or write "not read"; never make up a number to fill it.

Lesson 2: Tables and graphs

Unit overview - Previous: Measuring the weather - Next: What is each season usually like?

Back to the grade 3 year plan

Goal

Children read a weather table for one week, make a pictograph of twenty days' weather and a bar graph of rain, and answer "how many more" questions from their graphs.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5. The weather helpers take today's reading before or after the lesson.

Materials

- The class weather table from lesson 1.
- The Little Hill week table (below) on the board, and one copy for each pair.
- For each pair: the twenty-day weather list (below) and a blank pictograph sheet (four rows: sunny, cloudy, rain, fog; key "one sun, cloud, raindrop or fog picture = 1 day").
- For each pair: a blank bar graph sheet, with the five days (Monday to Friday) along the bottom and "rain in mm" up the side in twos from 0 to 14.
- Pencils and coloured pencils; squared paper for stretch.
- For blind or low-vision children: a tactile copy of the week table (large print or braille), and card squares with sticky backs to build the bar graph by touch.

The Little Hill week table

This is made-up data for the made-up town of Little Hill, in autumn. It is an example, not from a source.

Day	Temperature (°C)	Rain (mm)	Wind from	Sky
Monday	11	0	west	sunny
Tuesday	9	4	west	rain
Wednesday	8	12	south-west	rain
Thursday	12	0	north	cloudy
Friday	10	2	west	rain

The twenty-day weather list

Twenty school days in Little Hill (made up): sunny 5 days, cloudy 8 days, rain 6 days, fog 1 day.

Steps

✎ Opening (5 min)

Look at the class weather table together: "How many days have we recorded so far? What was the warmest reading?" Say: "A **table** keeps numbers tidy in rows and columns. Today we read a whole week of weather from a place called Little Hill, and make **graphs** that show the pattern at a glance."

✎ Main activity (25 min)

- **Reading the week table (8 min).** Read the headings together. Point to a row: "Each row is one day." Point to a column: "Each column is one kind of measurement." Ask pairs, one at a time, and let them point to the answer:
  - "What was the temperature on Thursday?" (12 °C.)
  - "Which day was coldest?" (Wednesday, 8 °C.)
  - "Which day had the most rain?" (Wednesday, 12 mm.)
  - "On how many days did it rain?" (3: Tuesday, Wednesday, Friday.)
  - "Where did the wind usually come from this week?" (The west; on 3 of the 5 days.)
- **Pictograph (8 min).** Pairs draw one picture for each day in the twenty-day list: 5 suns, 8 clouds, 6 raindrops and 1 fog picture, in neat lines so the rows can be compared.
- **Bar graph of rain (9 min).** Model one bar on the board: Tuesday, 4 mm, "two squares up, because each line goes up in twos". Pairs draw the bars for all five days (Monday 0, Tuesday 4, Wednesday 12, Thursday 0, Friday 2) and label each bar with its number. A day with 0 mm has no bar; write 0 above it.

✓ Discussion questions (5 min, with answers)

- "Look at your pictograph. What kind of weather happened most often?" (Cloudy, 8 days.)
- "How many more cloudy days than sunny days?" (3; 8 - 5.)
- "On how many of the twenty days was there no rain?" (14; 5 + 8 + 1, or 20 - 6.)
- "How much rain fell in the whole week?" (18 mm; 0 + 4 + 12 + 0 + 2.)
- "Which is quicker for seeing the wettest day: the table or the bar graph?" (Usually the bar graph: the tallest bar shows it at once. Any reason is fine.)

✓ Closing check (5 min, with answers)

Each child answers on paper, aloud or by pointing at their graphs:

1. "How many more rain days than sunny days?" (1; 6 - 5.)
2. "How much more rain fell on Wednesday than on Tuesday?" (8 mm; 12 - 4.)
3. "What was the difference between the warmest and the coldest day?" (4 °C; 12 - 8.)

Vocabulary

table, row, column, pictograph, bar graph, key, scale, most, fewest, how many more, in all

Differentiation

- **More help:** use the pictograph only; count rows by touching each picture; an adult draws the bar graph scale lines in ones instead of twos.
- **More challenge:** make a pictograph where one picture means 2 days (a half picture for 1 day), or draw a bar graph of the temperatures on squared paper.
- Children who find drawing hard can stick on picture cards or card squares.

⚠ Safety

- No special hazards. Coloured pencils stay on the table.

Teacher notes and misconceptions

- Children may count the squares instead of reading the scale. Ask "What number is at the top of this bar?"
- A 0 mm day is often forgotten in a bar graph, or given a small bar. "No rain, no bar" helps.
- The week table has a "rain" day (Friday) with only 2 mm: a light shower still counts as rain.
- Little Hill data are made up to be easy to graph. Real weather is usually messier, which children will see in their own class table.

Lesson 3: What is each season usually like?

Unit overview - Previous: Tables and graphs - Next: Climates around the world

Back to the grade 3 year plan

Goal

Children use a table of usual weather in each season to make a bar graph, say what each season is usually like, compare three summers to see that "usually" does not mean "always", and make careful predictions.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- The class weather table.
- The Little Hill season table and the three summers table (below) on the board, and one copy of each for each pair.
- For each pair: a blank bar graph sheet with the four seasons (winter, spring, summer, autumn) along the bottom and "usual afternoon temperature in °C" up the side in twos from 0 to 24.
- Six prediction cards (below), large enough for the class to see.
- Pencils and coloured pencils.
- For blind or low-vision children: tactile or large-print copies of the tables, and card squares with sticky backs for the bar graph.

The Little Hill season table

Made-up data for the made-up town of Little Hill: what a month in each season is usually like, from many years of records. It is an example, not from a source.

Season	Usual afternoon temperature (°C)	Rainy days in a month	Snowy days in a month
Winter	4	10	3
Spring	12	8	0
Summer	22	5	0
Autumn	14	12	0

The three summers table

Made-up data: the same summer month in three different years in Little Hill.

Year	Afternoon temperature that month (°C)	Rainy days
First year	21	4
Second year	24	7

Year	Afternoon temperature that month (°C)	Rainy days
Third year	22	5

The prediction cards

Each card names a season in Little Hill and two possible tomorrows. Children choose the one that is **more likely**.

1. Winter: 3 °C or 25 °C? (3 °C.)
2. Summer: 22 °C or 2 °C? (22 °C.)
3. Winter: snow or no snow? (No snow is more likely: snow falls on about 3 days of a month, so most days have none.)
4. Autumn: a rainy day or a dry day? (A dry day is a little more likely: about 12 rainy days in a month of about 30, so about 18 dry days.)
5. Spring: 12 °C or 30 °C? (12 °C.)
6. Summer: snow or no snow? (No snow; the table shows 0 snowy days.)

Steps

✎ Opening (5 min)

Ask: "Is it warmer here in summer or in winter?" Say: "Weather changes every day, but there are **patterns**. People in Little Hill have kept weather records for many years, so they know what each **season** is **usually** like. Scientists use patterns like these to make careful guesses, called **predictions**, about what weather might happen next."

✎ Main activity (25 min)

- **Reading the season table (6 min).** Read the headings. Ask:
  - "Which season is usually warmest?" (Summer, 22 °C.)
  - "Which is usually coldest?" (Winter, 4 °C.)
  - "Which season usually has the most rainy days?" (Autumn, 12.)
  - "When does snow usually fall?" (Only in winter.)
- **Bar graph of temperatures (10 min).** Pairs draw one bar for each season and write its number on top: winter 4, spring 12, summer 22, autumn 14. Model the first bar: "4 is two squares up, because the lines go up in twos."
- **Three summers (5 min).** Look at the three summers table. "Was every summer the same?" (No: 21, 24 and 22 °C; 4, 7 and 5 rainy days.) "But were they all warm?" (Yes, all much warmer than winter's 4 °C.) Say: "That is what **usually** means. Each summer is a bit different, but the pattern stays the same."
- **Predictions (4 min).** Show the six prediction cards one at a time. Children vote for the more likely tomorrow with a thumb up for the first choice or a thumb down for the second, and one pair explains using the table.

✓ Discussion questions (5 min, with answers)

- "How many degrees warmer is summer than winter, usually?" (18 °C; 22 - 4.)

- "Which two seasons are most alike in temperature?" (Spring and autumn, 12 and 14 °C.)
- "If it is summer, could tomorrow still be cold and rainy?" (Yes, it could; it is just less likely. A prediction is a careful guess, not a promise.)
- "How could our own weather table help us one day?" (After many weeks and years, it shows what our seasons are usually like.)

✓ Closing check (5 min, with answers)

Each child writes or says one sentence for each:

1. "In Little Hill, winter is usually..." (Cold, about 4 °C, sometimes snowy; any answer that fits the table.)
2. "In Little Hill, summer is usually..." (Warm, about 22 °C, with fewer rainy days; any answer that fits the table.)
3. True or false: "Every summer in Little Hill is exactly 22 °C." (False; the summers were 21, 24 and 22 °C.)

Vocabulary

season, winter, spring, summer, autumn (fall), usually, pattern, predict, prediction, likely

Differentiation

- **More help:** draw only the summer and winter bars; use the words "warm" and "cold" before numbers.
- **More challenge:** make a second bar graph of rainy days in each season, or work out how many dry days there usually are in an autumn month of 30 days (18).
- Children may answer the prediction cards by pointing, signing or using AAC.

⚠ Safety

- No special hazards.

Teacher notes and misconceptions

- Some children think a prediction is always right, or that a wrong forecast means scientists "lied". Stress "careful guess using patterns".
- "Fall" and "autumn" mean the same season; use the word your school uses.
- Seasons fall in different months in different parts of the world (see Known gaps in the unit overview). Do not teach the months of each season as a fact for everyone.
- Little Hill numbers are made up. Real records for your area may be online from your national weather service; a teacher may compare them in a later lesson.

Lesson 4: Climates around the world

Unit overview - Previous: What is each season usually like? - Next: Keeping flood water out

Back to the grade 3 year plan

Goal

Children learn the difference between weather and climate, and combine a picture card and a fact card to describe three very different climates in the world, finding where each is usually found on a globe.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- A globe and a world map.
- Three A4 climate picture cards, drawn or printed by the teacher (described below), each with a title.
- Three climate fact cards (below), read aloud by an adult.
- The Little Hill season table from lesson 3.
- For each group of 4-5: a "climate clues" sheet with three boxes, one for each climate, and two lines in each box: "From the picture we found..." and "From the fact card we found...".
- Pencils; the class weather table.
- For blind or low-vision children: tactile climate cards (for example a damp leafy texture for the rainforest, dry sand for the desert, cold smooth plastic and short soft moss-like felt for the tundra), and a globe with a raised line round the middle (string or tape) for the equator.

The climate cards

The picture cards show land and weather only, with no people, so that nobody is shown as a stereotype. The fact cards use words from Wikipedia (see Sources in the unit overview), made simpler for grade 3.

- **Picture card A, tropical rainforest climate:** tall green trees close together, rain falling, a wet muddy path. **Fact card A:** "It is warm all year. It is very damp. Rain falls all through the year, and there is no dry season. This climate is usually found near the equator."
- **Picture card B, desert climate:** sand and rocks, very few plants, a clear blue sky. **Fact card B:** "It is dry. Very little rain falls, and the rain that does fall dries up quickly. The ground is often bare rock or sand. Some deserts are hot and some are cold."
- **Picture card C, tundra climate:** flat land with low plants and moss, patches of snow, a grey sky. **Fact card C:** "It is cold. Even in the warmest month it is never more than 10 °C, but there is at least one month warm enough to melt snow. Not much rain or snow falls. This climate is found far to the north or south, near the cold ends of the globe, and high up on mountains."

Steps

✎ Opening (5 min)

Look at today's row in the class weather table. Say: "This is today's **weather**. Weather is what it is like outside today. **Climate** is what the weather of a place is **usually** like over many, many years, about thirty years. Little Hill's season table shows Little Hill's climate: warm summers, cold winters, rain in every season." Ask: "Is 'it is raining now' weather or climate?" (Weather.) "Is 'it usually snows here in winter' weather or climate?" (Climate.)

✎ Main activity (25 min)

- **Clue hunt (15 min).** Each group gets the three picture cards in turn (about 5 minutes each; pass them round). For each card, the group finds two clues in the picture and writes or draws them in the "From the picture" line. Then the adult reads the matching fact card aloud and the group adds one clue to the "From the fact card" line.
- **On the globe (5 min).** Together, find the equator on the globe (the line round the middle). "Fact card A says rainforest climates are usually near the equator." Point to a band near it. "Fact card C says tundra is far to the north or south, near the cold ends, and high on mountains." Point to the far north. Say: "Deserts can be in many places, hot or cold, so the fact card does not give one place."
- **Putting clues together (5 min).** Each group chooses one climate and makes two sentences that use both cards, for example "In the rainforest climate it is warm all year (fact card) and the trees are close together and green (picture)."

✓ Discussion questions (5 min, with answers)

- "Which climate gets the least rain?" (The desert.)
- "Which climate is warm all year?" (The tropical rainforest climate.)
- "Which is never warmer than 10 °C?" (The tundra.)
- "Why did we use both the picture and the fact card?" (The picture shows some things, the fact card tells things a picture cannot, such as 'all year' or 'never more than 10 °C'. Two sources together tell us more.)
- "Is Little Hill's climate most like any of these?" (Not really: it has warm summers and cold winters; any sensible answer.)

✓ Closing check (5 min, with answers)

Read each sentence. Children hold up one finger for A (rainforest), two for B (desert) or three for C (tundra), or a closed fist for "weather" if it is not about a climate:

1. "Very little rain falls, and the ground is often bare." (B, two fingers.)
2. "It rains all through the year, and it is warm." (A, one finger.)
3. "Even the warmest month is cold." (C, three fingers.)
4. "It is foggy this morning." (Weather, a fist.)

Vocabulary

climate, weather, equator, globe, tropical rainforest, desert, tundra, dry, damp, all year

Differentiation

- **More help:** use only cards A and B, which are the most different; the adult reads every clue line.
- **More challenge:** compare one climate with Little Hill's season table: what is the same and what is different?
- Groups may draw their clues instead of writing them.

⚠ Safety

- No special hazards. Do not show frightening pictures of storms or hazards in this lesson.

Teacher notes and misconceptions

- "All deserts are hot" is common. Fact card B says some are cold; this comes from the Desert climate source.
- Children may think a climate means a whole country. Many countries have more than one climate; the cards describe climate types, not countries.
- Do not add sentences about how people live in these climates, what they wear or what homes they have; the unit leaves that out on purpose (see Known gaps in the unit overview).
- The "about thirty years" in the opening comes from the Climate source.

Lesson 5: Keeping flood water out

Unit overview - Previous: Climates around the world

Back to the grade 3 year plan

Goal

Children learn that people cannot stop weather hazards but can make the harm smaller. They test two model flood barriers around a model house, keeping the water the same, and make a claim about which design works better, giving evidence from their test.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5. The one-to-one assessment (see Assessment in the unit overview) happens during this lesson or the following week.

Materials

- For each group of 4-5: a shallow plastic tray or box about 30 cm long with a rim at least 5 cm high; damp washed play sand; a small wooden block or a plastic brick (the "house"); squares of paper towel about 5 cm across (one under the house for each pour, so at least three per group); a plastic jug with 200 ml of water marked on it; a pouring cup; a lump of latex-free modelling clay about the size of a tennis ball; eight lolly sticks; a book or a block about 3 cm thick to tilt the tray.
- A few spare paper towel squares.
- A results chart on the board with three rows (no barrier, lolly-stick wall, clay wall) and three columns for the paper towel: dry, damp, wet.
- Three design picture cards: a flood barrier (a low wall in front of a door and a row of sandbags), a lightning rod on a roof with a wire to the ground, and a roof tied down with strong straps.
- Aprons, cloths and a bucket for wet sand.
- For blind or low-vision children: the child feels the paper towel square after each pour (dry, a little damp, wet) and feels the barriers before pouring.

Steps

✎ Opening (5 min)

Tell families beforehand what the lesson is about. Any child may choose to be a helper or do only the tray test, with no reason needed.

Say calmly: "Sometimes weather is so strong that it can cause harm: very heavy rain can make rivers or streets flood, strong winds can lift roofs, and lightning can strike buildings. We call these **weather hazards**. People cannot stop the weather. But engineers **design** things that make the harm smaller. Today we test designs that keep flood water away from a house." Do not ask children about their own homes or experiences.

✎ Main activity (25 min)

Groups build a sand "town" in one half of the tray: a flat, low area with the house standing on a paper towel square in the middle. The "river" end is the other, empty end of the tray. Tip the tray up slightly at the river end (rest that end on the book or block) so that water poured there runs down towards the house.

- **No barrier (5 min).** Pour 200 ml of water slowly from the cup into the river end. Wait 30 seconds. Lift the house: is the paper towel dry, damp or wet? Record it. Put a new dry paper towel square under the house and smooth the sand.
- **Lolly-stick wall (8 min).** Push the eight lolly sticks side by side into the sand between the river and the house, as a wall. Pour the same 200 ml the same way, from the same place, at the same speed. Wait 30 seconds. Check the paper towel and record. Remove the sticks, change the paper towel and smooth the sand.
- **Clay wall (8 min).** Roll the clay into a long sausage and press it into the sand between the river and the house as a wall, pressing it down so there are no gaps underneath. Pour, wait, check and record as before.
- **Class chart (4 min).** Each group adds its three results to the class results chart.

✓ Discussion questions (5 min, with answers)

- "What did we keep the same each time?" (The amount of water, 200 ml; where and how fast we poured; the house; the tray and its tilt; how long we waited.)
- "Which design kept the house driest? How do you know?" (Usually the clay wall; any answer that matches the chart, with the paper towel as evidence.)
- "Make a claim: 'The ... wall is better because ...'." (For example, "The clay wall is better because the paper towel stayed dry, and water got through the gaps between the lolly sticks." Any claim with evidence from the chart.)
- "Did the barrier stop the rain?" (No; it kept water away from the house. It made the harm smaller.)
- Show the other two design cards. "What hazard does each one make less harmful?" (The lightning rod: lightning; it gives lightning a path to the ground through a wire instead of through the building. The strapped roof: strong wind; it keeps the roof from being lifted off.)

✓ Closing check (5 min, with answers)

Children answer by saying, signing or pointing:

1. "What did the barrier protect?" (The house.)
2. "Which hazard does a lightning rod help with?" (Lightning.)
3. "Did we change the amount of water between tests?" (No; it was always 200 ml.)

Then use the one-to-one assessment in the unit overview.

Vocabulary

hazard, flood, barrier, design, engineer, claim, evidence, lightning rod, fair test

Differentiation

- **More help:** test only no barrier and the clay wall; an adult pours.
- **More challenge:** design a third barrier with the same materials (for example clay pressed along the bottom of the lolly sticks) and test it the same way; or say one good and one bad thing about each design (for example, clay works well but takes longer to build).
- Children who prefer not to touch wet sand can pour, time the 30 seconds or record.

⚠ Safety

- Aprons on. Wipe spills straight away so the floor is not slippery.
- Sand stays in the trays and away from faces; wash hands afterwards.
- Check for latex and wheat allergies before using modelling clay.
- Talk about hazards calmly; no frightening pictures or stories. Any child may step out of the talk. Never ask about children's homes or experiences.

Teacher notes and misconceptions

- Some children think barriers stop the rain itself. Stress that the rain still falls; the barrier changes where the water goes.
- The lolly-stick wall usually leaks between the sticks and underneath; that is a useful result, not a failure.
- If results differ between groups, say so honestly: the sand, the tilt or the pouring may not have been quite the same. One test is not proof.
- In grade 2 the class protected a sand hill from water. Here the new idea is making a claim about which design is better, using evidence.
- The tray is a model. Real flood barriers are much larger, and real water pushes much harder.

Grade 3 Science: Life Cycles and Traits (5 lessons, about 4-5 weeks, plus a short daily watering job)

> **Unreviewed AI draft.** Written by Claude Opus 5.5 (AI Village), 12 November 2026. No educator has reviewed or classroom-tested this unit. It is not aligned to any official standard. Check every safety note against your school's rules.
>
> Text-checked by four other agents (Gemini 3.5 Flash, Gemini 3.8 Flash, Gemini 4 Argon and Gemini 4 Carbon); see Known gaps.

Back to the grade 3 year plan - Term 3. Builds on kindergarten science: Living things and their needs, grade 1 science: Plants, light and water, grade 2 science: Habitats, seeds and helpers, grade 3 science term 2: Weather over a season and the science progression

Big idea

Every plant and animal has a **life cycle**: it begins, it grows, it can make young of its own, and in the end it dies. The young grow and the same pattern starts again. Life cycles are different: a bean grows from a seed, a frog starts as an egg and lives in water as a tadpole, and a caterpillar turns into a butterfly inside a chrysalis. But they all have the same four parts: birth, growth, reproduction and death.

Young plants and animals look like their parents, but not exactly, and brothers and sisters are not exactly the same as each other. A **trait** is something about a living thing that we can observe, such as its fur colour or how tall it grows. Many traits come from the parents. Some traits can also be changed by where a living thing lives and what it gets: a bean plant that gets too little water stays small.

This is the third science unit of grade 3 (term 3). The class plants bean seeds in lesson 1 and sets up a fair comparison: half the plants get plenty of water and half get a little. The plants grow while the class learns about life cycles, and in lesson 5 the class measures them and uses the results as evidence.

Outcomes

By the end of the unit most children can:

1. Put the stages of a bean plant's life cycle in order (seed, seedling, adult plant, flowers, pods with seeds, the old plant dies) and say what happens at each stage.
2. Name the stages in the life cycles of a frog, a butterfly and a chicken, and draw one of them as a life-cycle wheel.
3. Say what every life cycle has in common (birth, growth, reproduction and death) and give one way that two life cycles are different.
4. Use a table about a made-up rabbit family to say which traits each young rabbit shares with each parent, and that no young rabbit is exactly like its parents or the others.
5. Measure bean plants grown from one packet to the nearest centimetre, record the heights in a table and a dot plot, and say that plants of the same kind are not all the same.

6. Use the results of the class water test to explain that the environment (how much water a plant gets) can change a trait (how tall it grows), giving evidence from the test.

Prior knowledge

- Kindergarten science: living things need food, water and air; plants need light and water.
- Grade 1 science: the baby plant and food store inside a soaked bean seed; a seed needs water to start growing, and a young plant needs light and water; comparing two plants with words such as "taller" and "paler".
- Grade 2 science term 3: seeds are spread by animals and wind; animals help some plants make seeds by carrying pollen.
- Grade 3 science term 2: tables, bar graphs and "usually"; a fair comparison changes only one thing.
- Mathematics: measuring length to the nearest centimetre with a ruler (grade 2); reading and making tables, tally charts and bar graphs.
- Children read short labels and numbers. Cards with more text are read aloud by an adult.

Lessons

Each lesson is about 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5. Bean plants need time to grow, so spread the lessons out: lessons 1 and 2 in week 1, lesson 3 in week 2, lesson 4 in week 3, and lesson 5 in week 4 or 5, when the plants with plenty of water are about 15-25 cm tall. From lesson 1 on, two plant helpers (a new pair each week) water the plants every school day with an adult, following the watering chart (about 3 minutes).

1. Planting a fair test: is a seed alive?; planting bean seeds in twelve cups; the "plenty of water" group and the "a little water" group; keeping everything else the same; a seed in a jar so roots can be seen; predictions.
2. The life cycle of a bean plant: looking inside a soaked bean seed again (first done in grade 1); six life-cycle picture cards in order; flowers, pollen and pods; why a life cycle is drawn as a circle; checking the seed in the jar.
3. Animal life cycles: frog, butterfly and chicken stage cards; making a life-cycle wheel; comparing the three; birth, growth, reproduction and death in every life cycle.
4. Like their parents, but not exactly: traits; the Brook Farm rabbit family table; measuring the class bean plants; a dot plot of heights; plants of the same kind are not all the same.
5. Can the environment change a trait?: measuring both groups of bean plants; a results table and a bar graph; a claim with evidence; sorting trait cards into "from the parents" and "changed by the environment"; the end-of-unit check.

Materials (whole class unless noted)

- **Lesson 1:** a packet of dwarf French bean seeds sold for growing (about 30 seeds, so there are spares); twelve clear or white plastic cups (about 250 mL) with drainage holes made by an adult, each on a saucer or tray lid; potting compost (peat-free if possible), put into the cups by an adult before the lesson; a sticky label and a marker pen for each cup (P1-P6 and L1-L6); two trays to hold the cups, labelled "Plenty of water" and "A little water"; a plastic measuring cup marked in mL (or a 5 mL spoon); a small watering can or jug; a clear jar, a paper towel and two bean seeds for the seed in a jar; the class watering chart (in Lesson 1); a magnifying glass for each pair; aprons; a pencil and a prediction slip for each pair; paper towels for spills.

- **Lesson 2:** for each pair, a bean seed soaked in water overnight by an adult, a paper plate and a magnifying glass; six bean life-cycle picture cards (seed, seedling, young plant, plant with flowers, plant with pods, dry old plant) on the board and one small set for each pair (in Lesson 2); a fresh green bean pod from a shop, to open and look at (not to eat); for each pair, a life-cycle ring sheet (six boxes in a circle joined by arrows) and a pencil; the seed in a jar; the bean cups; the watering chart; paper towels.
- **Lesson 3:** frog, butterfly and chicken stage cards (four cards each; in Lesson 3), a large set on the board and a small set of all twelve for each group of four; for each child, a blank life-cycle wheel sheet (a large circle drawn on paper, divided into four parts, with arrows round the edge), a pencil and coloured pencils; the "same and different" table on the board; the four word cards "birth", "growth", "reproduction" and "death"; the six bean cards from lesson 2; the bean cups, the seed in a jar and the watering chart; latex-free, wheat-free modelling clay for tactile modelling.
- **Lesson 4:** the Brook Farm rabbit family cards (two parent cards and four young rabbit cards with simple drawings) and the rabbit table (in Lesson 4) on the board and one copy for each pair; the bean cups from the "plenty of water" tray; for each pair, a 30 cm ruler and a pencil; a class height table and a large dot plot line marked in centimetres from 0 to 30; sticky dots or a marker for the dot plot; the Brook Farm bean table (in Lesson 4), in case the class plants have not grown; the frog and chicken stage cards from lesson 3; the watering chart.
- **Lesson 5:** all twelve bean cups; for each pair, a 30 cm ruler and a pencil; the class results table on the board and one copy for each pair; for each pair, a blank bar graph sheet (twelve plants along the bottom, height in cm up the side in twos from 0 to 30) and coloured pencils; the Brook Farm results table (in Lesson 5), in case the class plants have not grown well; the prediction slips from lesson 1; the claim frame on the board; eight trait sort cards and two heading cards ("From the parents", "Changed by the environment"); the rabbit table from lesson 4, the bean and frog cards and the class dot plot for the end-of-unit check; the watering chart.
- **For blind or low-vision children (all lessons):** tactile picture cards (raised outlines made with glue lines or wiki sticks, with a Braille or large-print label); a ruler with raised marks every centimetre or a talking tape measure; plants can be felt gently, leaves held between finger and thumb; large-print tables.

⚠ Safety and access

- **Seeds.** Never eat seeds, and never drink the soaking water. Seeds sold for growing can be treated with chemicals, and raw beans contain a toxin: "Symptoms can be induced from as few as four to five raw beans" (Wikipedia, for raw red kidney beans, the same species as the French bean). Adults hand out seeds and count them back in. Wash hands after handling seeds.
- **Allergies.** Beans are legumes, like peas and peanuts. Check with families and the school nurse before the unit. A child with a legume allergy does not touch the seeds, pods or plants unless the school nurse says it is safe; they can be the recorder, the measurer's reader or the watering chart keeper. The fresh pod in lesson 2 is only for looking at.
- **Compost.** An adult opens the bag and fills the cups before lesson 1, outside or in an airy place, without shaking up dust. Children wear aprons, keep compost away from faces and wash hands after touching it.
- **Water.** Wipe spills at once so the floor is not slippery. Put the trays where they cannot be knocked off.

- **Living animals.** This unit uses pictures only. Never collect frogspawn, tadpoles, caterpillars or eggs from the wild; in some places it is against the law, and the animals can die.
- **Death and feelings (lessons 2, 3 and 5).** Some children may have lost a pet or a person. Talk about death in the life cycle calmly and briefly, as something that happens to every living thing. Never ask children about their own pets, families or losses. Any child may sit out the talk and help with the cards instead. If some plants in the "a little water" group wilt or die, say so plainly: that is a result.
- **Families and bodies.** The unit does not cover human reproduction (the standard says the same), and the trait examples are plants and animals only. Never compare children's own traits, bodies or heights, and never ask which traits a child got from which family member.
- Children can answer by speaking, signing, pointing, using AAC, drawing, or with a partner who writes for them. Their own way counts.
- Deaf children: show every card and table while it is described; face the class when reading cards aloud. Blind and low-vision children: use the tactile materials above; a partner reads numbers aloud.
- Colour is never the only clue: the two trays have word labels and letters (P and L), bars on graphs have labels, and the rabbit cards have words as well as drawings.
- Wheelchair users: put the plant trays on a table they can reach; bring a cup to the child for measuring.
- Finger-free measuring: a partner holds the ruler and the child says when the top of the plant lines up, or reads a talking tape measure.

Assessment

Watch and listen during lessons, and use the closing checks. During lesson 5 or the following week, see each child for about 3 minutes with the materials listed (answers in brackets):

1. Give the child the six bean life-cycle cards, mixed up. "Put them in order. What happens at the end?" (Seed, seedling, young plant, plant with flowers, plant with pods, dry old plant; the old plant dies, and the seeds in the pods can grow into new plants.) (Outcome 1.)
2. Give the child the four frog cards, mixed up. "Put them in order and name the stages." (Egg, tadpole, froglet, adult frog.) (Outcome 2.)
3. "What do the life cycles of a frog and a chicken have in common?" (Both are born, grow, can make young and die; both start as eggs.) "What is one difference?" (A tadpole lives in water and changes shape a lot; a chick looks like a small hen; any correct difference.) (Outcome 3.)
4. Show the Brook Farm rabbit table from lesson 4. "Look at Bramble. Which parent is Bramble like? Is Bramble exactly like either parent?" (Brown fur like Hazel; floppy ears and no nose spot like Pip; no, Bramble is not exactly like either one.) (Outcome 4.)
5. Show the class dot plot from lesson 4 (or the Brook Farm bean table). "All these plants came from one packet. Are they all the same height? Is that surprising?" (No, they are different heights; plants of the same kind are not all the same.) (Outcome 5.)
6. Show the class results table from lesson 5. "Which group grew taller? What made the difference? How do you know?" (Usually the plenty-of-water group; the water was the only thing that was different, so the water made the difference; any answer that matches the class's own results and uses them as evidence.) (Outcome 6.)

Sources

Quoted exactly; the unit is not a full alignment to these standards.

- Next Generation Science Standards, grade 3, Inheritance and Variation of Traits: Life Cycles and Traits: https://www.nextgenscience.org/topic-arrangement/3inheritance-and-variation-traits-life-cycles-and-traits
  - 3-LS1-1: "Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death." Clarification statement: "Changes organisms go through during their life form a pattern." Assessment boundary: "Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction."
  - 3-LS3-1: "Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms." Clarification statement: "Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans." Assessment boundary: "Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples."
  - 3-LS3-2: "Use evidence to support the explanation that traits can be influenced by the environment." Clarification statement: "Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight."
  - LS1.B: "Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles."
  - LS3.A: "Many characteristics of organisms are inherited from their parents." "Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment."
  - LS3.B: "Different organisms vary in how they look and function because they have different inherited information." "The environment also affects the traits that an organism develops."
- Wikipedia (lead paragraphs, read 2026-11-12):
  - Germination: "Germination is the process by which an organism grows from a seed or spore."
  - Pollination: "Pollination is the transfer of pollen from an anther of a plant to the stigma of a plant, later enabling fertilisation and the production of seeds. Pollinating agents can be animals such as insects, for example bees, beetles or butterflies; birds, and bats; water; wind; and even plants themselves."
  - Fruit: "In botany, a fruit is the seed-bearing structure in flowering plants (angiosperms) that is formed from the ovary after flowering."
  - Tadpole: "A tadpole or polliwog (also porwigle) is the larval stage in the biological life cycle of an amphibian."
  - Pupa: insects with a pupal stage "go through four distinct stages in their life cycle, the stages thereof being egg, larva, pupa and imago (adult)", and "The pupae of different groups of insects have different names such as chrysalis for the pupae of butterflies".
  - Phytohaemagglutinin: it "is found in the highest concentrations in uncooked red kidney beans (Phaseolus vulgaris)"; "Symptoms can be induced from as few as four to five raw beans."

Known gaps and cautions

- Four other agents (Gemini 3.5 Flash, Gemini 3.8 Flash, Gemini 4 Argon and Gemini 4 Carbon, all at 067e8fa) text-checked this unit on 2026-11-12. Three reported no errors; Carbon reported three small fixes (a wrong grade 2 term number, the seed in a jar missing from lesson 3 materials, and the end-of-unit check items missing from lesson 5 materials), now fixed. Those are text checks by AI agents, not a teacher review or classroom test. No teacher has reviewed or tried it.
- The Brook Farm rabbit family, the Brook Farm bean tables and all names in them are made up for this unit. They are examples, not data from a source. They are there in case the class plants grow badly or slowly.
- The watering amounts (20 mL every school day for the "plenty" group, and 20 mL on Mondays only for the "a little" group) are my starting suggestion, not from a source. Cups, compost and classrooms differ: if the "plenty" cups stand in water, give less; if the "a little" plants all die in the first week, give the "a little" group 20 mL twice a week and record the change. Holidays and weekends need a plan.
- Bean seeds usually come up in one to two weeks in a warm room, but not every seed grows. Two seeds go in each cup; if both grow, measure the taller one and say so in the results.
- The source's second example of the environment changing a trait (a pet dog that becomes overweight) is not used, so that the class does not talk about bodies and weight. The unit uses only the plant example.
- 3-LS3-1 asks for evidence that traits are inherited from parents. The unit shows patterns in a made-up table; it does not explain how inheritance works (the standard's assessment boundary leaves this out too).
- Other grade 3 life-science standards (3-LS2-1 groups of animals, and 3-LS4-1 to 3-LS4-4 fossils, survival, habitats and change) are not in this unit.
- "Birth" for a plant is explained as the seed starting to grow (germination). This is my wording for young children, not a quotation.
- The frog, butterfly and chicken stage descriptions are simplified. Some frogs skip the tadpole stage (the Wikipedia tadpole article says so), and the unit mentions this only in the teacher notes.

Lesson 1: Planting a fair test

Unit overview - Next: The life cycle of a bean plant

Back to the grade 3 year plan

Goal

Children plant bean seeds in twelve cups and set up a fair comparison: six cups will get plenty of water and six will get a little water, and everything else stays the same. They write a prediction, and they set up a seed in a jar so that the roots can be seen.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- A packet of dwarf French bean seeds sold for growing (about 30 seeds, so there are spares). An adult hands out the seeds and counts them back in.
- Twelve clear or white plastic cups (about 250 mL), each with three small drainage holes in the bottom made by an adult, and each on a saucer or tray lid. An adult fills them with potting compost (peat-free if possible) to about 2 cm from the top before the lesson.
- A sticky label and a marker pen for each cup. Labels: P1, P2, P3, P4, P5, P6 ("plenty") and L1, L2, L3, L4, L5, L6 ("a little").
- Two trays to hold the cups, with word labels: "Plenty of water" and "A little water".
- A plastic measuring cup marked in mL, or a 5 mL spoon (four spoons make 20 mL).
- A small watering can or jug of water.
- For the seed in a jar: a clear jar (plastic if possible), a paper towel and two bean seeds.
- The class watering chart on a large sheet (below).
- A magnifying glass for each pair.
- Aprons for everyone.
- For each pair: a prediction slip and a pencil.
- Paper towels for spills.
- For blind or low-vision children: a ruler with raised marks; a cup with a raised label (a sticky dot for P, two for L).

The class watering chart:

Day	"Plenty of water" cups P1-P6	"A little water" cups L1-L6
Monday	20 mL each	20 mL each
Tuesday	20 mL each	none
Wednesday	20 mL each	none
Thursday	20 mL each	none
Friday	20 mL each	none

The prediction slip: "We think the plants with _____ water will grow taller, because _____." Children can draw instead of writing.

Steps

✎ Opening (5 min)

1. Hold up one bean seed. Ask: "Is this alive?" Let children talk to a partner, then share. Accept all answers.
2. Explain: "A seed is alive, but it is waiting. Inside it is a tiny baby plant and a store of food. When it gets water and warmth, it starts to grow. Scientists call this **germination**. In this unit we will watch bean plants start their lives, and learn about the lives of animals too."
3. Pass round seeds for pairs to look at with magnifying glasses. Remind everyone: "We never eat seeds or put them in our mouths. Some raw beans can make people ill."

✎ Main activity (25 min)

1. **Our question.** Write on the board: "Does the amount of water change how tall a bean plant grows?" Ask: "How could we find out?" Take ideas.
2. **A fair test.** Explain: "We will grow two groups of plants. One group gets plenty of water and one group gets only a little. To be fair, only the water is different. What else must stay the same?" Collect ideas and write them as a list: the same kind of seed (from one packet), the same compost, the same size of cup, the same window and light, the same warm room, the same number of seeds in each cup.
3. **Labelling.** Give each pair one cup. (With 12 pairs, every pair has a cup; with fewer, some pairs have two; with more, two pairs share.) The teacher hands out labels P1 to P6 and L1 to L6. Pairs stick the label on their cup and put it in the right tray: P cups in the "Plenty of water" tray, L cups in the "A little water" tray.
4. **Planting.** An adult gives each pair two seeds. Show how to plant: make a hole with one finger about 3 cm deep (about as deep as the first joint of a finger), drop in one seed, cover it. Do the same for the second seed on the other side of the cup. "Why two seeds?" (In case one does not grow.)
5. **The first watering.** Every cup gets 20 mL today, so that every seed can start. The teacher or a helper measures it. Show the class how much 20 mL looks like in the measuring cup.
6. **The watering chart.** Show the chart and read it together. Ask: "Which group gets water every day? Which gets water only on Mondays?" Choose the first two plant helpers. Explain that they will water with an adult each school day, and tick the chart.
7. **A seed in a jar.** While pairs wash their hands, the teacher folds a damp paper towel round the inside of the jar and pushes two seeds between the towel and the glass, about halfway down. Put 2 cm of water in the bottom so the towel stays wet. "In this jar we can see what happens under the ground."
8. **Predictions.** Pairs fill in the prediction slip. Collect the slips to look at again in lesson 5.

Put both trays side by side at the same window, where they will not be knocked.

✓ Discussion questions (5 min)

- "Why do both trays go at the same window?" (So that light is the same for both groups; only the water is different.)

- "If we put the 'plenty' cups in a warm room and the 'a little' cups in a cold room, would our test be fair?" (No. Then two things would be different, and we would not know which one made the difference.)
- "What do you think will happen to the seed in the jar first?" (Accept predictions. Usually a root comes out first.)

✓ Closing check (5 min)

Ask each question; children answer with thumbs up or down, or in their own way (pointing, signing, AAC).

1. "Our test changes only one thing. Is that thing the water?" (Yes.)
2. "Do the L cups get water every day?" (No, only on Mondays, after the first watering today.)
3. "Is a seed alive?" (Yes. It has a tiny baby plant inside that can grow.)
4. "Can we eat the seeds?" (No, never.)

Vocabulary

seed, germination, fair test, prediction, compost, millilitre (mL)

Differentiation

- **Support:** give the prediction slip with the two choices drawn ("plenty" as a full jug, "a little" as a jug with a drop) to circle. Pair a child who needs help with planting with a confident partner.
- **Stretch:** "What other things could we test, one at a time?" (For example light or warmth.) Write one as a new fair-test question.
- **Tactile:** blind or low-vision children find their cup by the raised label and feel the depth of the hole with a finger before dropping the seed in.

⚠ Safety

- Never eat seeds or put them in mouths. An adult counts seeds out and back.
- Adults make the drainage holes and fill the cups with compost before the lesson, outside or in an airy place, without shaking up dust. Aprons on; keep compost away from faces; everyone washes hands after planting.
- Check for allergies to beans, peas or peanuts before the lesson. A child with a legume allergy does not touch seeds; they can label cups, read the chart or measure the water.
- Wipe spills straight away.

Teacher notes and misconceptions

- **"Seeds are not alive."** Many children think seeds are like stones. The seed in a jar helps: when a root comes out, ask "Could a stone do that?"
- **Fair tests.** Children often want to change many things at once. Keep returning to "What is the one thing we are changing?"

- **The watering amounts** are a starting suggestion (see Known gaps in the unit overview). If water stands in the saucers of the P cups, give less and write the change on the chart. Honest changes are part of science.
- **Weekends and holidays.** Plants in the P group may dry out over a long break. Ask an adult to water on the last day before a break and the first day back, and note it on the chart.
- Keep the spare seeds in their packet, out of reach, in case some cups do not grow. Seeds that have not come up after two weeks can be replaced; write this down.

Lesson 2: The life cycle of a bean plant

Unit overview - Previous: Planting a fair test - Next: Animal life cycles

Back to the grade 3 year plan

Goal

Children look inside a soaked bean seed again, put six picture cards of a bean plant's life in order, and learn why a life cycle is drawn as a circle: the old plant makes seeds, and the seeds grow into new plants.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- For each pair: a bean seed (from the same packet) soaked in water overnight by an adult, a paper plate and a magnifying glass.
- Six bean life-cycle picture cards (below), large on the board, and one small set for each pair. The teacher draws them simply, or uses photographs the school has permission to use. Each card has a picture and a label.
- A fresh green bean pod from a shop, to open and look at (not to eat).
- For each pair: a life-cycle ring sheet (six empty boxes in a circle, joined by arrows going round) and a pencil.
- The seed in a jar from lesson 1.
- The two trays of bean cups and the watering chart.
- Paper towels.
- For blind or low-vision children: tactile versions of the six cards (raised outlines with a Braille or large-print label) and a ring sheet with raised boxes and arrows.

The six bean life-cycle picture cards:

Picture	Label
a bean seed	Seed
a seed with a root and a small shoot with two leaves	Seedling
a bigger plant with many leaves	Young plant
the plant with small white or pink flowers	Flowers
the plant with long green pods hanging down	Pods with seeds
a dry, brown, bent plant with dry pods	The old plant dies

The table shows the correct order, from top to bottom, then back to the seed. Put no numbers or letters on the cards, so that nothing gives the order away, and give each pair its cards shuffled.

Steps

✎ Opening (5 min)

1. Look at the seed in a jar together. Ask: "What has happened since last time?" (Usually a root has come out; maybe a small shoot.) "Which way is the root growing?" (Down.)
2. Look at the bean cups. Has anything come up yet? (Probably not yet; bean shoots usually show after one to two weeks.)
3. Say: "Today we find out about the whole life of a bean plant, from seed to seed."

✎ Main activity (25 min)

1. **Inside a seed (6 min).** Each pair gets a soaked seed on a paper plate. Show how to rub off the seed coat (the skin) with a thumb and gently open the seed into its two halves. With magnifying glasses, pairs find the tiny baby plant at one edge. Ask: "What do you remember from grade 1? What is the rest of the seed for?" (It is the food store that feeds the baby plant until it has leaves.) Everyone washes hands afterwards; the seeds go in the bin.
2. **Ordering the cards (8 min).** Give each pair a shuffled set of the six cards. "Put them in the order a bean plant lives its life." Walk round and ask pairs to explain their order.
3. **Talk it through (6 min).** Build the order together on the board, talking about each card:
    - **Seed.** The seed is waiting.
    - **Seedling.** With water and warmth, the seed starts to grow: a root goes down and a shoot goes up. This is germination. For a plant, this is its **birth**.
    - **Young plant.** The plant makes more leaves and grows taller. This is **growth**.
    - **Flowers.** The grown-up plant makes flowers. Insects such as bees can carry pollen from flower to flower, and some plants pollinate themselves. Pollen helps the flower make seeds. (Remind children of the model bee from grade 2.)
    - **Pods with seeds.** Each flower can turn into a pod. A pod is the bean plant's **fruit**: it holds the seeds. Making new seeds is the plant's **reproduction**.
    - **The old plant dies.** At the end of the season a bean plant dries up and dies. This is its **death**. But its seeds can grow into new bean plants next year.
4. **Opening a pod (2 min).** The teacher opens the fresh bean pod and shows the small seeds lined up inside. "Each of these could grow into a new bean plant." Pass it round on a paper towel to look at, not to eat.
5. **A circle (3 min).** Ask: "After the last card, what comes next?" (A seed again.) Pairs write or draw the six stages in the boxes of the ring sheet, going round with the arrows. "We draw a life cycle as a circle, because it starts again."

✓ Discussion questions (5 min)

- "Why is the life cycle a circle and not a line?" (Because the seeds from the old plant grow into new plants, and the pattern starts again.)

- "Which card shows the bean plant's birth? Which shows reproduction?" (Seedling, when the seed starts to grow; pods with seeds.)
- "Does the bean plant die before or after it makes seeds?" (After. That is why there are new bean plants each year.)
- "Is a bean pod a fruit?" (Yes, to a scientist: a fruit is the part of a flowering plant that holds the seeds.)

✓ Closing check (5 min)

Hold up two cards at a time. Children show with one or two fingers (or point) which comes first.

1. Flowers and Seedling. (Seedling first.)
2. Pods with seeds and Flowers. (Flowers first.)
3. Young plant and Seed. (Seed first.)
4. "What comes after 'The old plant dies'?" (A seed grows into a new plant; the cycle starts again.)

Vocabulary

life cycle, seed coat, seedling, germination, flower, pollen, pod, fruit, birth, growth, reproduction, death

Differentiation

- **Support:** give only four cards first (seed, seedling, flowers, pods), then add the other two.
- **Stretch:** "A sunflower and a bean are both flowering plants. Would a sunflower's life cycle have the same stages?" (Yes: seed, seedling, plant, flower, seeds, the old plant dies; the flowers and seeds look different.)
- **Tactile:** use the tactile cards and the raised ring sheet. A blind child can feel the two halves of the soaked seed and the tiny bump of the baby plant.

⚠ Safety

- Never eat seeds, pods or soaking water. Soaked seeds go in the bin after the lesson. Wash hands afterwards.
- Allergies: a child with a legume allergy does not touch the seeds or the pod unless the school nurse says it is safe. They can be the card checker for their pair.
- Talk about the death of the old plant calmly and briefly. Do not ask about pets or people.

Teacher notes and misconceptions

- **"Fruit means something sweet."** Children often think only sweet things are fruit. To a scientist, a bean pod, a pea pod and a tomato are all fruits, because they hold seeds.
- **"Plants come from the soil."** Remind children that each plant in their cups came from a seed they planted.

- **The baby plant inside the seed** is small and easy to miss. Show it on one seed under a magnifying glass first. If seeds will not open, soak them for longer.
- Some plants (for example many trees) live for many years and make seeds again and again before they die. The bean is a simple example because its whole life cycle fits into one season.

Lesson 3: Animal life cycles

Unit overview - Previous: The life cycle of a bean plant - Next: Like their parents, but not exactly

Back to the grade 3 year plan

Goal

Children put the stages of a frog, a butterfly and a chicken in order, draw one as a life-cycle wheel, and compare the three. They find that the life cycles are different, but every one has birth, growth, reproduction and death.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- Animal stage cards (below): four frog cards, four butterfly cards and four chicken cards. One large set for the board, and one small set of all twelve for each group of four children. Each card has a picture and a label. The teacher draws them simply, or uses photographs the school has permission to use.
- For each child: a blank life-cycle wheel sheet (a large circle divided into four parts, with arrows going round the edge), a pencil and coloured pencils.
- The "same and different" table drawn on the board (below).
- Four word cards: "birth", "growth", "reproduction", "death".
- The six bean life-cycle cards from lesson 2.
- The bean cups, the seed in a jar and the watering chart.
- For blind or low-vision children: tactile versions of the stage cards (raised outlines with a Braille or large-print label) and a wheel sheet with raised lines; modelling clay (latex-free and wheat-free) to make the stages instead of drawing them.

The animal stage cards (in the correct order; give them to groups shuffled, with no numbers on them):

Frog	Butterfly	Chicken
Eggs (frogspawn in water)	Egg (on a leaf)	Egg
Tadpole (lives in water, swims with a tail)	Caterpillar (eats leaves and grows)	Chick (just hatched, fluffy)
Froglet (has legs and a short tail)	Chrysalis (a hard case; the caterpillar changes inside)	Young chicken (growing feathers)
Adult frog (can lay eggs)	Adult butterfly (can lay eggs)	Adult hen (can lay eggs)

The "same and different" table (fill it in together):

Question	Frog	Butterfly	Chicken
Does it start as an egg?			
Does the young one look like the adult?			

Question	Frog	Butterfly	Chicken
Does it change shape a lot as it grows?			
Does the young one live in water?			

Steps

✎ Opening (5 min)

1. Hold up the bean cards in order, quickly. "Last time we learned the bean plant's life cycle. Do animals have life cycles too?" Take ideas.
2. Check the bean cups and the seed in a jar together. Has anything come up? Note it on the board with today's date.

✎ Main activity (25 min)

1. **Sorting (8 min).** Give each group of four a shuffled set of the twelve animal cards. "First sort the cards into three animals. Then put each animal's cards in order." Walk round and ask groups to explain.

2. **Talk it through (7 min).** Build the three life cycles on the board, one column for each animal, talking about each stage:

    - **Frog.** A frog lays many eggs in water, called frogspawn. A tadpole hatches out. It lives in water and swims with its tail, like a small fish. It slowly grows legs and becomes a froglet, and its tail gets shorter. The adult frog can live on land and in water, and lays eggs. Scientists call a big change of shape like this **metamorphosis**.
    - **Butterfly.** A butterfly lays eggs on a leaf. A caterpillar hatches and eats and eats, growing bigger. Then it makes a hard case called a chrysalis. Inside, its body changes completely. An adult butterfly comes out, and it can lay eggs.
    - **Chicken.** A hen lays an egg. A chick grows inside and hatches out. It already looks a bit like a small chicken. It grows feathers and gets bigger, and the adult hen can lay eggs.

3. **Life-cycle wheels (10 min).** Each child chooses one of the three animals (or the bean) and draws its life cycle on a wheel sheet: one stage in each part, going round with the arrows, with a label for each stage. "Why does the arrow go back to the start?" (The adult lays eggs, and the cycle starts again.)

✓ Discussion questions (5 min)

Fill in the "same and different" table together, one row at a time. (Answers: starts as an egg: yes, yes, yes. Young one looks like the adult: no, no, a little. Changes shape a lot: yes, yes, no. Young one lives in water: yes, no, no.)

Then put up the four word cards: birth, growth, reproduction, death.

- "Where is the birth in each life cycle?" (When the young one hatches from the egg; for the bean, when the seed starts to grow.)

- "Where is the growth?" (Tadpole to frog; caterpillar getting bigger; chick to hen; seedling to plant.)
- "Where is the reproduction?" (The adult lays eggs; the bean plant makes seeds.)
- "What happens at the end of every life cycle?" (Death. Every living thing dies in the end. Some live a short time and some live many years. Its young carry on the cycle.)

✓ Closing check (5 min)

Ask each question. Children answer by pointing to a card on the board, or in their own way.

1. "Point to the stage that comes after the tadpole." (Froglet.)
2. "Point to the stage that comes before the adult butterfly." (Chrysalis.)
3. "Which animal's young looks most like its parent?" (The chicken.)
4. "Name one thing all these life cycles have." (Any of: birth, growth, reproduction, death; or "they go round in a circle".)

Vocabulary

life cycle, frogspawn, tadpole, froglet, caterpillar, chrysalis, hatch, metamorphosis, birth, growth, reproduction, death

Differentiation

- **Support:** give a group one animal's four cards at a time. Give the wheel sheet with the stage labels already written, to draw pictures beside.
- **Stretch:** "Is a tadpole a fish?" (No. It looks a bit like one and lives in water, but it is a young frog.) Or: add a fourth column to the table for the bean plant.
- **Tactile:** use the tactile stage cards. Children can model each stage with clay instead of drawing (an egg, a tadpole with a tail, a froglet with legs, a frog).

⚠ Safety

- Pictures only: never collect frogspawn, tadpoles, caterpillars or eggs from the wild. In some places it is against the law, and the animals can die.
- Check the clay for latex and wheat (some home-made dough contains wheat).
- Talk about death calmly and briefly, as part of every life cycle. Never ask children about their own pets or losses. Any child may sit out and sort the cards instead.
- This lesson is about animals only. If children ask about people, say simply that people have a life cycle too (babies grow into adults), and move on; the details of human reproduction are not part of this unit.

Teacher notes and misconceptions

- **"A caterpillar and a butterfly are different animals."** Many children think this. The cards help: it is one animal at two stages of its life.
- **"A chick grows from the yolk like a seed."** Keep it simple: a chick grows inside the egg and hatches out. Eggs from a shop do not have chicks in them.

- **Not every frog has tadpoles.** A few kinds of frog hatch from the egg as tiny froglets. The frog here is a common example, not the only kind.
- The words "larva" and "pupa" are the scientific names for the caterpillar and chrysalis stages. Use them for stretch only.
- The stages are simplified: real animals change little by little, and the cards show only four moments.

Lesson 4: Like their parents, but not exactly

Unit overview - Previous: Animal life cycles - Next: Can the environment change a trait?

Back to the grade 3 year plan

Goal

Children learn what a trait is. They use a table about a made-up rabbit family to find which traits the young share with each parent, and see that no young rabbit is exactly like its parents or the others. Then they measure the class bean plants and see that plants from one packet are not all the same height.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Materials

- The Brook Farm rabbit family: six cards (two parents and four young rabbits), each with a simple drawing and the rabbit's name and traits in words. One large set for the board.
- The Brook Farm rabbit table (below) on the board, and one copy for each pair.
- The six bean cups from the "Plenty of water" tray (P1-P6).
- For each pair: a 30 cm ruler and a pencil.
- The class height table on the board (two columns: cup, height in cm).
- A large dot plot line on the board or on paper, marked in centimetres from 0 to 30, and sticky dots or a marker.
- The Brook Farm bean table (below), in case the class plants have not grown yet.
- The frog and chicken stage cards from lesson 3 (for the opening).
- The watering chart.
- For blind or low-vision children: tactile rabbit cards (fur texture for colour: smooth fabric for white, rough fabric for brown; ears made of card that stand up or hang down; a raised dot for the nose spot); a ruler with raised marks or a talking tape measure; a dot plot made with pins or stickers on a corkboard so it can be felt.

The Brook Farm rabbit table (made up for this unit):

Rabbit	Fur colour	Ears	White spot on nose	Tail
Hazel (parent)	brown	stand up	yes	white
Pip (parent)	white	floppy	no	white
Bramble (young)	brown	floppy	no	white
Clover (young)	white	stand up	yes	white
Fern (young)	brown	stand up	no	white
Moss (young)	white	floppy	yes	white

The Brook Farm bean table (made up; ten bean plants from one packet, all given plenty of water, measured after three weeks):

Plant	1	2	3	4	5	6	7	8	9	10
Height (cm)	9	12	10	14	11	12	13	10	12	11

Steps

✎ Opening (5 min)

1. Hold up the frog cards. "Does a baby frog look like its parents?" (Not at first; a tadpole looks very different. An adult frog looks like its parents.) "Does a chick look like its parents?" (Quite a lot.)
2. Explain: "Something we can observe about a living thing, like its colour, its shape or how tall it grows, is called a **trait**. Today we look at which traits young animals and plants share with their parents."

✎ Main activity (25 min)

1. **The rabbit family (10 min).** Put up the rabbit cards and the table. Read the table together: Hazel and Pip are the parents, and Bramble, Clover, Fern and Moss are their young. Pairs answer, using their copy of the table:
    - "Which young rabbits have brown fur like Hazel?" (Bramble and Fern.)
    - "Which young rabbits have floppy ears like Pip?" (Bramble and Moss.)
    - "Which young rabbits have a white spot on the nose like Hazel?" (Clover and Moss.)
    - "Which trait do all six rabbits share?" (A white tail.)
    - "Is any young rabbit exactly the same as Hazel? As Pip? As each other?" (No. Each young rabbit has some traits like Hazel and some like Pip, and no two are the same.)
2. **Measuring the bean plants (10 min).** Bring out the six P cups. Show how to measure: stand the ruler on the compost next to the stem, with 0 at the compost, and read the number at the top of the highest leaf or the tip of the shoot, to the nearest centimetre. If two seeds grew in a cup, measure the taller one. Two pairs measure each cup, one after the other, and compare: "Did you get the same number? If not, measure again together." Write each height in the class height table. (Measure only the P cups today; the L cups wait until lesson 5.)
3. **A dot plot (5 min).** Each pair puts a dot above their plant's height on the dot plot line. If two plants have the same height, the second dot goes above the first. If the class plants have not grown yet, use the Brook Farm bean table instead.

✓ Discussion questions (5 min)

- "All these bean plants came from one packet and had the same water, light and compost. Are they all the same height?" (No. Usually they are different.)
- With the Brook Farm table: "What is the tallest? The shortest? Which height is most common?" (14 cm; 9 cm; 12 cm, three plants.)

- "Why might plants from one packet be different?" (Each seed is a little different, just as the young rabbits are; and small things in each cup can be different too, such as how deep the seed was planted. Scientists call differences in a group of the same kind **variation**.)
- "Are the young rabbits different from each other for the same reason?" (Partly: each one got a different mix of traits from its parents.)

✓ Closing check (5 min)

Ask each question; children answer on fingers, by pointing to the table, or in their own way.

1. "How many young rabbits have stand-up ears?" (2: Clover and Fern.)
2. "Is Moss exactly like Pip?" (No. Moss has white fur and floppy ears like Pip, but a white nose spot like Hazel.)
3. "Look at the Brook Farm bean table. How many centimetres taller is the tallest plant than the shortest?" (5 cm: 14 - 9 = 5.)
4. "What is a trait?" (Something we can observe about a living thing, such as its colour, shape or height.)

Vocabulary

trait, parent, young, similar, variation, centimetre, dot plot

Differentiation

- **Support:** use only two traits from the rabbit table (fur colour and ears). Hold the ruler steady for the child and let them read the number.
- **Stretch:** "Hazel and Pip have more young next year. Could one have brown fur and floppy ears? Could one have spotted fur?" (Brown fur and floppy ears is a mix we have already seen in Bramble. Spotted fur is not in the table, so we cannot tell from this table. This table is made up and too small to predict from.)
- **Tactile:** use the tactile rabbit cards: feel the fur texture, the ears and the nose dot. A blind child measures with a talking tape measure or a raised-mark ruler, with a partner checking the reading.

⚠ Safety

- Handle the plants gently: hold the ruler next to the stem, not against it.
- Wash hands after touching compost.
- Use only the made-up rabbit family and the plants. Never ask children which traits they got from which family member, and never compare children's own looks or heights. Some children are adopted, fostered or live with other family, and this is a private matter.

Teacher notes and misconceptions

- **"The young are always a half-and-half mix."** Children may expect each young rabbit to be exactly between the parents (for example light brown). The table shows that traits often come in whole: brown or white, not a mixture. This is a pattern in a made-up table, not a rule; real families vary.
- **"All plants of one kind are the same."** The dot plot helps: the plants are the same kind, but not the same height.
- The standard leaves out how inheritance works and predicting traits. Keep to observing patterns. The stretch question is about why we cannot predict from a small made-up table.
- If two pairs measure the same cup differently, that is useful: talk about where to put 0 and which leaf counts as the top.

Lesson 5: Can the environment change a trait?

Unit overview - Previous: Like their parents, but not exactly

Back to the grade 3 year plan

Goal

Children measure both groups of bean plants, record the results in a table and a bar graph, and use them as evidence for a claim: the amount of water (part of the environment) changed how tall the plants grew. They sort trait cards into traits that come from the parents and traits changed by the environment.

Length

About 40 minutes: Opening 5, Main activity 25, Discussion 5, Closing check 5.

Teach this lesson in week 4 or 5, when most plants in the "Plenty of water" group are about 15-25 cm tall.

Materials

- All twelve bean cups (P1-P6 and L1-L6) in their two trays.
- For each pair: a 30 cm ruler and a pencil.
- The class results table on the board (below), and one copy for each pair.
- For each pair: a blank bar graph sheet (the twelve cups P1-P6 and L1-L6 along the bottom, height in cm up the side in twos from 0 to 30) and coloured pencils.
- The Brook Farm results table (below), in case the class plants have not grown well.
- The prediction slips from lesson 1.
- The claim frame on the board (below).
- Eight trait sort cards (below) and two heading cards: "From the parents" and "Changed by the environment". One large set for the board; one small set for each group of four.
- For the end-of-unit check: the rabbit table from lesson 4, the bean and frog cards, and the class dot plot.
- The watering chart.
- For blind or low-vision children: a ruler with raised marks or a talking tape measure; a bar graph made from stacks of interlocking cubes (one cube for every 2 cm) so that it can be felt; tactile or large-print sort cards.

The class results table:

Cup	P1	P2	P3	P4	P5	P6	L1	L2	L3	L4	L5	L6
Height (cm)												

The Brook Farm results table (made up; six plants with plenty of water and six with a little water, from one packet, measured after four weeks):

Cup	P1	P2	P3	P4	P5	P6	L1	L2	L3	L4	L5	L6
Height (cm)	18	21	19	22	20	20	8	10	7	9	11	9

The claim frame: "The plants with _____ water grew taller. Our evidence: _____. The only thing that was different was _____."

The eight trait sort cards (made up for this unit; the answer is in brackets and is not on the card):

1. Clover the rabbit has white fur, like Pip. (From the parents.)
2. Tibbs the Brook Farm kitten has stripes, like its mother. (From the parents.)
3. A Brook Farm lamb has a black face, like its mother. (From the parents.)
4. A sunflower grown from a seed of a yellow sunflower has yellow petals. (From the parents.)
5. A bean plant that got only a little water stayed small. (Changed by the environment.)
6. A bean plant kept in a dark shed grew pale and thin. (Changed by the environment.)
7. A bean plant on a windowsill leaned towards the window. (Changed by the environment.)
8. The Brook Farm sheepdog learned to come when the farmer whistles. (Changed by the environment: it learned it.)

Steps

✎ Opening (5 min)

1. Bring out both trays and stand them side by side. Ask: "What do you notice?" Let children talk to a partner. (Usually the P plants look taller and greener; some L plants may be small, droopy or dead.)
2. Read out two or three prediction slips from lesson 1. "Today we find out if our predictions were right, using measurements."

✎ Main activity (25 min)

1. **Measuring (8 min).** Measure every cup the same way as in lesson 4: ruler on the compost next to the stem, 0 at the compost, the top of the highest leaf or shoot, to the nearest centimetre; the taller plant if two grew. Each pair measures one cup (with fewer than 12 pairs, some measure two). If a plant has died or never came up, write 0 and a note: "did not grow". Write every height in the class results table.
2. **Bar graph (9 min).** Pairs copy the results into their own table and draw a bar for each cup on the bar graph sheet. They colour the P bars in one colour and the L bars in another, and write P or L under each bar so that colour is not the only clue. If the class plants have not grown well, use the Brook Farm results table instead, and say so.
3. **A claim with evidence (3 min).** Pairs complete the claim frame together, by writing, drawing or telling an adult. (Example with the Brook Farm table: "The plants with plenty of water grew taller. Our evidence: the shortest P plant was 18 cm and the tallest L plant was only 11 cm. The only thing that was different was the water.")
4. **Sorting traits (5 min).** Read each sort card aloud. Groups of four put each card under one of the two headings. Go through the answers together.

✓ Discussion questions (5 min)

- "Were our predictions right?" (Compare with the slips. Either answer is fine; scientists change their ideas when the evidence says so.)
- "All twelve seeds came from one packet. So why were the L plants shorter?" (Because they got less water. The water is part of their environment. The environment changed a trait: how tall they grew.)
- "Were all the P plants exactly the same height?" (Usually not. That is the variation we saw in lesson 4. But the P plants were taller as a group.)
- "Can a trait come from the parents AND be changed by the environment?" (Yes. A bean plant gets its kind of leaves and flowers from its parents, but how tall it grows also depends on its water and light.)

✓ Closing check (5 min)

Ask each question; children answer by pointing to a heading card, on fingers, or in their own way.

1. "A puppy has long ears like its father. From the parents, or changed by the environment?" (From the parents.)
2. "A plant in a dry pot grew only a few small leaves. Which?" (Changed by the environment.)
3. "In the Brook Farm table, how many centimetres taller is P4 than L4?" (13 cm: 22 - 9 = 13.)
4. "Why was our test fair?" (Only the water was different; the seeds, compost, cups, light and room were the same.)

Then see children one at a time for the end-of-unit check (see Assessment in the unit overview), during this lesson's follow-up time or the next week.

Vocabulary

environment, trait, evidence, claim, results, bar graph, inherited (stretch)

Differentiation

- **Support:** give the bar graph sheet with the P1 bar already drawn as an example. Give the claim frame with the answers as picture choices to circle (a full jug or a jug with a drop; a tall plant or a short plant).
- **Stretch:** "Some traits are **inherited**: they come from the parents. Write one more card of your own for each heading." Or: "What could we test next, keeping everything else the same?" (For example light: one tray at the window and one further away.)
- **Tactile:** use the cube bar graph: one stack of cubes for each cup, one cube for every 2 cm (rounding to the nearest cube). A blind child compares the stacks by touch.

⚠ Safety

- Handle the plants gently. Wash hands after touching compost.

- If some L plants wilted or died, say so plainly and calmly: that is a result of the test. It is fine to water all the plants well after the lesson and see whether the small ones recover.
- Use only plant and animal examples. Never compare children's own traits, bodies or heights.
- At the end of the unit, plants can be planted outside by an adult, given to the school garden, or composted.

Teacher notes and misconceptions

- **"The L plants were just bad seeds."** Ask: "Did the P seeds and the L seeds come from the same packet?" (Yes.) "Then what was different?" (The water.) This is why the fair test matters.
- **"Environment means nature or forests."** Here, a living thing's environment means everything around it and everything it gets: water, light, food, warmth, and even what it learns.
- **Results that do not match.** Sometimes one L plant grows taller than a P plant. That is real data. Look at the whole group, not one plant, and talk about why one plant might be different (a seed planted shallower, or a cup nearer the window).
- **Card 8** shows that learning counts too: the sheepdog was not born knowing the whistle. The standard's core idea says characteristics can come from the environment, "which can range from diet to learning".
- Card 6 builds on grade 1, where children saw that a plant needs light to grow green, and card 7 on the plant bending towards a window.