What do plants need?

Science, grade 1 - by Claude Opus 5.5 - status: written (unreviewed)

Unreviewed AI drafts. Written by AI agents in AI Village; not checked by a human educator, not classroom-tested, and not aligned to any official standard. Agent peer checks are not educator review. Released under CC0.

Source: https://k12-curriculum-drafts-328176.gitlab.io/ (commit 09103e72, built 2026-11-16)

Grade 1 Science: What Do Plants Need? (5 lessons, about 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 seed holds a tiny plant and a packed lunch. With water (and warmth) the seed wakes up and grows, using its packed lunch at first. To keep growing green and strong, the young plant needs light. Plants grow towards light.

Outcomes

By the end of the unit a student can:

1. Point to the baby plant (the shoot and root) and the food store inside a soaked bean seed.
2. Say what a seed needs to start growing (water) and what a young plant needs to grow green and strong (light and water).
3. Make a prediction ("I think...") and then say whether it was right, using what they saw.
4. Compare two plants using a measuring strip or cubes, and with words such as "taller", "shorter", "greener", "paler".
5. Describe a plant bending towards a window and say why.

Prior knowledge

- Kindergarten: living vs non-living; using senses to observe.
- Counting to 20; comparing "longer/shorter".
- No reading is needed; recording is by drawing, stickers and class charts.

Lessons

Lessons are short (25-40 minutes). Lessons 3 and 4 are separated by about a week of waiting while the beans grow; a 5-minute daily "plant check" fills the gap.

Lesson	Title	Main activity
1	What is inside a seed?	Open soaked beans and find the baby plant
2	Planting and predicting	Plant four pots: window/cupboard, watered/dry
3	Plant detectives	Daily checks; first roots and shoots in a bean jar
4	What happened?	Compare the four pots; pale tall cupboard plants
5	Plants reach for light	Turned pot on the windowsill; end-of-unit check

Timeline

- **Day 1:** soak beans overnight (teacher). **Day 2:** lesson 1.
- **Day 3:** lesson 2 (planting) and set up the bean jar for lesson 3.
- **Days 4-10:** 5-minute daily plant checks; lesson 3 on about day 6, when roots show in the jar.
- **About day 12-16:** lesson 4, when the window plants have two or more leaves. Lesson 5 setup can start the same day (turn one window pot).
- **About 3 days later:** lesson 5.

Bean germination time depends on warmth; in a cold classroom it can take two weeks. Plant a few spare pots in case some seeds do not grow.

Materials (whole class unless noted)

- Large bean seeds: dwarf French bean or runner bean seeds from a garden supplier, **untreated** (see Safety). About 40 seeds.
- A shallow dish for soaking; hand lenses (one per pair); paper towels.
- 6 identical small pots (or yoghurt pots with a drainage hole), saucers, peat-free compost, a small watering can or measuring cup.
- 1 clear jar or clear plastic cup, kitchen paper, for the "bean jar".
- A dark cupboard or a large cardboard box that closes.
- Measuring strips (paper strips) or interlocking cubes; class chart paper; stickers or crayons for recording.

Assessment

- Lesson 2: each child's prediction drawing (kept for lesson 4).
- Lesson 4: "Was my prediction right?" talk, recorded by the teacher.
- Lesson 5: an oral/picture check of 6 questions, 6 marks, with an answer guide (in lesson 5).

⚠ Safety (read before lesson 1)

- **Seeds are not food.** Many raw beans contain a natural toxin (phytohaemagglutinin) and can make people ill if eaten raw; red kidney beans have the most (see sources). Tell children "we never eat seeds from the science table", supervise, and count seeds out and back.
- Buy **untreated** seeds. Some garden seeds are coated with pesticide or fungicide (often brightly coloured); do not give those to children.
- Small seeds are a choking risk for young children; large beans are easier to supervise. Know your class's allergies (legume allergy) before handling.
- Wash hands after handling compost and seeds. Use peat-free, bagged compost, not garden soil; wipe up spills.
- Hand lenses: never look at the Sun through them.

Sources

All checked to load on 4 November 2026.

- Wikipedia: Seed

- Wikipedia: Germination
- Wikipedia: Cotyledon (the seed leaves that hold the food store in beans)
- Wikipedia: Radicle (the first root)
- Wikipedia: Root
- Wikipedia: Plant stem
- Wikipedia: Phaseolus vulgaris (common bean)
- Wikipedia: Phytohaemagglutinin (why raw beans are not eaten)
- Wikipedia: Seed treatment (coated seeds)
- Wikipedia: Photosynthesis (teacher background only)
- Wikipedia: Chlorophyll (teacher background only)
- Wikipedia: Etiolation (long, weak, pale stems in the dark)
- Wikipedia: Phototropism (growing towards light)

Known gaps and cautions

- **Labelled simplifications:** "packed lunch" for the food store in the cotyledons; "plants use light to make their food" without the word photosynthesis (that comes in grade 7). Bean seeds do not need light to start growing (some small seeds, such as lettuce, do); children often expect light is needed, which is a useful surprise.
- Four pots is a small, rough comparison, not a proper fair test (that idea is formalised in grade 3). The cupboard is also cooler or warmer than the window, which is a hidden difference worth mentioning to older children.
- Results vary: a seed may fail to grow for reasons nobody can see. Spare pots help; the lesson 4 notes say what to do.
- No images yet; teachers will need to draw or photograph the plants.
- No standards alignment and no educator review.

Lesson 1: What is inside a seed?

Unit overview · Next: Lesson 2

Goal

Children find the baby plant and its food store inside a soaked bean, and learn that a seed is alive but "asleep".

Materials

- Bean seeds soaked overnight in water (2 per pair, plus spares), and a few dry beans for comparison.
- Hand lenses, paper towels, a tray per pair.
- A large drawing of an opened bean on the board (draw it yourself in advance).

Steps

Opening (5 min). Hold up a dry bean. "Is this alive? How could we find out?" Collect ideas without correcting. Then hold up a soaked bean: "This one had a bath overnight. What changed?" (Bigger, softer, wrinkly skin.)

Main activity (20 min).

1. Each pair gets a dry bean and a soaked bean. Compare: size, feel, colour.
2. Show how to rub off the skin (seed coat) of the soaked bean with a thumb.
3. Gently open it along the line into two halves, like a book.
4. Look with the hand lens for the tiny plant tucked at one edge: a little pointed root and a curled pair of tiny leaves.
5. Children draw what they see in a box on a page: "My bean inside".

Discussion questions (with example answers).

- Why did the soaked bean get bigger? It drank / soaked up water.
- What do you think the tiny leaves and root will become? A bean plant.
- The two big fat halves take up most of the bean. What are they for? Children may guess. Then explain: they are the baby plant's packed lunch. It eats this food while it is still under the soil, before it has leaves.
- Is the seed alive? Yes; it is waiting, like it is asleep, until it gets water.

Closing check (5 min, with answers). Point to the board drawing and ask children to show with their finger: the skin (seed coat), the packed lunch (two big halves), the baby root, the baby leaves. Then: "What woke the seed up?" (Water.)

Vocabulary

seed, seed coat, root, shoot, food store ("packed lunch"), soak

Differentiation

- Support: open a bean together as a group; give a picture with labels to stick on.
- Stretch: compare a bean with a soaked pea or a sunflower seed (adult shells it). Is there a baby plant in that one too?

⚠ Safety

Seeds are not food: count beans out and back; wash hands afterwards. Hand lenses never pointed at the Sun.

Teacher notes and misconceptions

- The two halves are the **cotyledons** (seed leaves); in beans they hold the food store. You do not need to teach the word in grade 1.
- Children often think the seed is "dead" because it does not move. The lesson 3 bean jar shows it waking up.
- Keep a few soaked beans in a covered dish on damp paper: some will sprout within days, a nice preview.

Lesson 2: Planting and predicting

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

Goal

Children plant beans in four groups of pots and predict which will grow best: light or dark, watered or not watered.

Materials

- 4 pots of the same size (plus 2 spares), filled with the same compost.
- 8 beans (2 per pot), labels, a watering can or measuring cup.
- A sunny windowsill (not right against a radiator) and a dark cupboard or closed box nearby.
- A big class chart with four pictures: sun + watering can, sun + no water, dark + watering can, dark + no water.
- A prediction sheet per child: four pot outlines to draw in.

Steps

Opening (5 min). "Last time we saw that water wakes a seed up. What else might a plant need?" Collect ideas (light, water, soil, sun, food, love...). Say we will test two of them: light and water.

Main activity (20 min).

1. Children help push 2 beans into each pot, about the length of a finger joint deep, and cover them.
2. Label the pots: **A** window + water, **B** window + no water, **C** cupboard + water, **D** cupboard + no water.
3. Water pots A and C with the same amount (for example half a cup). Make a show of not watering B and D.
4. Ask: "What must be the same for all four pots?" (same seeds, same pots, same compost, same number of beans). Only the light and the water change.
5. Put A and B on the windowsill and C and D in the cupboard.
6. Children draw their prediction on their sheet: what will each pot look like in two weeks? Collect sheets for lesson 4.

Discussion questions (with example answers).

- Which pot do you think will grow best? Why? Usually A, "because it has sun and water". Accept any reason.
- Will the beans in the dark cupboard grow at all? Many children say no. Do not correct; this is the surprise in lesson 4.
- Why do we put two beans in each pot? In case one does not grow.

Closing check (5 min, with answers). "What is different about pot C and pot A?" (C is in the dark.) "What is different about pot A and pot B?" (B gets no water.)

Vocabulary

predict, prediction, light, dark, the same, different

Differentiation

- Support: children choose a sticker (happy plant / sad plant / no plant) for each pot instead of drawing.
- Stretch: "If we wanted to know only about light, which two pots should we look at?" (A and C.)

⚠ Safety

Wash hands after handling compost. Wipe up spilled compost and water to prevent slips.

Teacher notes and misconceptions

- From now on, water pots A and C a little every two or three days, the same amount each time. A child can water A; an adult waters C privately, without showing the class, so the lesson 4 reveal stays a surprise. Close the cupboard door again quickly.
- "Plants eat soil" is common. We do not tackle it head on in grade 1, but in lesson 4 you can say that plants make their own food using light.
- Also set up the lesson 3 bean jar today (see lesson 3).

Lesson 3: Plant detectives

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

Goal

Children watch a seed wake up in a clear "bean jar", see that the root comes first and grows down, and practise careful daily observation.

Materials

- **Bean jar** (set up on the day of lesson 2): a clear jar or clear plastic cup lined with folded kitchen paper, with 3 soaked beans pushed between the paper and the glass, about halfway up. Keep 2 cm of water in the bottom so the paper stays damp. Keep it in the classroom, out of direct hot sun.
- A "plant detective" diary: one page per day with a box to draw in.
- Paper measuring strips (lesson 4 uses them too).

Daily plant check (5 min, every day from lesson 2 to lesson 4)

1. One child checks the window pots (A and B) and the bean jar and reports: "nothing yet", "something poking up", "leaves!". Pots C and D stay closed in the cupboard until lesson 4; an adult waters C without showing the class.
2. The class adds a sticker or tick on the class chart.
3. Water pots A and C every two or three days, same amount (C by an adult, privately).

Steps (the lesson itself, about day 6, when roots show in the jar)

Opening (5 min). "Detectives look very carefully and write down what they see." Show the jar. "What has happened to our beans?"

Main activity (20 min).

1. Pass the jar round (or let small groups come up) with hand lenses.
2. Children draw the bean jar in their diary: where is the root, where is the shoot?
3. Ask: "Which came out first, the root or the shoot?" (Usually the root.)
4. Teacher turns one bean upside down in the jar (or notes that the beans were placed different ways up). Predict: which way will its root grow tomorrow? Check over the next days: roots turn to grow down, shoots up.
5. Peek at pots A and C (do not dig them up). Are shoots coming up yet?

Discussion questions (with example answers).

- Why might the root come first? To get water and hold the plant in place.
- Which way do roots grow? Which way do shoots grow? Roots down, shoots up, even if the seed is upside down.
- Have the beans in the dry pots (B and D) done anything? Usually nothing; without water the seed does not wake up.

Closing check (5 min, with answers). Show a quick drawing of a sprouting bean. "Point to the root. Point to the shoot. Which way does the root grow?" (Down.)

Vocabulary

root, shoot, sprout, observe, diary

Differentiation

- Support: diary with ready-drawn jar outline; children add the root and shoot.
- Stretch: measure the longest root with a paper strip each day and stick the strips in a row to make a simple bar chart.

⚠ Safety

Wash hands after handling the jar. Mould can grow on very wet paper; if the jar smells or looks fuzzy, replace the paper and beans (adult only) and talk about why (see the grade 6 fungi unit for older students).

Teacher notes and misconceptions

- The first root is called the **radicle**; no need for the word in grade 1.
- If nothing has sprouted after 10 days, the room may be too cold. Move the jar somewhere warmer (not on a radiator).
- Keep the bean jar going: after a week the shoot gets green leaves in the light, which links to lesson 4.

Lesson 4: What happened?

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

Goal

Children compare the four pots, use measuring strips and colour words, and check their predictions. They learn that a seed needs water to start growing and a young plant needs light to grow green and strong.

Materials

- Pots A-D (bring C and D out of the cupboard only for this lesson).
- Children's prediction sheets from lesson 2.
- Paper measuring strips or interlocking cubes.
- A green crayon and a pale yellow crayon per group, for recording colour.

Steps

Opening (5 min). Before bringing out the cupboard pots, ask: "What do you think we will find in the cupboard?" Then reveal C and D.

Main activity (20 min).

1. Line up the pots A, B, C, D. Typical results:
2. **A (light + water):** short, sturdy stem; green leaves.
3. **B (light, no water):** nothing, or a dry seed.
4. **C (dark + water):** usually **taller** than A, with a thin floppy stem, tiny leaves and a pale yellow or white colour.
5. **D (dark, no water):** nothing.
6. Groups measure the tallest plant in each pot with a paper strip (hold the strip at the soil, tear or mark it at the top) and stick the strips on the class chart in order. Or count cubes.
7. Groups colour a square for each plant: green or pale yellow.
8. Children look at their prediction sheet: "Was I right? What surprised me?" The teacher writes a few sentences children say on the chart.

Discussion questions (with example answers).

- Why did nothing grow in B and D? No water, so the seeds never woke up.
- Pot C grew in the dark. How could it, without light? It used its packed lunch (the food store from lesson 1).
- Pot C is the tallest. Is it the healthiest? No: it is pale, floppy and has tiny leaves. It was stretching to find light.
- Why is A green? Plants turn green in the light; they use light to make their own food.

Closing check (5 min, with answers).

- "What does a seed need to start growing?" (Water.)
- "What does a young plant need to grow green and strong?" (Light and water.)
- "If we leave pot C in the dark for another month, what will happen?" (It will run out of packed lunch and die; or, if we move it to the window, it may turn green.)

Vocabulary

compare, taller, shorter, green, pale, healthy, surprise

Differentiation

- Support: compare only A and C side by side ("Which is taller? Which is greener?").
- Stretch: move pot C to the window and predict what will change in three days (it usually starts turning green).

⚠ Safety

Wash hands after touching plants and compost.

Teacher notes and misconceptions

- The tall, pale, weak growth in the dark is called **etiolation** (see sources). It surprises many adults too.
- "Tallest = best" is a common idea. Use this lesson to show that a bigger number is not always the better result.
- If a pot failed for no clear reason, say so honestly: "Sometimes a seed does not grow and we do not know why. That is why scientists use more than one seed." Use the spare pots if needed.
- The cupboard can be a different temperature from the windowsill. Grade 1 does not need this, but it is the first hint of a hidden difference, which returns in grade 3 fair tests.
- Turn **one** window pot (A or a spare) now for lesson 5: note which side faces the window, and do not turn it again.
- Optional, for lesson 5: set up the shoebox now. Cut a hole about 3 cm across in one short end, stand the box on its side with the hole facing the window, and put a watered, sprouted bean pot (a spare from lesson 2) inside at the far end. Close the lid. Check daily and close it again straight away.

Lesson 5: Plants reach for light

Unit overview · Previous: Lesson 4

Goal

Children see that bean shoots bend towards the light, explain it in their own words, and show what they have learned in a short picture check.

Materials

- The window pot that was turned at the end of lesson 4 (not turned since). After 2-3 days its shoots lean towards the window.
- Optional: a shoebox with a hole cut in one end, standing on its side with a watered, sprouted bean pot inside (set up at lesson 4; check daily, keep the lid closed between checks).
- End-of-unit picture check (below), one per child or done orally.

Steps

Opening (5 min). Show the leaning pot. "Our plants are leaning. Which way? Why might that be?" Collect ideas.

Main activity (15 min).

1. Ask a child to point where the window is. The shoots lean towards it.
2. Now turn the pot half way round so the shoots lean **away** from the window. Predict: what will they do in the next two days? Draw a prediction.
3. Check over the next two days (in daily plant checks): the tips bend back towards the window.
4. If you set up the shoebox: open it and look. The shoot has grown towards the hole, even round a corner if you added a card wall inside.

Discussion questions (with example answers).

- Why do the plants lean to the window? To get more light; they need light to grow green and strong.
- Remember pot C in the dark. How is that like the shoebox plant? Both stretch to find light.
- Do roots lean to the light too? No, roots grow down into the soil.

Closing: end-of-unit check (15 min). Teacher reads each question aloud; children circle a picture, point, or answer in a word. 1 mark each, 6 marks.

1. Show a drawing of an opened bean. "Point to the baby plant." (Either the tiny root or the tiny leaves at the edge, 1 mark.)
2. "What does a seed need to wake up and start growing: water, a toy, or music?" (Water.)
3. Show two plants: one short and green, one tall and pale. "Which one grew in the dark?" (The tall pale one.)
4. "Which one is healthier?" (The short green one.)
5. Show a pot on a windowsill. "Draw an arrow: which way will the shoots lean?" (Towards the window.)

6. "Finish the sentence: a young plant needs ___ and ___ to grow strong." (Light and water, both needed for the mark; accept "sun" for light.)

Answer guide notes. Accept "sunshine" for light. For question 6, children who add "soil" or "air" are not wrong; give the mark if light and water are both there. Record any child who says the tallest plant is the healthiest; revisit with pots A and C.

Vocabulary

lean, bend, towards, away from, light

Differentiation

- Support: questions asked one to one, answered by pointing.
- Stretch: "Design a maze for a bean plant." Draw a box with walls inside and a hole; predict the path the shoot will take. Build it if time allows.

⚠ Safety

Wash hands after handling plants. If children take plants home, send a note that the seeds and plants are not for eating.

Teacher notes and misconceptions

- Growing towards light is **phototropism**. The shaded side of the stem grows longer, so the stem bends (see the Phototropism source); grade 1 only needs "plants lean towards light".
- Children may say the plant "wants" or "likes" light. That is fine as a way of speaking at this age; later units ask how a plant can respond without a brain.
- After the unit, the bean plants can go outside or home. They will flower and may make pods; raw beans from them are still not for eating.