Mostly Air and Water

Teacher		**Class**	Grade 5
Subject	Science	**Topic**	Where plants get their food
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn plants build most weight from air and water. They weigh plants and argue with evidence.

Curriculum links

- Support an argument that plants get the materials they need for growth chiefly from air and water.

Learning objectives

- Students will explain in simple words how plants make sugar food.
- Students will use weighing evidence to show growth comes chiefly from air and water.
- Students will support an argument about plant growth with two evidence pieces.

Success criteria

- I can name air and water as the main builders of plants.
- I can explain soil mass barely changes while plants gain mass.
- I can write a claim with two pieces of evidence.

What students already know

Ask: What do plants need to grow big? List sun, water, air, soil. Ask where new stem weight comes from.

Key words

photosynthesis	how green leaves use light, air gas and water to make sugary food [6]
carbon dioxide	an unseen gas in the air that leaves take in to make food [5]
stomata	tiny holes, mostly on leaves, where gases move in and out [6]
minerals	tiny helpful bits from soil that keep plants healthy [5]
evidence	something you see or measure that helps prove an idea is true

Materials

- Slides 1-12, projector and speakers
- Video clip 1 (1:00-6:00) on slide 6
- kitchen scale in ounces, 2 bean plants in 8-oz cups started 2 weeks apart, hand lens
- half-sheet claim cards, pre-filled weight table in ounces with pictures
- Worksheet Task B letter sheet, pencils, whiteboard and markers

Before the lesson

- Start 2 bean plants in 8-oz cups 2 weeks apart so growth difference is clear
- Print half-sheet claim cards and pre-filled weight table in ounces with pictures, one per pair
- Print Worksheet Task B, one per student, test Video clip 1 (1:00-6:00) on slide 6
- Set up weighing station with scale, paper towels, hand lens and trash for spills

Lesson outline

0–5 min **Starter** 5 min · Whole class

Hook curiosity about where new plant weight comes from and set the goal.

YOU DO

1. Show Slide 1 title and hold up the bigger bean plant in its cup.
2. Say the hook question and let partners whisper a guess for 30 seconds.
3. Show Slide 2 objectives and read the I can lines together.
4. Take a quick show of hands vote for soil, water, air or sunlight.

STUDENTS DO

1. Look at the two plants and whisper a guess to a partner.
2. Vote with hands for where most weight came from.

Say: If this plant got much bigger but the soil stayed almost the same, where did the new plant come from? Today we will explain photosynthesis in simple words and argue with evidence. I can name air and water as main builders.

Ask: If the plant got bigger but soil did not go down much, what could explain it? (The new material came from somewhere else, like air and water.) · What do plants need to make food? (Sunlight, water and carbon dioxide air gas.)

Check understanding: Scan votes and partner talk; if many say soil only, say we will test that idea with weighing next.

Support: Give vote choices on cards with pictures: soil, water, air, sunlight to point to. **Stretch:** Ask to add a reason for vote: I think ___ because ___.

Use: Slides 1–2

5–20 min **Teaching** 15 min · Whole class

Explain photosynthesis and the weighing evidence that soil does not supply most mass.

YOU DO

1. Show Slides 3-5 and model the steps: light hits leaf, roots pull water up stem, leaves breathe in air gas.
2. Show Slide 6 and play Video clip 1 (1:00-6:00), ask students to listen for air and water as builders.
3. Explain an early test showed new wood did not come from soil [3] and a tree gains huge weight but soil barely changes.
4. Model the argument sentence and point to the word wall: air, water, carbon dioxide, soil.

STUDENTS DO

1. Watch Slides 3-5, watch Video clip 1 (1:00-6:00) and whisper one builder they heard.
2. Repeat the steps with gestures: sun on face, water up arm tubes, gas in through fingers.

Say: Plants use sunlight, water, and a gas called carbon dioxide to make their own food, sugars [6]. Water is absorbed through roots and moved through tubes to leaves [7]. An early test showed soil does not provide the matter that lets plants gain mass [3].

Worked example: Model claim: Most plant mass came from air and water because the plant grew a lot while the dry soil mass changed only a little. That matches the early test where wood gain did not come from soil [3].

Ask: Where does water for photosynthesis enter and travel? (Absorbed through roots and moved through tubes in the stem to leaves [7].) · What did the early weighing test show about soil? (Soil is not the source of most mass; new wood did not come from soil [3].)

Check understanding: Cold-call two students to name the three inputs; reteach with Slide 3 steps if missing carbon dioxide or water.

Support: Keep Slide 3 steps visible and point to leaf, stem, roots while explaining. **Stretch:** Ask why sunlight is needed for power but does not add most weight.

Use: Slides 3–6, Video clip 1 (1:00–6:00)

20–40 min **Main activity** 20 min · Groups

Use weighing evidence to argue most plant mass does not come from soil.

YOU DO

1. Demo weighing each 8-oz cup on the scale in ounces and record with the class.
2. Hand out lens and pre-filled weight table; guide looking at roots and stems.
3. Talk through how gain came largely from matter made from carbon dioxide and water, so most tree weight comes from air [4].
4. Give half-sheet and model finishing the claim sentence with because.

STUDENTS DO

1. Weigh each cup, look at roots and stems with the hand lens, circle bigger change and smaller change on table.
2. Finish half-sheet: Most mass came from air and water because the soil changed only a little while the plant changed a lot.

Say: We weigh each cup and compare how much the plant grew to how little the dry soil mass changed. Tiny leaf pores called stomata breathe in carbon dioxide for photosynthesis [5]. The big gain came largely from matter made from carbon dioxide and water [4].

Worked example: Think-aloud: Cup A plant small, Cup B plant tall with more leaves. Soil change tiny, plant change big, so most mass came from air and water because soil changed only a little while plant changed a lot [4].

Ask: Which changed more, plant size or soil mass? (Plant size changed a lot; soil mass barely changed.) · Where did the new plant matter mostly come from? (From carbon dioxide in air and water, not mostly from soil [4][5].)

Check understanding: Collect half-sheets and read two aloud; if claim lacks because, model again and have pairs fix.

Support: Give a pre-filled weight table in ounces with pictures so students only circle bigger change and smaller change [4]. **Stretch:** Have students predict what would happen to growth if air flow was blocked but soil stayed the same, then defend it.

Use: Slides 4, 7

40–52 min **Argument writing** 12 min · On their own

Write and speak a short evidence-based argument for air and water.

YOU DO

1. Show Slide 9 task: one-sentence claim, list two evidence pieces, practice saying why.
2. Give Worksheet Task B and read the letter frame together.
3. Model one letter opening using weighing and leaf-gas evidence.
4. Time 7 minutes writing, then 3 minutes partner practice saying why it proves the claim.

STUDENTS DO

1. Complete Worksheet Task B short letter with claim plus two evidence pieces.
2. Read letter to partner and say why evidence proves the claim.

Say: Write your claim in one sentence and list two evidence pieces we saw. Water, carbon dioxide, and minerals are not food by themselves because they do not contain usable energy in Calories, but plants use them as materials to make food [3]. Practice saying why it proves your claim.

Worked example: Dear friend, I claim most of this plant came from air and water. Evidence 1: the dry soil barely changed while the plant grew a lot. Evidence 2: leaves take in gas through stomata to build sugars. So soil cannot explain the big gain.

Ask: What two evidence pieces prove air and water build most weight? (Soil mass barely changed while plant gained; leaves take in carbon dioxide and roots drink water [5].) · Why is soil minerals only a small part? (Minerals help health but hydrogen, oxygen, nitrogen, and carbon make up over 95 percent of weight [5].)

Check understanding: Walk and tick claims with because plus two facts; pull two strong letters to read if time is short.

Support: Provide sentence starters: I claim ___ . My evidence is ___ . This proves ___ . **Stretch:** Add a rebuttal line: Some may say soil makes plants, but weighing shows ___.

Use: Slide 9, Worksheet Task B

52–60 min **Plenary** 8 min · Whole class

Confirm air plus water build plants and check the success lines.

YOU DO

1. Show Slide 10 bullets and restate: gas enters through stomata, water travels roots to stem to leaves, light powers sugar making.
2. Show Slide 11 and run Think, pair, share: If wood mostly comes from air, why must we still water plants?
3. Show Slide 12 true-or-false and vote with paddles or thumbs.
4. Link back to I can lines and set homework.

STUDENTS DO

1. Pair-share why watering still matters even if wood carbon comes from air.
2. Vote true or false and correct one false idea together.

Say: Carbon dioxide enters through stomata, tiny leaf holes, and water travels roots to stem to leaves. Plants are producers that absorb sunlight energy through photosynthesis and also need water and nutrients from soil [8]. Plants need water to get nutrients from soil and to move them around [7].

Ask: If wood mostly comes from air, why must we still water plants? (Water supplies hydrogen and oxygen for building and moves nutrients around the plant [5][7].) · True or false: Most material for growth comes from air and water? (True; carbon from air plus hydrogen and oxygen from water make most weight.)

Check understanding: Use Slide 12 votes; if split, restate weighing fact and take a revote before exit tickets.

Support: Let pairs point to word wall with air, water, carbon dioxide, and soil [5] before answering. **Stretch:** Ask to explain why extra fertilizer alone cannot make a plant without air and water.

Use: Slides 10–12

Common mistakes

Mistake	How to spot it	How to fix it
Thinking soil turns into plant mass and dirt disappears as plants grow	Claims soil loss equals plant gain or votes soil only on Slide 5	Recheck weighing: soil barely changed while plant grew, so gain came largely from carbon dioxide and water [4]
Calling water, carbon dioxide or soil minerals food by themselves	Writes water is food or minerals are food without making sugar	Explain they do not contain usable energy in Calories, plants use them as materials to make sugar food [3][6]
Thinking sunlight or fertilizer adds most weight	Says light becomes wood or more fertilizer equals more wood alone	Restate sunlight powers making sugar food [6] and minerals help health but air and water supply most building matter [5]

Support

- Pre-filled weight table in ounces with pictures; students circle bigger and smaller change
- Sentence starters and word wall: air, water, carbon dioxide, soil

Stretch

- Predict and defend growth if air flow was blocked but soil stayed the same
- Write a rebuttal to the soil-only idea using weighing evidence

For the LSE or teaching assistant

Sit with weighing groups; help pour nothing, read scale in ounces, prompt circle choice and scribe claim if needed.

Safety

- Wash hands after touching soil
- Wipe up soil and water spills right away so no one slips

Check for understanding

Question	Answer
Where do plants get most materials for growth?	Chiefly from air and water.
What weighing evidence shows soil is not the main source?	Plant gained a lot while dry soil mass barely changed.
How does carbon dioxide get into the plant?	Through stomata, tiny holes mostly on leaves.

Homework

Write one sentence telling at home where a plant's new leaves mostly came from and one weighing fact.

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