THE STANDARD

Plant Growth

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

ANCHORING PHENOMENON

The Giant Tree and the Tiny Pile of Soil

Show 5th graders a photo of a massive oak tree, then a small bucket of soil. Tell them the tree started as an acorn in a pot with just a few pounds of soil. Now it weighs thousands of pounds. If you dug it up, the soil in the ground would barely have changed. So where did all that wood, all those leaves, all that mass come from? It clearly did not come out of the dirt. 5th graders will want to solve this.

> DRIVING QUESTION
> *"If the soil barely changed, where did all the tree's mass actually come from?"*

INVESTIGATIVE 1

Sprout a Seed With No Soil At All

Place bean seeds on a wet paper towel inside a clear plastic bag, tape it to the window, and add no soil whatsoever. Over a week the seeds sprout roots, a stem, and green leaves. The seed itself stores food that powers the first sprout, but once the leaves open and it keeps growing with no soil, the new material has to come from air and water. Use this to sharpen the anchor: if a plant can keep growing with zero soil, just water and air and light, then the soil was never the source of the plant's material in the first place.

> DRIVING QUESTION
> *"How can these seeds grow roots and leaves when there is no soil for them to eat?"*

INVESTIGATIVE 2

Weigh the Soil Before and After

Plant a fast-growing seed in a measured amount of dried soil. Weigh the dry soil at the start and tag it. Water the plant and give it light for several weeks, then carefully dry and re-weigh the soil while weighing the grown plant. The soil drops only a tiny bit, but the plant gained a lot. The numbers do not add up unless the new mass came from somewhere else: air and water. This is the cleanest, strongest evidence on the page, so lean on it as the main proof.

> DRIVING QUESTION
> *"Where did the plant's new weight come from if the soil only lost a little?"*