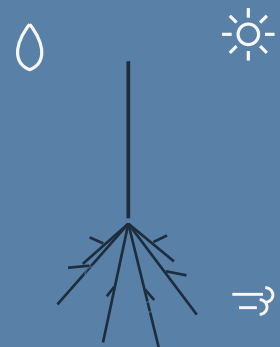


SOIL, WATER & PLANTS



What makes a plant thrive?

CORE IDEA

Plants succeed when their needs match the place. Soil, water, roots, sunlight, and air work together as a living system.

ESSENTIAL QUESTION

Why do some plants thrive in one place and struggle in another?

TARGET AGE

10-12

LESSON TIME

20-25 MIN

HANDS-ON OUTCOME

SOIL + WATER TEST

MATCH THE PLANT -> TO THE PLACE



LIVING-SYSTEM MINDSET

Healthy plants need the right conditions - not simply "more."

This lesson breaks the common shortcut that a struggling plant always needs more water. Students learn to observe the system first: soil, roots, moisture, sunlight, and plant needs.

Lesson at a Glance

Objectives, materials, teacher preparation, and the living system.

TEACHING FOCUS

Keep the science practical. Students do not need soil taxonomy or plant biology vocabulary. They need a working model: roots live in soil; roots need water and air; different soils handle water differently; different plants need different conditions.

BY THE END, STUDENTS CAN...

- 01 Explain that soil is more than "dirt."
- 02 Describe at least three ways soil can differ.
- 03 Explain why roots need both water and air.
- 04 Observe how water behaves differently in different soils.
- 05 Match a basic plant need to an appropriate site.
- 06 Make a simple recommendation using evidence.

MATERIALS

3 clear cups or containers
 Sandy soil
 Garden/topsoil
 Dense clay-like or compacted soil
 Water + small measuring cup
 Tray or towel
 Spoon or small trowel
 Healthy potted plant
 Visible roots / root-bound plant if available
 Optional: sponge, gravel, magnifying glass

THE LIVING SYSTEM



SOIL



WATER



ROOTS



AIR



SUNLIGHT

TEACHER PREP

Prepare three soil samples that behave noticeably differently: loose/sandy, dark/crumby garden soil, and dense/compacted clay-like soil. The goal is observation, not scientific classification. If using a live plant, choose something sturdy and common.

THE QUESTION IS NOT "WHICH SOIL WINS?" - IT IS "HOW DOES EACH ONE BEHAVE?"

Hook + What Is Happening Underground?

Use a plant problem to introduce soil spaces, water, air, and roots.

0:00-3:00 | HOOK

Same plant. Different place.

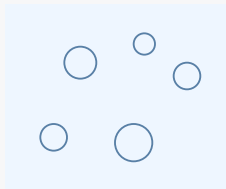
Show a healthy plant and a struggling plant of the same type. Ask why one might be doing better. After students suggest water, sun, bugs, or soil, complicate the problem: "What if both plants were watered? Can a plant get too much water?"

A HEALTHY PLANT NEEDS THE RIGHT CONDITIONS, NOT JUST MORE.

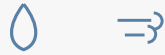
3:00-6:00

Soil is not just dirt.

Healthy soil can contain tiny mineral particles, organic material, water, air, and living organisms. The important idea for this age: soil has spaces inside it.



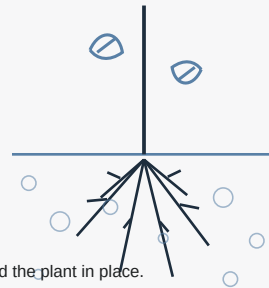
SOIL HAS PORES / SPACES



**ROOTS NEED BOTH
WATER + AIR**

6:00-8:00

Meet the roots.



ANCHOR

Hold the plant in place.

ABSORB

Take in water + nutrients.

EXPLORE

Grow through soil for resources.

ROOT CLUE



Healthy roots need room to grow.

If available, show a root-bound nursery plant and ask what students notice. Keep the takeaway simple: roots can reveal clues about plant health, and a plant can struggle even when the leaves are what we notice first.

Hands-On Experiment: The Water Race

Compare three soils. Predict first, observe second, explain last.

8:00-14:00 | EXPERIMENT

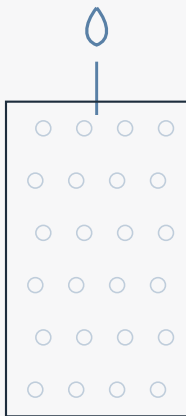
Which soil lets water move? Which holds it?

Students feel or observe each soil sample, make a prediction, then add the same measured amount of water to each. The purpose is not to crown a winner; it is to notice that soil structure changes water behavior.

A

SANDY SOIL

Loose + larger spaces



PREDICT:

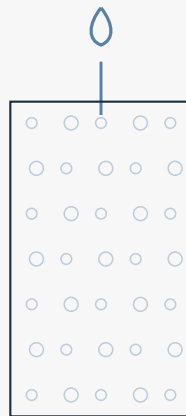
FAST?

OBSERVE: _____

B

GARDEN SOIL

Crumbly + mixed spaces



PREDICT:

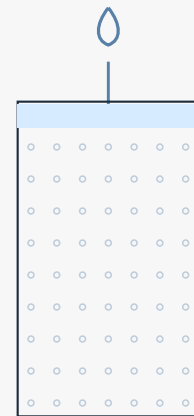
BALANCED?

OBSERVE: _____

C

DENSE SOIL

Tight + compacted



PREDICT:

SLOW / POOL?

OBSERVE: _____

DIFFERENT SOILS HANDLE WATER DIFFERENTLY.

Ask: Which moved water fastest? Which held it longest? Did water sit on top? Did the soil become muddy? Then challenge the shortcut: "Does the fastest-draining soil always win? Does the wettest soil always win?"

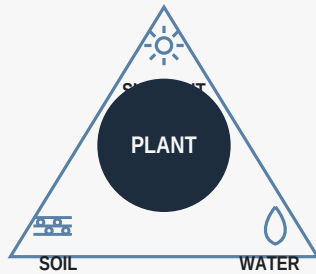
GOOD LANDSCAPING IS OFTEN ABOUT BALANCE.

Match the Plant to the Place

Connect soil, water, and sunlight to simple planting decisions.

14:00-17:00

The Plant Needs Triangle



The question is not: "Is this a good plant?"
The question is: "Is this the right plant for this place?"

PROFESSIONAL IDEA

Conditions have to match.

Plant A likes lots of sun, well-drained soil, and moderate water. Would you put it in a dark, wet corner beside a downspout?

Plant B likes partial shade and moist soil. Would the hottest, driest spot beside the driveway be your first choice?

MATCH NEEDS TO CONDITIONS - THEN EXPLAIN WHY.

17:00-21:00 | ACTIVITY

Save the Plant

SITE A

HOT + DRY

Lots of afternoon sun
Soil dries quickly
Far from downspout

SITE B

COOL + WET

Mostly shaded
Water collects after rain
Soil stays damp

SITE C

BALANCED

Morning sun
Some afternoon shade
Moist, not soggy



SUNSTAR

Full sun
Drier soil
Dislikes standing water



WOODLAND BELL

Shade
Moist soil
Dislikes hot afternoon sun



MEADOW BLOOM

Some sun
Moderate moisture
Adaptable soil

ADD A TWIST

"The homeowner really wants Sunstar in Site B."

Ask students what they would say. A professional listens to the customer and helps the customer understand what is likely to succeed.

Exit Challenge: Plant Doctor

Practice noticing symptoms without jumping to a diagnosis.

21:00-25:00 | EXIT CHALLENGE

Notice -> Connect -> Investigate

Give students simple plant-health scenarios. The goal is not perfect diagnosis. The goal is to collect clues, suggest a possible explanation, and name what they would check next.

CASE 01

Yellow leaves + soil that stays wet for days



01

WHAT DID YOU OBSERVE?

The soil stays wet. The leaves are yellow.



02

WHAT MIGHT BE HAPPENING?

The roots may be stressed by too much moisture.



03

WHAT WOULD YOU CHECK NEXT?

Drainage, soil, roots, watering, and sunlight.

CASE 02

Plant wilts every afternoon + soil is dry and cracked

Observation: _____

Possible explanation: _____

Check next: _____

THE SAME SYMPTOM CAN HAVE MORE THAN ONE CAUSE.

FACILITATOR PROMPT

If a student says, "The plant needs water," ask: "What did you observe that makes you think that? What else could cause the same symptom? What would you check before changing anything?"

Home Project: Plant & Soil Detective

Observe one real plant and build an evidence-based health hypothesis.

HOME ACTIVITY | 15-25 MIN

Choose one plant. Study the place around it.

Students can choose a tree, shrub, flower, garden plant, or patch of grass. They should not dig around roots or disturb the plant. The assignment is observation, not treatment.



01

MEET THE PLANT

Name it if you can. If not, describe it and draw it or take a photo.



02

STUDY SUNLIGHT

Full sun, partial sun, shade, or not sure? What makes you think so?



03

READ THE SOIL

Dry, moist, wet, loose, hard, crumbly, sandy, dark, light? Record only what you observe.



04

FOLLOW THE WATER

Find one clue about how the plant gets water: rain, hose, irrigation, low area, or runoff.



05

LOOK FOR ROOT CLUES

Without digging: exposed roots, surface roots, mulch against trunk, dry soil, standing water, or nothing unusual?



06

READ PLANT HEALTH

Healthy green leaves, yellow/brown leaves, wilt, new growth, flowers, bare areas, insect damage, or something else?

FINISH THE REPORT

Make a hypothesis - and name what you still need to know.

I think this plant is: thriving / doing okay / struggling / not sure.

Because I noticed: _____

Before I was sure, I would want to check: _____

Optional: With adult permission, compare two small soil samples using the same amount of water. No fertilizer, pesticide, or chemicals.

Assessment + Level 1 Wrap-Up

What competency looks like and how the foundation now connects forward.

ASSESS FOR COMPETENCY

 OBSERVE Describe a real soil or plant condition.	 CONNECT Explain how soil, water, or sun might matter.	 COMPARE Notice that soils behave differently.	 MATCH Pair basic plant needs with a site.	 INVESTIGATE Name what to check before concluding.
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A successful student can say: "This plant needs ___, this site has ___, so I think ___."

TEACHER NOTE

Avoid the "just add water" shortcut.

Young students often see wilt = add water. This lesson should begin breaking that habit. Plants can struggle from too little or too much water, drainage, soil, sunlight, roots, temperature, pests, disease, or other stress.

Students do not need to diagnose them all. They need to learn that one symptom can have several causes.

TEACHER NOTE

Do not turn this into botany class.

Skip soil taxonomy, cell structures, nutrient cycles, detailed photosynthesis chemistry, and scientific names at this stage.

Keep the working model:
 Roots live in soil.
 Roots need water + air.
 Soils handle water differently.
 Plants need different conditions.
 Match the plant to the place.

LEVEL 1 FOUNDATION - COMPLETE

01

KNOW THE INDUSTRY

Landscaping is a whole industry.

02

WORK LIKE A PRO

Safe, responsible habits come first.

03

READ THE SITE

Observe before you change anything.

04

UNDERSTAND THE SYSTEM

Soil, water, roots, sun, and plants

NEXT: LEVEL 2 - MEASURE IT, MARK IT, BUILD IT.