

Autumn Decomposer Detectives

20 activities about leaves, tiny recyclers and the forest floor. Ages 6-9.



The missing-leaf mystery

The hedgehog detective has a question: why do fallen leaves change? Follow clues, meet the forest-floor team, work with pretend data and build a layered paper habitat.

Gather: pencils or crayons, child scissors, a glue stick and two spare sheets of paper. A ruler is optional. A grown-up can help with reading, folding and cutting. No real leaves, soil or fungi are needed.

Print single-sided in your paper size. Activities are pages 2-21; grown-up notes and answers are pages 22-24. Try several short sessions. All observations can use the drawings.

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Open the forest-floor case

Color the story picture. Find a fallen leaf, a mushroom and a place where a small animal could shelter.



One thing I can see:

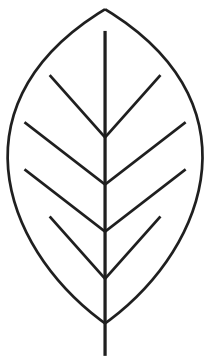
One thing I wonder:

This is an imaginary scene, not a species guide. The detective is pretend; the forest processes we investigate are real.

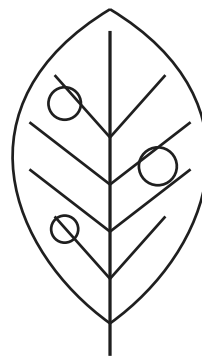
Four leaf clues

Match each drawing to its clue. Write the letter in the small box, then color the shapes.

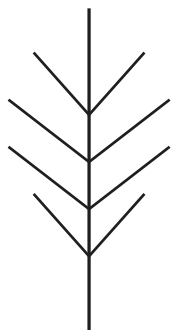
1



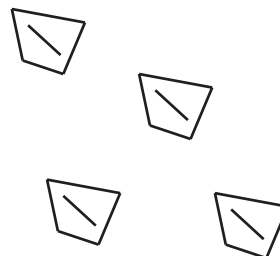
2



3



4



A / only a vein pattern B / three holes
C / small separate pieces D / whole outline, no holes

A hole or a torn edge is a clue, not proof of its cause. These drawings cannot tell us the exact age of a leaf.

Alive, once alive, never alive

Write each card number in the best group. Think about the whole object named on the card.

1. Living oak seedling

2. Fallen dead leaf

3. Small pebble

4. Living woodlouse

5. Dead twig

6. Water droplet

7. Living fungus

8. Dead pine needle

9. Air in a gap

ALIVE

ONCE ALIVE

NEVER ALIVE

Living organisms may be too small to see. Non-living things such as water, air and mineral grains are important parts of a habitat.

Meet the recycling teams

Read the job cards. Connect each numbered helper to the correct team. Each team has two helpers.

1 / Leaf-decaying fungus

Breaks down leaf material outside its body, then absorbs nutrients.



2 / Leaf-decaying bacteria

Tiny cells that break down substances in dead leaves.



3 / Earthworm

Eats dead material and the organisms on it; helps mix and break it up.



4 / Woodlouse

Eats decaying plant pieces; helps make litter into smaller bits.



DECOMPOSERS

Break down substances, including outside their cells.

DETRITIVORES

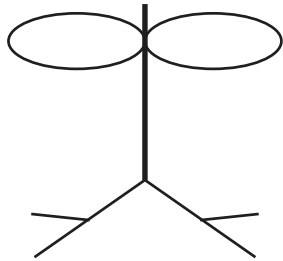
Eat bits of dead material and help break them up.

Both teams help matter cycle through the forest.

Here we distinguish microbial decomposers from detritivores. Many bacteria and fungi do other jobs too; not every species decays leaves.

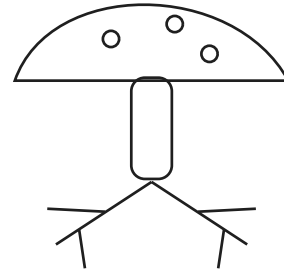
Fungus or green plant?

Read the two identity cards. Write P for this green plant, F for this fungus, or B for both.



P / OAK SEEDLING

A plant. Uses light to make sugars. Has roots that take in water and nutrients.



F / LEAF-DECAYING FUNGUS

Not a plant. Breaks down dead material and absorbs nutrients. Has fungal threads.

Can grow: ____

Makes sugars using light: ____

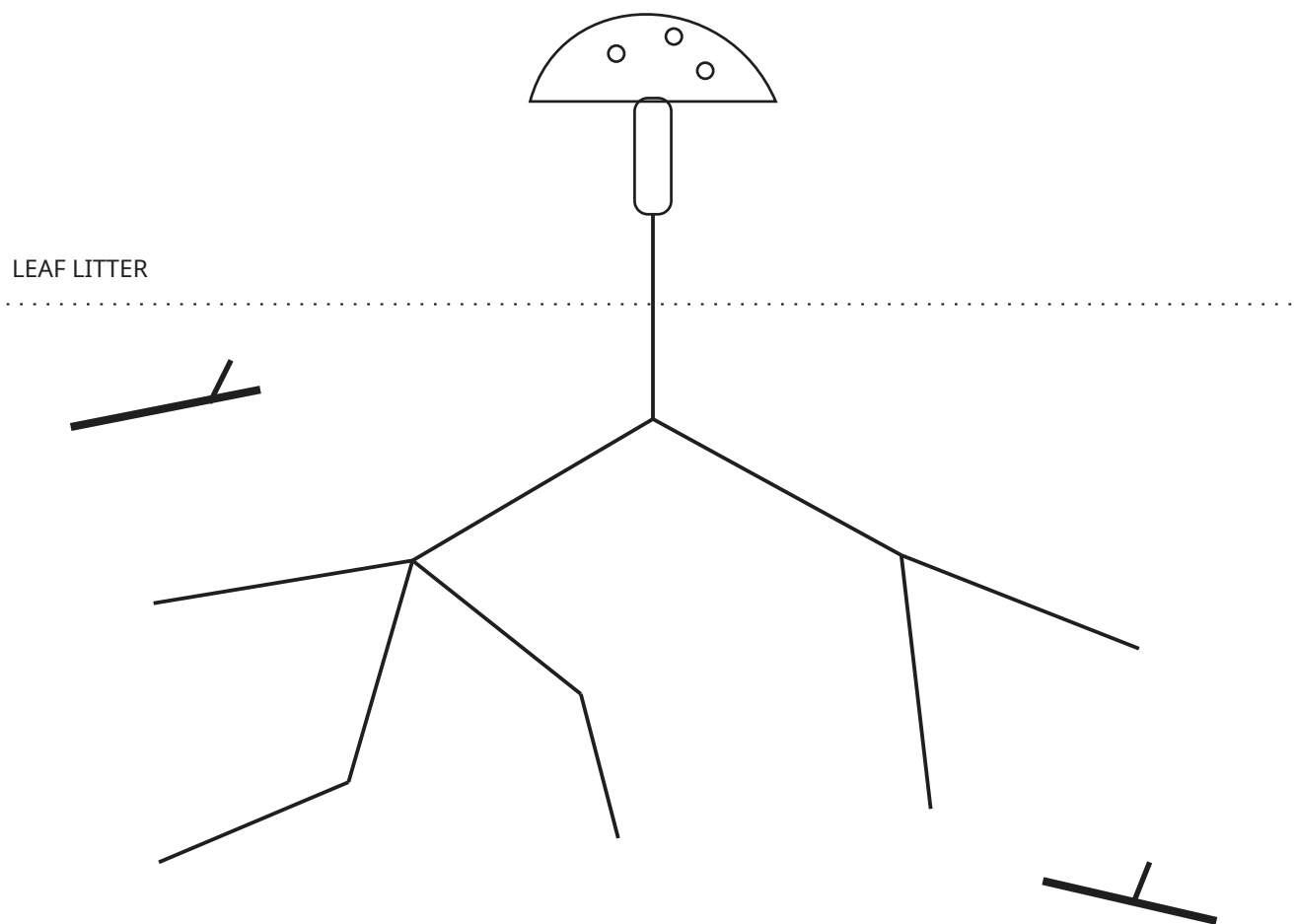
Has plant roots: ____

Absorbs food from dead material here: ____

A mushroom is a fruiting body made by some fungi. It is not a plant, and its fungal threads are not roots.

The hidden thread network

Trace the solid branching lines joined to the mushroom. Ignore the dotted litter boundary. Cross out the two separate twigs.



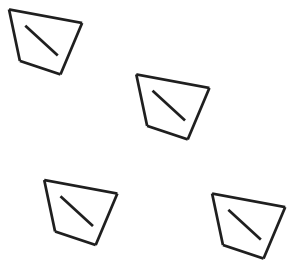
Label the joined network: ROOTS or FUNGAL THREADS?

My label: _____

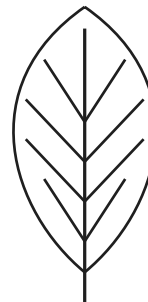
The network of fungal threads is called mycelium. This enlarged diagram is a model, not a map of a real fungus. Some fungi never make mushrooms.

Put the leaf story in order

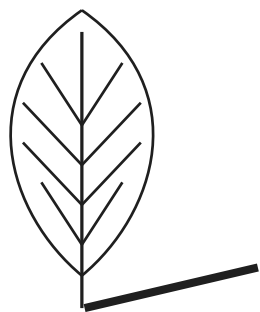
Write 1-4 in the boxes to tell one simplified story. Start with a living leaf on a tree.

A

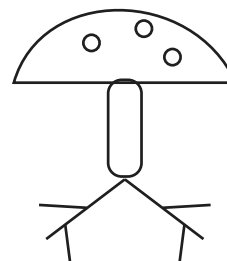
Smaller leaf pieces

B

A whole dead leaf falls

C

A living leaf on a tree

D

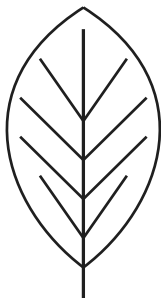
Decomposers release nutrients

Processes overlap: microbes can work before a leaf breaks into visible pieces. There is no fixed number of days for every leaf.

Plan a fair comparison

Two pretend samples start alike. Only their moisture changes. Circle all the things to keep the same.

A / DAMP



Moist, with air spaces

B / VERY DRY



Little available water

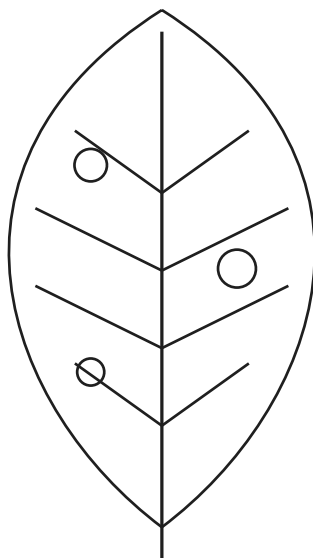
- ☐ Kind of leaf
- ☐ Starting dry leaf mass
- ☐ Warmth
- ☐ Time before checking
- ☐ Moisture

I predict _____ changes more because ...

This is a paper investigation. Moisture can affect decomposition, but more water is not always better: waterlogged material can have too little oxygen.

Evidence or a guess?

Study this drawing only. Write O for a visible observation or G for a guess that needs more evidence.



There are three round holes.

☐

A woodlouse made every hole.

☐

The drawing has a central vein.

☐

This leaf has been here exactly seven days.

☐

Scientists separate what they notice from explanations they still need to test. A drawing cannot identify who made a hole or how old a leaf is.

Read the pretend field notes

These numbers are invented for practice. Both samples started with 12 g of dry leaf material.

CHECK	A / DAMP	B / VERY DRY
Start	12 g	12 g
First later check	9 g	11 g
Second later check	6 g	10 g

The pretend scientists dried the remaining leaf material before weighing it, so added water is not counted. The checks happened after the same amount of time for A and B.

At the last check, A had ____ g left.

At the last check, B had ____ g left.

A lost $12 - 6 =$ ____ g. B lost $12 - 10 =$ ____ g.

No real sample was tested. Leaf mass can change as material is used, released as gases or moved away. Matter does not simply vanish.

Make the results visible

Use Activity 10. Fill one square for each gram of dry leaf material remaining at the second check.

A / DAMP

--	--	--	--	--	--	--	--	--	--	--	--

B / VERY DRY

--	--	--	--	--	--	--	--	--	--	--	--

1 2 3 4 5 6 7 8 9 10 11 12

Each filled square = 1 gram REMAINING.

Which sample lost more leaf mass? How much more?

Can these pretend results prove that every damp forest decays faster?

A smaller remaining bar means more of the starting leaf mass was lost. These invented numbers practice reading evidence; they are not field research.

Follow the forest food

Draw the five arrows listed below. Every arrow points FROM food TO the organism that uses or eats it.

DEAD LEAVES

WOODLOUSE

LEAF-DECAYING FUNGUS

HEDGEHOG

SPRINGTAIL

1. Dead leaves -> woodlouse
2. Dead leaves -> leaf-decaying fungus
3. Woodlouse -> hedgehog
4. Fungus -> springtail
5. Springtail -> spider

SPIDER

This simplified food web shows selected feeding relationships. Animals have other foods too. The arrows show food/energy transfer, not walking directions.

Repair the detective report

Each statement has one mistake. Cross out the wrong word or phrase and write a better one.

1. A mushroom is a plant.

Better word:

2. Woodlice help by turning whole leaves straight into rocks.

What woodlice really do:

3. Soil is made only of dead leaves.

Name two other parts:

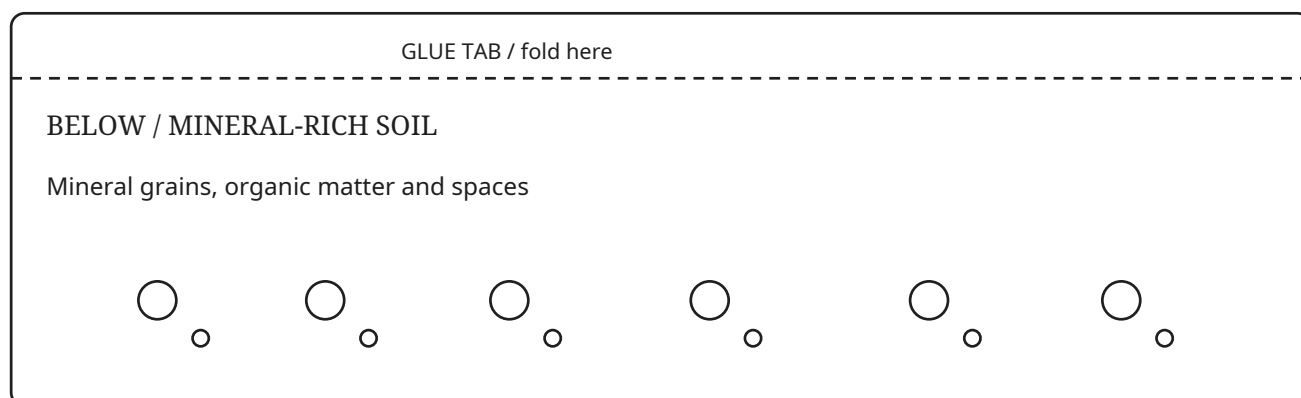
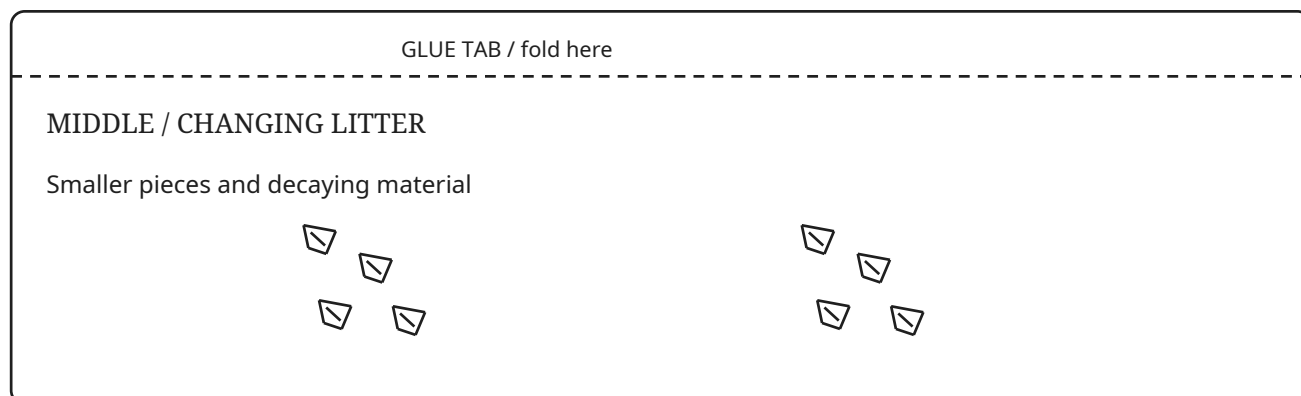
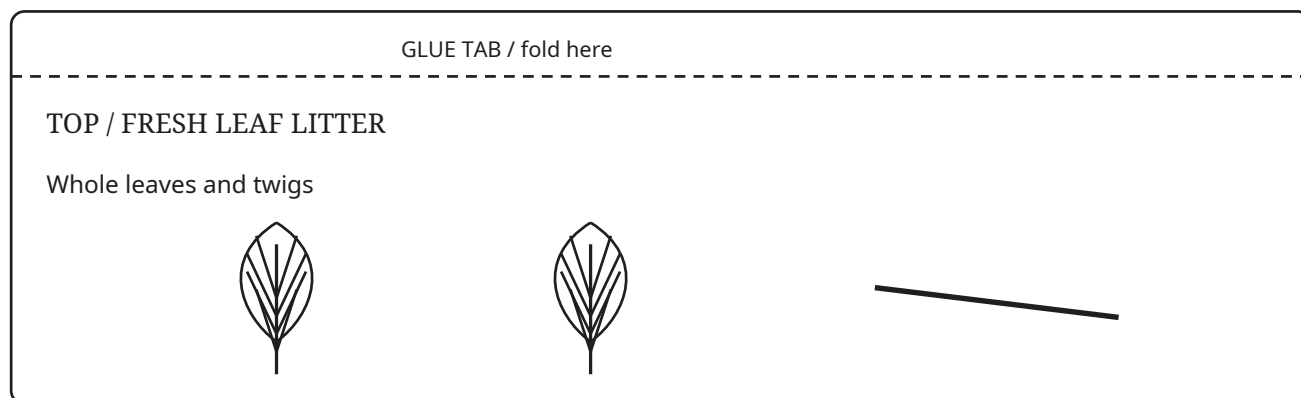
4. A food-web arrow goes from eater to food.

Fix the direction:

Soil includes mineral grains, organic matter, air and water. Living organisms use its many spaces. Dead leaves add organic material, not all of soil.

Build a forest-floor lift-the-flaps

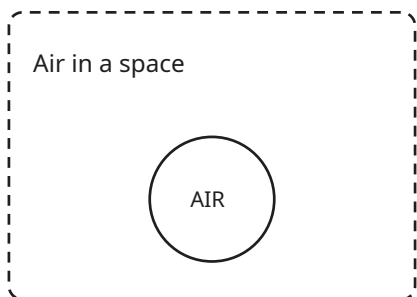
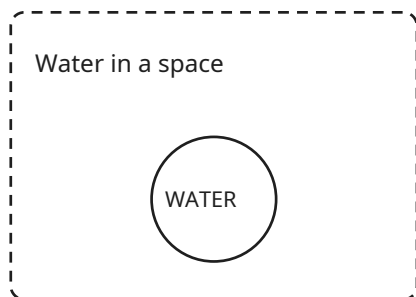
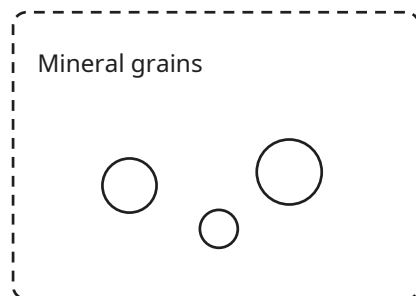
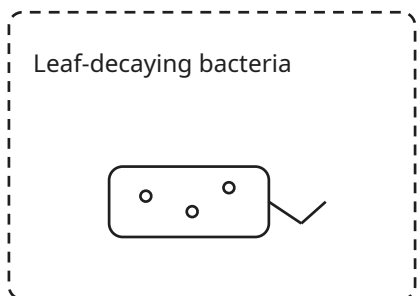
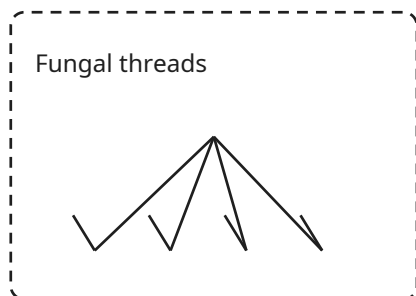
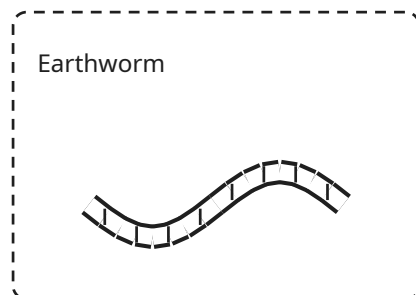
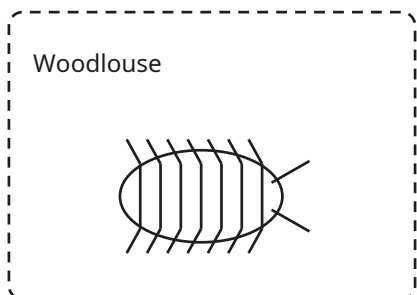
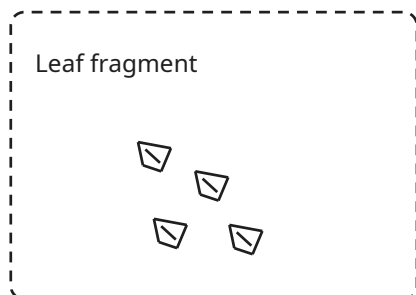
Color the three strips. Cut around each outer box. Fold the dotted top tab back and glue **ONLY** the tab to a spare sheet.



Stack the flaps top to bottom on your spare sheet. Lift them to see beneath. This is a simplified forest profile; real soils and litter layers vary.

Move the residents in

Cut these eight cards. Place up to THREE side by side under each flap from Activity 14. Explain, then glue or keep them movable.



A card can have more than one sensible home. Leave gaps for air and water in your model.

Cards are not to scale. Many residents live across more than one layer. Air and water share spaces between soil particles; do not fill every space with solids.

Design a small habitat patch

This is a paper garden. Keep the path clear. Add a leaf-litter patch of THREE connected squares away from the path.

Gate

		PATH		
		PATH		
		PATH		
		PATH		
		PATH		

House

Squares connect along an edge, not just at a corner. Draw leaves in your three chosen squares. Add a shelter symbol in one. Give your patch a name.

Patch name: _____

Many small animals use leaf litter for food or shelter. A real garden plan needs the landowner or grown-up to choose a suitable place; do not move wildlife.

A detective field notebook

Use the story picture in Activity 1, or look from a path outdoors with a grown-up. You do not need to collect or touch anything.

My source: STORY PICTURE / OUTDOORS Date: _____

SKETCH ONE SMALL AREA / add labels to what you can see

Two observations:

A question to investigate:

Stay on the path and leave leaves, soil, logs and fungi in place. Do not taste, handle or grow unknown organisms. Looking at the printed picture works just as well here.

The calendar is not a stopwatch

Match each change to its likely effect by writing A, B or C. These are clues to discuss, not exact predictions.

1 / A deciduous tree sheds many leaves.

2 / A long dry spell dries the litter.

3 / A cold spell cools the litter.

A / Many biological processes can slow.

B / More dead leaf material arrives.

C / Less water is available to microbes.

Different forests have different seasons, leaves and organisms. Many living things remain in winter. No single timetable describes every leaf.

Close the case. Open a question.

Make a mini museum label that teaches someone one accurate idea about the forest floor.

My exhibit is called:

DRAW YOUR MAIN IDEA / add labels or arrows

One clue or result I can show:

One question I still have:

Try explaining the different jobs of a woodlouse and a leaf-decaying fungus. If you use the sample-data results, tell your audience that the numbers are invented.

For the grown-up

Read aloud, accept spoken answers and let the child change their mind when a new clue appears.

Four suggested sessions

1: Activities 1-6, notice and classify. 2: Activities 7-11, sequence, predict and read evidence. 3: Activities 12-16, connect and construct. 4: Activities 17-20, observe, explain and share. Stop before it feels like a test.

Prepare the paper build

Print single-sided. Activity 14 is physical page 15; activity 15 is page 16. Glue only the flap tabs to a spare sheet. Residents can go under several flaps: their locations are not rigid layers. Activity 19 is the cut-and-fold story on page 20.

Keep the biology precise

We distinguish leaf-eating detritivores, including woodlice and earthworms, from microbes that break down substances. Many fungi and bacteria have other roles. A mushroom is a fungal fruiting body; mycelium is a thread network, not plant roots.

Use data as a reading exercise

The 12 g samples and later masses in Activities 10-11 are fictional. Both have the same starting dry mass; water is excluded by drying before weighing. Do not describe this as an experiment your child performed or as proof about all forests.

Keep observation optional

Every activity works indoors on paper. If outdoors, look from a path with an adult. No collecting, tasting, fungus handling, log turning or cultures are needed. Do not introduce earthworms or other organisms into a habitat.

Support and extend

Use patterns instead of colors and let the child dictate. For a stretch, ask what evidence would separate two explanations for leaf damage. Soil profiles, species roles and decomposition rates vary by place.

Original editorial activity pack. Layout and answer checks do not replace parent-and-child playtesting; the suggested age fit and session length remain provisional.

Answers and discussion clues

Activities 1-10. Open observations can have several sensible answers; ask what evidence supports them.

1-2 / Look and match

1: Accept things visible in the picture and any relevant question. 2: Drawings 1-4 match D, B, A, C. Holes do not establish a cause or an exact age.

3 / Groups

Alive: 1, 4, 7. Once alive: 2, 5, 8. Never alive: 3, 6, 9. Refer to the named object, not whether its atoms were once part of something living.

4 / Teams

Leaf-decaying fungus and bacteria connect to decomposers. Earthworm and woodlouse connect to detritivores. Both teams help break down dead material, by different processes.

5-6 / Fungi

5: B, P, P, F. 6: Trace the connected network, not the two detached twigs; label it FUNGAL THREADS. Mycelium is the network. Fungi are not plants.

7 / Order

C, B, A, D; boxes A-D contain 3, 2, 1, 4. This is one simplified sequence. Microbial work and fragmentation overlap; no fixed day count is implied.

8-9 / Fair evidence

8: Keep kind of leaf, starting dry mass, warmth and checking time alike; change moisture. Accept a reasoned prediction. 9: O, G, O, G.

10 / Numbers

At the last check A has 6 g and B has 10 g remaining. Losses are 6 g and 2 g. These are explicitly invented measurements, not observed findings.

Science references / organism roles and fungi

USDA NRCS, Soil Tech Note 11A: Biological Underground Community. NPS, Mushrooms and Other Fungi (Katahdin Woods and Waters). Accessed October 2026.

nrcs.usda.gov/state-offices/illinois/soil-tech-note-11a-biological-underground-community

nps.gov/kaww/learn/nature/mushrooms.htm

More answers and sources

Activities 11-20. Scientific sources support the concepts, not a claim that this workbook improves learning outcomes.

11 / Graph

Fill 6 squares for A and 10 for B. A lost 4 g more than B: $6 - 2 = 4$. Fictional samples cannot establish a rule for all damp forests.

12-13 / Connections

12: Follow the five listed food -> user/eater links. 13: Mushroom is fungal; woodlice eat and break up dead plant material; soil also has mineral grains, air and water; arrows go food -> eater.

14-15 / Forest-floor model

Stack fresh litter above changing litter above mineral-rich soil. Accept supported resident placements across layers. Fungal threads and bacteria occur in litter and soil. Air and water occupy pore spaces; the model is not to scale.

16-18 / Habitat and time

16: Any three edge-connected non-path squares work; e.g. the top three squares in the leftmost column. 17: Observations should be visible, questions distinct. 18: 1-B, 2-C, 3-A.

19-20 / Explain

Look for an accurate leaf story and a distinction between evidence and wondering. Nutrients can be recycled; plant roots do not eat leaves. Celebrate an honest unfinished question.

Science references / soil, habitat and changing rates

NPS, Soil Food Web (White Sands): soil components and feeding roles.

nps.gov/whsa/learn/nature/soil-food-web.htm

NPS, I Didn't Know That!: Leave the Leaves: litter as habitat.

nps.gov/articles/000/idkt_leave-the-leaves.htm

US Forest Service, Climate history shapes contemporary leaf litter decomposition (Strickland et al., 2015): interacting temperature, moisture and community effects.

research.fs.usda.gov/treearch/49256