

GIVE SPARK · HANDS-ON SCIENCE LAB

Fossil Cookies

An investigation of fossil evidence, with an optional edible extension

What can a fossil print tell you about the living thing that made it, and what does it leave out?

Teacher Guide

Grades 3–4 · Earth and life science · 60 minutes

FREE LAB

OVERVIEW

The lab at a glance

One lesson, one driving question and a mystery print that a partner has to read as evidence.

THE DRIVING QUESTION

What can a fossil print tell you about the living thing that made it, and what does it leave out?

Children answer this from a print their partner made, without seeing the object.

What children do

Each child gets a mystery bag with one object inside and a ball of modeling clay. They flatten the clay into a cookie shape, press the object into it behind a screen and hide the object again. Partners swap clay cookies and work as paleontologists. They record what they observe in the print, infer what made it and name something the print cannot tell them. Then the bags are opened.

What children learn

A fossil is evidence of something that lived long ago. Many fossils are prints, such as the mark of a shell, a leaf or a foot in mud that later hardened. Scientists observe the shape, size and pattern of a print and infer what made it. An inference needs a reason that comes from the evidence, and some questions stay open because the print does not hold the answer.

Success looks like

1. I say what I observe in the print before I say what I think made it.
2. I give a reason for my inference that points to something in the print.
3. I name one thing this print cannot tell us.

Words to use

WORD	MEANING FOR CHILDREN
Fossil	Evidence of a living thing from long ago, kept in rock
Print	The mark something leaves when it presses into a soft surface
Observe	Notice with your senses
Infer	Decide what is likely, using evidence and what you already know

AT A GLANCE

Time: 60 minutes. The lesson uses modeling clay, so nothing needs baking. Edible cookies are an optional extra.

Grouping: individual prints, then pairs.

Standards link: supports NGSS 3-LS4-1. Children practice the reasoning that standard needs, which is using a fossil as evidence of a living thing. The lesson does not use real fossil data.

SESSION PLAN

STAGE	MIN
Mystery print	8
What is a fossil?	7
Make a mystery print	12
Paleontologist swap	15
What prints can tell us	13
Clear away	5
Total	**60**

THE STUDENT RESOURCE

A separate two-page PDF. Page 1 is the Fossil Detective recording page. Page 2 is a take-home recipe for edible fossil cookies.

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PREPARATION

Get ready

Clay, one mystery bag for each child and a sample print of your own.

Materials

For each child

- A ball of modeling clay or play dough about the size of a golf ball
- One mystery bag: a paper bag or envelope with one print-maker inside
- The student page and a pencil

For each pair

- A folder or large book to stand up as a screen

For you

- One clay cookie with a shell print in it, made before the lesson. Keep the shell in your pocket.

Fill the mystery bags

Put one object in each bag and fold the top over. Partners need different kinds of object, so give out a mix at every table. Use only the three kinds below, because each one matches a real kind of fossil.

IN THE BAG	HOW THE CHILD PRESSES IT	THE REAL FOSSIL IT MODELS
A shell	Flat into the clay, ridged side down	The print a shell leaves in mud. Fossil shell prints are common.
A leaf or fern with strong veins	Flat, vein side down, rubbed gently	A leaf print in fine mud
A plastic animal	**Feet only.** Walk it across the clay for three or four steps.	A trackway of footprints, which is a trace fossil

Do not let children press the side of a whole toy animal into the clay. Animals do not leave whole-body prints like that, and children remember the picture.

Why clay and not cookie dough

Clay needs no preparation and no oven, and children can press a second time if the first print fails. They study the print while it is soft, which is all the lesson needs. The edible version is on the take-home page for families, and you can bake it with your class as an extra if your school allows food.



A shell print, a leaf print and a trackway. The bag keeps each object secret until the reveal.

SAFETY

Modeling clay and play dough are not food. Some play dough contains wheat, so check for allergies.

Children wash their hands after the lesson.

HOW MUCH CLAY

Allow about 1 ounce (30 g) for each child. A class of 25 needs about 25 ounces (700 g). The clay can be rolled up and used again.

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Run the lesson

Children read a print you made, make their own in secret, then study a partner's print as evidence.

Mystery print 8 MINUTES

DO Show your clay cookie with the shell print. Keep the shell hidden. Give children a quiet look, then sort their ideas into two columns on the board: **We observe** and **We infer**. Show the shell once the class has given reasons.

ASK "What do you think made it? What in the print makes you say that?"

What is a fossil? 7 MINUTES

SAY *"A fossil is evidence of a living thing from long ago, kept in rock. Some fossils are prints. A shell, a leaf or a foot pressed into soft mud, and the mud later hardened into rock. Scientists who study fossils are called paleontologists. They almost never see the living thing, so they work from evidence like this."*

Make a mystery print 12 MINUTES

1. Give each child a ball of clay and a closed mystery bag. Pairs stand a folder between them as a screen and flatten the clay into a cookie about as thick as a finger.
2. Each child looks inside their own bag without showing anyone. Tell the class how to press each kind of object, using the table on page 3.
3. They press, lift straight up and check the print. If it is faint, they roll the clay up and press again.
4. The object goes back in the bag with the top folded over. The bag stays on the child's own desk.

Paleontologist swap 15 MINUTES

DO Partners slide their clay cookies around the screen and take the screen down. Each child completes sections 1 to 4 of the student page for their partner's print. Nobody speaks about their own object. When both partners have written an inference, they open the bags together and complete section 5.

ASK "What would you still want to know that this print cannot show you?"

What prints can tell us 13 MINUTES

DO Return to the driving question. Build two lists on the board from what pairs found: **A print can tell us** and **A print leaves out**.

ASK

- "The footprints showed how many toes the animal had and how far apart its steps were. Could they show its color, or what it ate?"
- "Scientists have found fossil shells high in mountains. What might that tell them about that place long ago?"

Leave 5 minutes to roll up the clay and return the objects.

LOOK FOR

Children separating what they see from what they think. Listen for a reason that points to the print, such as "I think it was a shell because the lines spread out from one point."

IF THIS HAPPENS

A child names the object at once. Ask for the evidence first. "Which things in the print told you that?"

A partner infers something different from the real object. Treat it as good science if the reason fits the print. Ask what extra evidence would settle it.

A child peeks in a partner's bag. Swap that pair's prints with another pair.

THE MODEL AND ITS LIMITS

Ask what is the same about the clay and real mud, and what is different. Both take a print while soft. A real fossil print forms when the mud is buried and turns to rock over a very long time. Say this plainly, so children do not think fossils form in minutes.

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The science behind it

What you need to know about fossils, the ideas children bring and the optional edible version.

How real fossils form

Most living things never become fossils. A fossil can form when a plant or animal, or a mark it made, is buried quickly by mud, sand or ash. Soft parts usually rot away and hard parts such as shells, bones and teeth last longer. More layers pile on top, and over a very long time the layers turn to rock.

A buried shell can dissolve and leave a hollow in the rock with its shape. That hollow is called a mold, and the clay print models it. Minerals carried by water can later fill a mold and make a stone copy called a cast. Minerals can also slowly replace bone, so many fossil bones are rock in the shape of the original.

Footprints, burrows and trails are trace fossils. They record what an animal did. A trackway can show the size of the feet, the number of toes and the length of each step.

Fossils usually form through processes that take a very long time. Many fossils are millions of years old.

Ideas children often bring

A CHILD MIGHT SAY	YOU COULD RESPOND
“Fossils are just old bones.”	Many fossils are stone that took the shape of the bone. Leaves, shells and footprints become fossils too.
“A fossil tells us everything about the animal.”	Go back to the two lists. Color, sound and behavior are mostly missing.
“We made real fossils.”	We made a model of a print. It does not show the burying, the rock or the time.
“The whole animal gets pressed into the rock.”	Bodies are usually buried and only the hard parts last. Prints come from feet, shells and leaves.

Optional: edible fossil cookies

The recipe on the take-home page makes about 24 sugar cookies. If you bake with your class, use washed plastic animals and washed shells as print-makers, check allergies for wheat, egg and dairy, and make sure nobody tastes raw dough. Brush cinnamon into each print so it shows after baking.

ASSESSMENT

Use the student page and what you hear during the swap.

Observing: describes shape, size or pattern without naming the object.

Inferring: gives a reason that comes from the print.

Limits of evidence: names something the print cannot show.

TAKE IT FURTHER

Read a trackway. One child walks, then runs, a toy animal across a long strip of clay. A partner works out which part was the run and explains how the steps show it.

Mystery from another class. Swap a set of prints with another class, so nobody in the room knows the answers.

SUPPORT AND CHALLENGE

Support. Give a child a shell, which leaves the clearest print, and let them describe it aloud while a partner writes.

Challenge. Ask for two different things that could have made the same print, with a reason for each.

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Fossil detective

What can a fossil print tell you about the living thing that made it, and what does it leave out?

Name _____ **Date** _____

1 Draw your partner's mystery print

Draw the print exactly as you see it. Show its real size if you can.

2 I observe

Write what you can see. Do not say what made it yet.

Shape

_____

Size

_____

Pattern or lines

_____

3 I infer

I think this print was made by

_____

because I can see

_____

4 What this print cannot tell me

_____

5 The reveal

Open the bags together.

It was made by _____

The clue that helped me most was _____

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Make fossil cookies at home

A recipe to share with your family.

You need an adult for this. An adult uses the oven. Wash your hands first, and do not taste the dough before it is baked.

1 You will need

- [ ] 2 cups all-purpose flour
- [ ] ½ teaspoon baking powder
- [ ] ¼ teaspoon cinnamon, plus extra for dusting
- [ ] ¼ teaspoon salt
- [ ] ½ cup (1 stick) unsalted butter, softened
- [ ] 1 cup white sugar
- [ ] 1 egg, beaten
- [ ] 2 teaspoons vanilla extract
- [ ] Clean objects for printing, such as washed plastic animals and washed shells



2 Make your cookies

1. Mix the flour, baking powder, cinnamon and salt in a bowl.
2. In a second bowl, beat the butter and sugar until pale. Beat in the egg and vanilla.
3. Add the dry mix a little at a time and stir until you have a dough.
4. Wrap the dough and put it in the refrigerator for 1 hour.
5. Roll a spoonful of dough into a ball and press it flat. Make it about as thick as your finger.
6. Press a shell flat into the dough, or walk a toy animal's feet across it. Lift straight up.
7. Brush a little cinnamon into the print.
8. Chill the cookies for 15 minutes so the prints stay sharp.
9. Ask an adult to bake them at 350°F (180°C) for 8 to 10 minutes, until the edges are just golden.

3 Fossil challenge

Give a cookie to someone at home and keep the object hidden. Can they work out what made the print? Ask them to tell you which clues they used.

Their best clue was

_____

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