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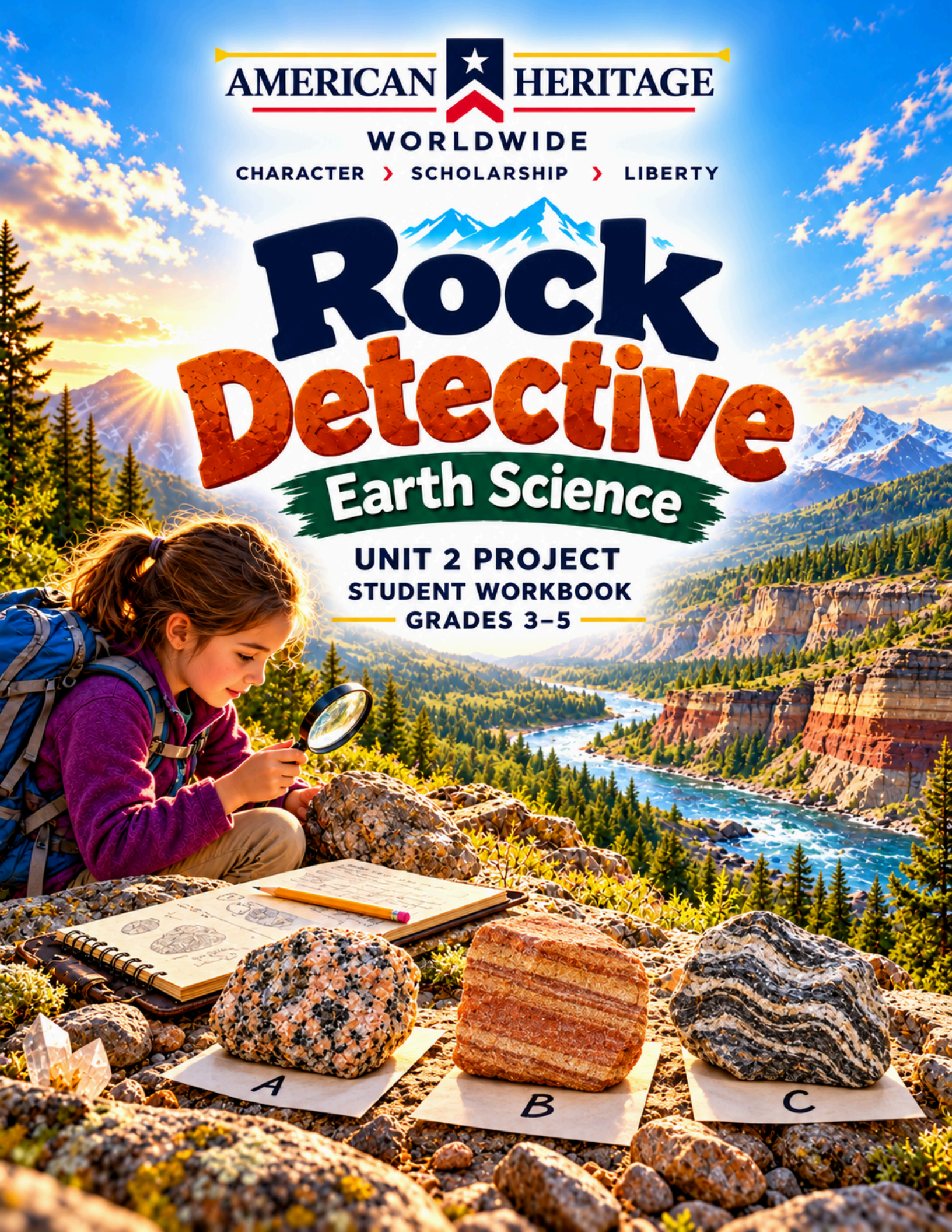
# Rock Detective

## Earth Science

**UNIT 2 PROJECT**

**STUDENT WORKBOOK**

**GRADES 3–5**



# Rock Detective: Case File

AHS Worldwide · Earth Science · Unit 2 Project · Upper Elementary

| Name: | | Date: | |
|---|---|---|---|

## Your Challenge

Find three rocks near home and crack each one's case: what it is made of, which rock family it belongs to, and what the weather is doing to it.

| Two turn-in days | The one big idea |
|---|---|
| • DAY 4 — turn in pages 1–5 and one photo of your labeled egg carton.<br>• DAY 8 — turn in this whole packet and one "Case Closed" video, 2 to 3 minutes. | Every rock carries clues about how it formed. Learn to read the clues, and the rock tells you its own story. |

**THE ONE BIG TRAP:** Do not name a rock by its color. Color can fool you. Streak, scratch, and texture tell the truth.

## Your Detective Kit

| | |
|---|---|
| ☐ 3 rocks from your yard, a park, or a driveway | ☐ A steel nail |
| ☐ An egg carton or a paper plate | ☐ The back of a tile, or the rough bottom of a mug |
| ☐ Tape and a marker | ☐ A few drops of white vinegar |
| ☐ A coin | ☐ A pencil *(a magnifying glass helps, but is not required)* |

## How a Rock Detective Works

- **One page a day.** Each one takes about 10 to 15 minutes.
- **One sentence.** Detectives explain their thinking: "My best guess is ____ because ____." The *because* is what counts — not getting the name right.
- **Your carton is your case board.** Every day you add one new clue to each rock's label. By Day 8, your clues are ready for your video.
- **One star suspect.** On Day 5 you pick your favorite rock and follow its whole life story.

## How the Eight Days Fit Together

| Part | Days | What you do |
|---|---|---|
| **Crack the Case** | 1–4 | Collect three rocks, test them, and sort each into its family. |
| **Follow the Trail** | 5–7 | Pick a star suspect and find out where it came from and where it is going. |
| **Case Closed** | 8 | Present your case on video. |

CRACK THE CASE · DAY 1

# Meet Your Three Suspects

Lesson 9 · 10–15 min

**DETECTIVE RULES:** Look in your yard, a park, or a driveway. Ask a grown-up before you take one — some parks have a no-collecting rule. Pick real rocks, not brick, concrete, or blacktop. Try to find three that look different.

## Read This First: Rock or Mineral?

- A MINERAL is a natural solid that was never alive. It is the same material all the way through.
- A ROCK is made of one or more minerals mixed together.
- Think of a cookie: the chips, oats, and raisins are the minerals. The whole cookie is the rock.

*Sketch each suspect like a police sketch. Then give it a detective nickname, like "Sparkles" or "Old Stripey."*

| Rock A | Rock B | Rock C |
|---|---|---|
| | | |
| **Nickname:** | **Nickname:** | **Nickname:** |
| **Where I found it:** | **Where I found it:** | **Where I found it:** |
| ☐ ONE MINERAL ☐ ROCK | ☐ ONE MINERAL ☐ ROCK | ☐ ONE MINERAL ☐ ROCK |

*Last row: tick your guess. Most rocks are a mix. A white or clear chunk of quartz is one mineral you might really find.*

**CARTON CLUE:** Label three cups A, B, and C with tape. Write each rock's nickname on its label and put the rock in its cup.

CRACK THE CASE · DAY 2

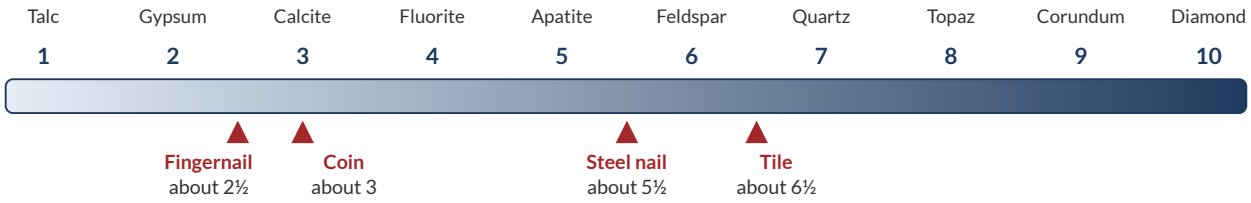
# Secret Color and Scratch Tests

Lesson 9 · 10–15 min

## Three Quick Tests

1. SECRET COLOR (streak) — Rub a corner of the rock hard across the rough back of the tile. The color of the powder line is the rock's secret color. No powder? Write "none."
2. SHINE (luster) — Does it shine like metal, shine like glass, or have no shine, like chalk?
3. SCRATCH — Try your fingernail, then the coin, then the nail. Stop at the *first* one that leaves a groove that does not rub away. For the nail, set the rock flat on a table and scratch away from your fingers, with a grown-up nearby.

## The Mohs Hardness Scale — 1 is softest, 10 is hardest




| Test | Rock A | Rock B | Rock C |
|---|---|---|---|
| **Secret color (streak):** | | | |
| **Shine — circle one:** | METAL GLASS NONE | METAL GLASS NONE | METAL GLASS NONE |
| **First tool that scratched it — circle one:** | FINGERNAIL (under 2½)<br>COIN (2½ to 3)<br>NAIL (3 to 5½)<br>NONE (over 5½) | FINGERNAIL (under 2½)<br>COIN (2½ to 3)<br>NAIL (3 to 5½)<br>NONE (over 5½) | FINGERNAIL (under 2½)<br>COIN (2½ to 3)<br>NAIL (3 to 5½)<br>NONE (over 5½) |

*The numbers in ( ) are the rock's hardness range. Tool numbers are close, not exact.*

**COLOR CAN FOOL YOU:** A mineral called hematite can look black, silver, or red — but its secret color is always reddish-brown. That is why detectives trust the streak.

**CARTON CLUE:** Add each rock's secret color to its label.

# Crystal Check



## Igneous Rock: Melted Rock That Cooled

Underground, melted rock is called MAGMA. Above ground, it is LAVA. When it cools and hardens, it becomes igneous rock. How fast it cooled shows in the crystals:

| How it cooled | What you see | Example |
|---|---|---|
| Slowly, deep underground | **Big crystals**, locked like puzzle pieces | Granite |
| Fast, at the surface | **Tiny grains**, too small to see well | Basalt |
| Super fast | **Glassy**, no grains at all | Obsidian |
| With gas bubbles inside | **Holes** all through it | Pumice — it can float! |

**CRYSTALS OR SAND?** Crystals are locked tight and often have flat, shiny faces. Sand grains are round and a few may rub off on your finger. Sand is a clue for tomorrow.

| Clue | Rock A | Rock B | Rock C |
|---|---|---|---|
| **What I see — circle one:** | BIG CRYSTALS<br>TINY GRAINS<br>GLASSY HOLES<br>NONE OF THESE | BIG CRYSTALS<br>TINY GRAINS<br>GLASSY HOLES<br>NONE OF THESE | BIG CRYSTALS<br>TINY GRAINS<br>GLASSY HOLES<br>NONE OF THESE |
| **Igneous suspect?** | **YES MAYBE NO** | **YES MAYBE NO** | **YES MAYBE NO** |
| **If yes, it cooled…** | **SLOW FAST** | **SLOW FAST** | **SLOW FAST** |

**CARTON CLUE:** Add what you saw — like "big crystals" or "no crystals" — to each label.

**Bonus Clue** — *optional*

Granite and basalt both start as melted rock. Why does granite have big crystals and basalt only tiny ones?

CRACK THE CASE · DAY 4

# Name Each Rock's Family

Lessons 11–12 · 10–15 min

| Sedimentary Clues | Metamorphic Clues |
|---|---|
| *Bits of sand, mud, pebbles, or shells pressed and cemented together.*<br>• Flat LAYERS, like pages in a book<br>• SAND GRAINS — feels gritty, like sandpaper<br>• PEBBLES glued together<br>• FOSSIL BITS — shells or leaf prints | *An older rock changed by heat and squeezing deep underground — without melting.*<br>• STRIPES or bands, often wavy<br>• SPARKLY flat sheets that flash in the light<br>• Splits into thin, flat slabs<br>• Hard and sparkly like sugar (marble, quartzite) |

*Igneous clues are on page 4: crystals, glassy, or holes.*

| Suspect | Family — tick one | My best guess is ___ because ___. |
|---|---|---|
| **Rock A** | ☐ Igneous<br>☐ Sedimentary<br>☐ Metamorphic | |
| **Rock B** | ☐ Igneous<br>☐ Sedimentary<br>☐ Metamorphic | |
| **Rock C** | ☐ Igneous<br>☐ Sedimentary<br>☐ Metamorphic | |

**CARTON CLUE:** Add each rock's family to its label. *Example: "B — Sandy — gray streak — no crystals — SEDIMENTARY."*

**THIS IS YOUR FIRST UPLOAD — DAY 4**
Take one photo of your carton from above, with all three rocks and labels showing. Turn it in with pages 1–5 of this packet.

FOLLOW THE TRAIL · DAY 5

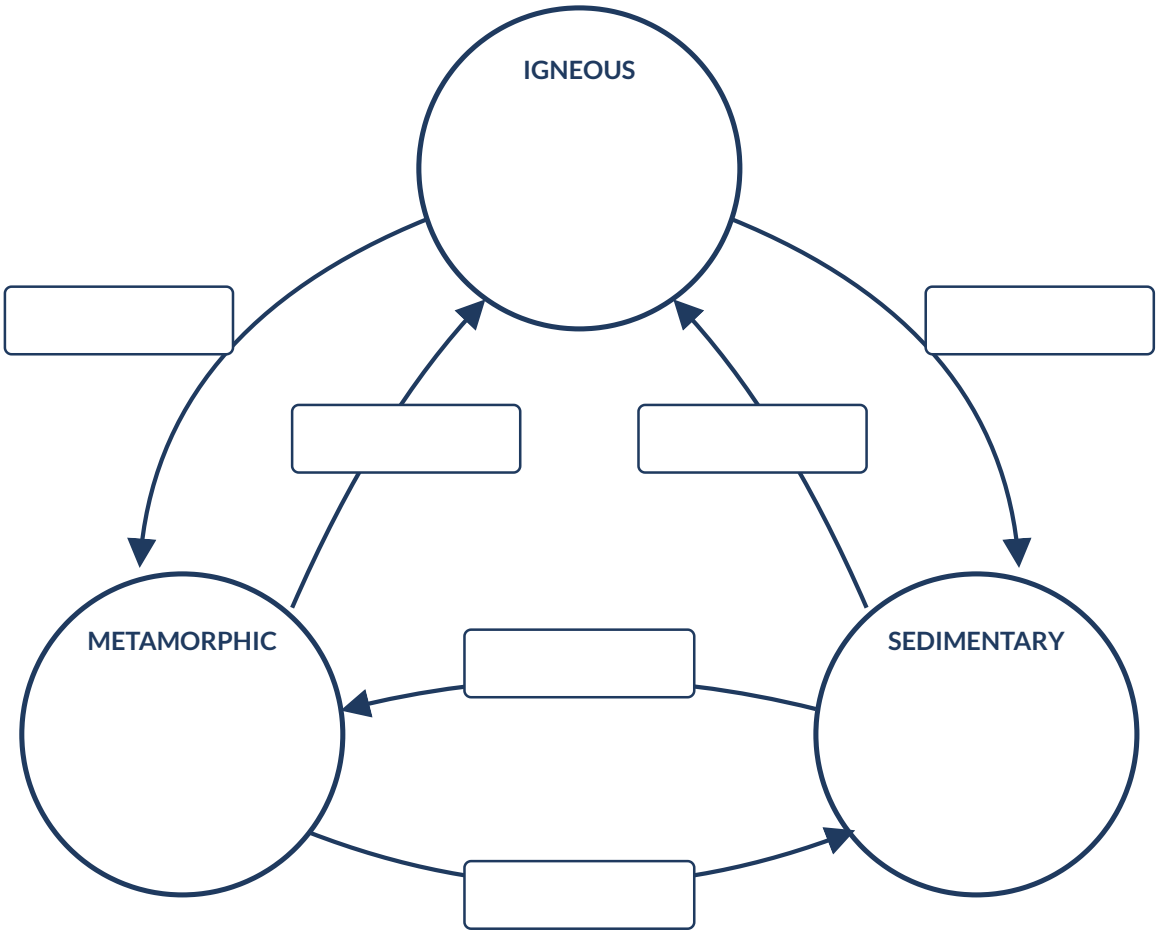
# The Rock Cycle Puzzle

Lesson 13 · 10–15 min

## Solve the Puzzle

1. Every arrow shows a rock turning into a new family. Fill each arrow's box from the word bank. *Hint: arrows that point to the same family use the same phrase.*
2. Write the letter of each of your rocks inside its family's circle.

**MELT, THEN COOL** | **HEAT AND SQUEEZE** | **BREAK DOWN, THEN PRESS AND CEMENT**




## Pick Your Star Suspect

| | |
|---|---|
| **My star suspect is Rock ___, nicknamed:** | |
| **Its next stop could be the _____ family, if it gets…** | |

**CARTON CLUE:** Draw a big star on your star suspect's label.

FOLLOW THE TRAIL · DAY 6

# The Fizz Test and Weathering Clues

Lesson 14 · 10–15 min

## Weathering Breaks Rock Down Right Where It Is

**MECHANICAL** — breaks rock into smaller pieces of the same stuff.

- Water in a crack freezes, grows, and pushes the crack wider.
- Roots grow into cracks and split them.
- Tumbling in water rubs sharp edges ROUND.

**CHEMICAL** — changes what the rock is made of.

- Iron in a rock reacts with air and water and makes RUST stains.
- Rain is very slightly acidic. Over a long time it dissolves rocks like limestone.

**THE FIZZ TEST — TRY ALL THREE ROCKS:** Scratch a spot with the nail to make a little powder. Add ONE drop of vinegar and watch closely — the bubbles can be tiny. A fizz means the rock has calcite, the mineral in limestone and marble. That fizz is chemical weathering, sped way up! Wipe the rocks and wash your hands after.

| | Rock A | Rock B | Rock C |
|---|---|---|---|
| Did it fizz? | ☐ YES ☐ NO | ☐ YES ☐ NO | ☐ YES ☐ NO |

## Star Suspect Clue Hunt

| | |
|---|---|
| Tick every clue you find: | ☐ Rounded edges ☐ Cracks ☐ Rust stains ☐ It fizzed |
| The weathering I found is — circle: | MECHANICAL CHEMICAL BOTH |
| because… | |

**CARTON CLUE:** Add "fizz" or "no fizz" to every label.

**Bonus Clue** — *optional*

Ice is much softer than rock. So how can ice break a rock apart?

FOLLOW THE TRAIL · DAY 7

# How Did It Get Here?

Lesson 15 · 10–15 min

## Erosion Moves the Pieces

Weathering breaks rock down. EROSION carries the pieces away. When they are dropped in a new place, that is DEPOSITION. The four big movers:

1. WATER — rain, rivers, and waves carry rocks and tumble them smooth.
2. WIND — blows sand and dust from place to place.
3. ICE — glaciers scrape and drag rocks along, even giant boulders.
4. GRAVITY — pulls rocks downhill, like in a rockslide.

*Bonus mover: people. A driveway rock was probably dropped off by a truck. That counts!*

**SOIL RUB:** Put a pinch of soil from where you found your star suspect on white paper. Rub it between your fingers. Soil is mostly tiny bits of weathered rock, mixed with bits of old plants, water, and air. Wash your hands after.

## What I Found in the Soil — tick what you notice

☐ Gritty bits (sand) ☐ Smooth like flour (silt) ☐ Sparkly flecks ☐ Bits of roots or leaves (not rock!)

## My Star Suspect's Trip

| | |
|---|---|
| **The mover that brought it here — circle:** | **WATER WIND ICE GRAVITY PEOPLE** |
| **My best guess is ___ because ___.** | |

**CARTON CLUE:** Add the mover to your star suspect's label.

**Bonus Clue** — *optional*

The soil has tiny bits of rock in it. Where did those bits come from in the first place?

CASE CLOSED · DAY 8

# The Cliff Question and Your Video

Lesson 16 · 10–15 min

## The Cliff Question

In rock layers nobody has disturbed, the bottom layer was put down first, so the **bottom layer is the oldest**. Scientists call this SUPERPOSITION. Imagine your three rocks are layers in one cliff. Write a letter in each layer.

| GRASS AND SOIL | |
|---|---|
| **TOP — youngest** | Rock ____ |
| **MIDDLE** | Rock ____ |
| **BOTTOM — oldest** | Rock ____ |

| I put Rock __ on the bottom because… |
|---|
| |

*Hint: which rock had to be buried deepest, or had to wait for another rock to exist first? There is more than one good answer.*

## Your Video Note Card — fill it in, then read it on camera

1. For each rock, read its label: "Rock ____ is **(family)** because **(one clue)**."
2. My star suspect's life story: It formed when _____. Weathering by _____ is breaking it down. _____ moved it to where I found it. Its next stop is the _____ family.
3. The cliff: read your "bottom layer" answer from the top of this page.

**THIS IS YOUR FINAL UPLOAD — DAY 8**

Two to three minutes. Have your carton and this packet in the shot. Hold the camera still, talk like you are solving the case for a friend, and watch it back once. Turn in this whole packet with the video.