

BEYOND THE REFERENCE RANGE

THE ROCK SURFACE EVIDENCE WALK

A Texture + Rounding Field Investigation

• Why are some rocks smooth and others rough?

ACCESSION	SETTING
BRR-WJ-031-ACT-01	OUTDOOR
AGE	TIME
2+ participating; adult selects route + safe touch samples	25-45 min
CONTAINMENT LEVEL	VERSION
LOW - dust, dirt + apparently urgent geology	1.0 • 2026-09-11

ACTIVITY INTENT

Use ordinary outdoor rocks as a small evidence set. Compare surface texture, edge shape, and location clues without assuming that any single feature tells the whole geologic story. The investigation introduces observation scoring, site context, comparison groups, and the idea that rock surfaces can preserve evidence of source material, fracture, weathering, abrasion, and transport.

PURPOSE + SCIENCE BACKGROUND

Rock surfaces do not become smooth or rough for one simple reason. The mineral grains and structure of the original rock matter. Fresh breaks can expose sharp, angular faces. Weathering can weaken or alter exposed surfaces, while moving sediment can collide and abrade during transport. National Park Service geology resources describe weathering as rock breakdown and note that sediment shape can reflect both the nature of the source rock and abrasion during transport. This activity keeps those explanations open instead of treating smoothness as a clock.

NON-NEGOTIABLE SAFETY RULE

Stay on stable, permitted ground. Do not climb road cuts, unstable slopes, creek banks, retaining walls, or loose boulder piles. Leave rocks in place where collecting is prohibited. For toddlers, touch only clean, stable rocks too large to fit in the mouth; wash hands after the investigation. Geology is observational, not edible.

MATERIALS

- Field Notes Binder or one observation sheet
- Pencil, crayon, or marker
- Optional hand lens or magnifier
- Optional ruler or small measuring tape
- Optional phone camera for close-up evidence photos
- A safe outdoor route with visible loose rocks or gravel; no collecting required

PRE-ANALYTICAL SETUP

- **Choose two comparison areas.** Examples: a gravel path edge and a natural soil area; a drainage edge and a drier patch; or two visibly different rock deposits.
- **Define the observation unit.** One rock = one specimen. Observe 8-12 rocks total if attention allows.
- **Use the same scoring scale.** Texture score: 0 very smooth, 1 mostly smooth, 2 mixed, 3 rough, 4 very rough/jagged.
- **Add an edge description.** Rounded / mixed / angular.
- **Record context.** In place, moved landscaping material, drainage, path, slope, garden bed, or unknown.
- **Do not wash or wet specimens before scoring.** Water can make surfaces look darker and feel different.

PROCEDURE

- 1 **Open the case.** Ask: "Why are some rocks smooth and others rough?" Make one family prediction before touching anything.
- 2 **Sample Site A.** Choose 4-6 visible rocks using a simple rule such as "the next rock we can safely reach every three steps." This reduces only-picking-the-interesting-ones bias.
- 3 **Score the surface.** For each rock, record texture 0-4 and edge shape: rounded, mixed, or angular.
- 4 **Look for clues.** Note fresh-looking chips, cracks, visible grains, layering, pits, polish, scratches, or a location where rocks may have been moved by water, people, or gravity.
- 5 **Repeat at Site B.** Use the same number of rocks and the same scoring method.
- 6 **Choose two case specimens.** Identify the smoothest and roughest observations. Describe what makes them different without declaring a final cause yet.
- 7 **Compare sites.** Which site had more rounded edges? Which had higher texture scores? Were the rocks themselves obviously different types?
- 8 **Interpret carefully.** Build a short explanation using evidence words: "We noticed..." "This could mean..." "Another possibility is..."
- 9 **Close the run.** Save one photo or sketch and one new question. Leave the site as you found it.

FIELD NOTES BINDER - MINIMUM DATA SET

Specimen	Site	Texture 0-4	Edges	Evidence note
1				
2				
3				
4				
5				
6				
7				
8				

Prediction: _____ New question: _____

QUALITY CONTROL (QC)

- Use the same texture scale at both sites.
- Observe rocks in place when possible; moving them can hide the original context.
- Compare a similar number of rocks from each site.
- Score before discussing the “right” answer so the observation is not bent toward the prediction.
- Use the same observer for repeat scoring when possible, or note when a different person scores.
- Photograph with a size reference only if safe and permitted.
- Treat decorative gravel, crushed stone, and landscaping rock as a separate category because human processing and transport can change shape and texture.

QC ACCEPTANCE NOTE

A field set does not need a dramatic difference to be valid. If Site A and Site B look similar, record that result. A non-difference may mean the sites share a source, the sample is small, the same landscaping material was used, or the selected locations simply do not differ in the way the hypothesis predicted.

QUALITY ASSURANCE + SAFETY

- **Context integrity:** do not claim a natural transport history for obvious landscaping aggregate.
- **Interpretation restraint:** smooth does not automatically mean older, farther traveled, or “more weathered.” Rock type and original fracture shape matter.
- **Child safety:** adults choose the route; toddlers touch only stable, non-mouth-size samples and stay clear of traffic, water edges, slopes, and sharp debris.
- **Leave No Trace:** observe in place where collection is restricted or unnecessary.
- **Data integrity:** do not erase odd observations because they ruin the pattern. Odd rocks are often where the investigation gets interesting.

PROCEDURAL DEVIATIONS

Deviation	Likely effect	Disposition
Rock was moved before context note	Site evidence partly lost	Keep surface score; mark context uncertain
Wet rock compared with dry rocks	Texture/color perception may shift	Let dry if safe; rescore or note condition
Decorative gravel mixed with natural rock	Source/transport confounded	Separate as human-moved subset
Different observers use scale differently	Scoring drift	Do a two-rock calibration, then continue
Toddler reorganized specimens	Sequence identity lost	If IDs uncertain, keep photo/sketch only; invalidate mislabeled comparisons

ROOT CAUSE ANALYSIS (RCA)

If the field evidence feels contradictory, check the boring possibilities before inventing a tiny geologic conspiracy.

- **Different source rocks:** mineral grain size and rock structure can make one surface naturally rougher than another.
- **Fresh break:** a recently fractured face may look sharp even if other surfaces on the same rock are rounded.
- **Human processing:** crushed stone, tumbling, landscaping, road base, or imported gravel can mimic or erase natural history.
- **Transport energy:** repeated collisions during movement can abrade edges, but not every setting moves sediment the same way.
- **Weathering differences:** exposure to water, ice, temperature change, chemistry, roots, and time can alter surfaces at different rates.
- **Sample size:** eight rocks are a family field investigation, not a regional geologic survey. Management has declined to fund a drilling campaign.

CORRECTIVE + PREVENTIVE ACTION (CAPA)

- If sites are too similar, choose a second comparison pair with clearer environmental differences.
- If human-moved material dominates, label it explicitly and compare it with a natural deposit instead of mixing the groups.
- If scoring drifts, place two reference rocks beside the observer and agree what “1” and “4” mean before continuing.
- If the conclusion starts sounding absolute, rewrite it as evidence + possibility: “The rounded edges could reflect abrasion during transport, but rock type and source shape also matter.”
- For a repeat run, increase the sample to 10 rocks per site and calculate a median texture score instead of relying on one favorite specimen.

VARIATIONS

- **Toddler:** two safe, large rocks only. Touch “smooth” and “rough,” point, swap hands, and make a texture rubbing with paper at home if the rocks are yours to use.
- **Early elementary:** sort photo cards or permitted samples into smooth / mixed / rough, then count each group.
- **Older learners:** record texture and roundness separately, compare medians by site, and note possible confounders.
- **Water comparison:** observe a legal, stable gravel area near moving water from a safe distance and compare with dry upland gravel. No wading required.
- **Geology extension:** identify whether grain size, layering, or crystals may explain roughness independent of transport.

BONUS ROUND

- Make a “surface evidence” photo pair: one smooth/rounded specimen and one rough/angular specimen, each with a one-sentence hypothesis.
- Look for one rock with both a rounded side and a fresh angular break. It is an excellent reminder that one specimen can record more than one event.
- Repeat after a season and compare the site itself rather than expecting one rock to visibly change.

FURTHER INVESTIGATION

- What clues tell us a rock may have moved?
- Can two rocks be equally smooth for completely different reasons?
- Why do some rocks break into flat sheets while others fracture into chunky pieces?
- How does moving water sort rocks by size?
- What changes first: a rock's edges, its surface texture, or both?

INTENTIONAL MEMORY PROMPT

No-face photo: one smooth/rounded rock and one rough/angular rock in the same frame, with the Field Notes page or a small handwritten SMOOTH? / ROUGH? card beside them. If collection is not permitted, photograph each in place and make a two-image collage later.

Suggested caption: "ROCK SURFACE EVIDENCE WALK • 2026 • Geology filed a texture report."

BENCH NOTES

- Rock texture is evidence, not a verdict.
- Source material matters before weathering or transport ever begin.
- Fresh fractures can create angular surfaces on otherwise rounded rocks.
- Abrasion during transport can round edges and smooth surfaces.
- Weathering breaks rock down in place; erosion moves weathered material.
- A smooth rock is not automatically older than a rough rock.
- One field walk gives clues. Repeating the comparison gives context.

REFERENCES • GO DOWN THE RABBIT HOLE

Primary Rabbit Hole: [National Park Service - Coastal Sediments: Sorting](#)

NPS explains that sediment shapes can reflect the source rock and abrasion experienced during transport. Verified 2026-09-11.

Supporting geology: [National Park Service - Weathering](#)

NPS overview of chemical and mechanical weathering. Verified 2026-09-11.

REVISION HISTORY

Version	Date	Change
1.0	2026-09-11	Initial Wonder 031 Full SOP + Quick SOP package.