



Rock Hardness & Soil Investigation

Week 27 — Wednesday | Hands-On Earth Material Experiments



Reading Time

Today you will act like a geologist by testing rock properties and investigating soil composition. One important property of rocks and minerals is **hardness** — how resistant they are to being scratched. Geologists use the **Mohs Hardness Scale**, which ranks minerals from 1 (softest, like talc) to 10 (hardest, like diamond). You can test hardness by trying to scratch a rock with everyday objects: a fingernail (hardness ~2.5), a copper penny (~3.5), a steel nail (~5.5), or a piece of glass (~5.5). If an object leaves a scratch, the rock is softer than that object.

Soil is made of different layers called **horizons**. The top layer is **topsoil**, which is dark and rich in organic matter where most plant roots grow. Below that is **subsoil**, which contains more clay and less organic matter. Deep below the subsoil is **bedrock**, solid rock that has not yet broken down. You can investigate soil by sieving it through different mesh sizes to separate particles, or by mixing soil with water in a jar and watching the layers settle. Heavier sand sinks fastest, silt settles in the middle, and clay floats longest. Organic matter may float on top.



Reading Questions

1. What is hardness and how do geologists measure it?

2. What are the three main soil layers called?

3. In a soil settlement jar, which particles sink to the bottom first?

4. Explain how you would test if a rock is harder or softer than a copper penny. What would the results tell you?



Vocabulary Grid

Write a definition or draw a picture for each word.



Hardness



Mohs Scale



Topsoil



Subsoil



Bedrock



Sieve

Rock Hardness Scratch Test

Materials: 3 different small rocks, a fingernail, a copper penny, a steel nail, a piece of glass, a magnifying glass.

Method: Try to scratch each rock with each tool. Look closely with the magnifying glass to see if a scratch line remains. Record your results.

Before you start: Which rock do you think will be the hardest? Why?

Hardness Test Results

Rock	Fingernail Scratch?	Penny Scratch?	Nail Scratch?	Glass Scratch?	Hardest/Softest?
Rock A					
Rock B					
Rock C					

Soil Sieve Investigation

Materials: Soil sample, 3 sieves/screens with different hole sizes (large, medium, small), shallow trays, magnifying glass.

Method: Pour soil through the largest sieve first, then the next, then the smallest. Collect what falls through each sieve. Observe and draw the different particle sizes.

Soil Particle Results

Sieve Size	What Passed Through?	Particle Size	Sketch
Large holes			
Medium holes			
Small holes			



Experiment Analysis

1. Which of your rocks was the hardest? What evidence did you find?

2. Which rock was the softest? Could you scratch it with your fingernail?

3. What was the most common particle size in your soil sample?

4. Compare your scratch test results to the Mohs Hardness Scale. If your rock was scratched by a nail but not a penny, where do you think it falls on the scale?



True or False — Circle Your Answer

- ☐ 1. Hardness measures how resistant a rock is to being scratched.
- ☐ 2. Diamond is the softest mineral on the Mohs scale.
- ☐ 3. Topsoil is rich in organic matter and dark in color.
- ☐ 4. Subsoil is the topmost layer of soil.
- ☐ 5. Bedrock is solid rock below the soil layers.
- ☐ 6. In a soil jar, sand settles at the bottom first.
- ☐ 7. A sieve is used to separate soil particles by size.
- ☐ 8. If a rock scratches glass, it is softer than glass.



Fill in the Blanks

Word Bank: hardness Mohs scale topsoil subsoil bedrock sieve sand clay

- 1. Resistance to scratching is called _____.
- 2. The scale used to rank mineral hardness is the _____.
- 3. The dark, nutrient-rich top layer of soil is _____.
- 4. The soil layer below topsoil with more clay is _____.
- 5. Solid rock beneath all soil layers is called _____.
- 6. A tool with holes used to separate particles is a _____.
- 7. Large, heavy soil particles that settle quickly are _____.
- 8. Tiny soil particles that take a long time to settle are _____.



Think About It

If you were building a house foundation, which soil type would you prefer: sandy soil, clay soil, or loamy soil? Explain why your choice would be best for supporting heavy buildings.