Mystery Material Lab

Use property evidence to identify unknown materials.

5-PS1-3 "Make observations and measurements to identify materials based on their properties. Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle every test result or observation that helps identify a material. Write M beside clues about Powder M and R beside clues about Metal R.

Clues in a Science Station

1. Scientists can identify an unknown material by comparing several properties, not by guessing from one clue. A property is something you can observe or test, such as color, shine, hardness, magnetism, electrical conductivity, thermal conductivity, or solubility. Use safe tools and record results carefully. Do not use density for this kind of identification. One test can narrow choices, but several tests make an identification stronger.

2. At a school science station, students compared unknown Powder M with reference samples of table salt and baking soda. They placed equal small scoops into separate cups of water and stirred each for one minute. Powder M and baking soda made clear mixtures with no grains left. Salt dissolved too, so this test alone could not identify M. In a second test, they added vinegar. Powder M bubbled. Baking soda bubbled, while salt did not.

3. The group then tested an unknown metal strip, Metal R. It was reddish brown and shiny after it was rubbed with a cloth. A magnet did not pull it. In a simple circuit, the strip completed the path and lit a small bulb. These results matched a copper reference strip. An iron nail also lit the bulb, but it was pulled by the magnet and looked gray.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why could the water test alone not identify Powder M?

2. What material was Powder M? Give two pieces of evidence from the tests.

3. Which property clearly separated Metal R from the iron nail? Describe the results.

4. What two observations support identifying Metal R as copper instead of iron?

3 YOUR TURN

Your own words

An unknown solid could be an iron nail, aluminum foil, or a plastic ruler. In 3 or 4 sentences, describe two safe tests, state the result you would record for each material, and explain how the results could identify the unknown. Do not use density. Then carry out a teacher-prepared identification station: labeled table salt, clean sand, and one coded sample of either. For each, measure 1 g with a balance and 20 mL of room-temperature water with a graduated cup. Keep water temperature, cups and stirring alike. Observe the solid, stir for up to 60 seconds, and time when no grains remain visible. Record each measured mass, water volume, appearance and time in seconds, or "grains still visible at 60 s." Compare the unknown with both references and identify it using your actual evidence; repeat if uncertain. Use separate paper for the record. Do not taste samples; wash hands afterward.

ANSWER KEY # Mystery Material Lab

PART 1 · READ AND MARK

Circle every test result or observation that helps identify a material. Write M beside clues about Powder M and R beside clues about Metal R. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why could the water test alone not identify Powder M?	**Powder M, baking soda, and salt all dissolved in water.**
2	What material was Powder M? Give two pieces of evidence from the tests.	**Baking soda. It dissolved in water and bubbled when vinegar was added, matching the baking soda reference.**
3	Which property clearly separated Metal R from the iron nail? Describe the results.	**Response to magnetic forces. Metal R was not pulled by a magnet, while the iron nail was pulled.**
4	What two observations support identifying Metal R as copper instead of iron?	**Metal R was reddish brown and was not pulled by a magnet. The iron nail looked gray and was pulled by the magnet.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would test each item with a magnet and then place it in a simple circuit with a battery and bulb. Iron would be pulled by the magnet and light the bulb, aluminum would not be pulled but would light the bulb, and plastic would neither be pulled nor light the bulb. I would match the unknown's two results to this pattern to identify it. Completed station acceptance: the learner must supply actual measured masses, volumes and timed observations for both references and the coded sample. An unknown that loses visible grains like the salt reference, while sand remains visible, supports identifying table salt among these two choices. Actual times depend on the setup and must not be invented.

Accept answers that use evidence from the passage and correctly compare more than one property. For Part 3, accept other safe, accurate property tests and result patterns that can distinguish all three materials without using density. The original 3–4 sentences remain a planning task. The added station requires real observations and measurements, not another proposed test. Teacher provides the three samples, balance, graduated cup and timer. Judge the identification against actual reference results; accept uncertainty with a justified repeat. Disappearance of visible grains supports dissolving here but does not mean matter vanished. Keep sample quantities and conditions matched; time is an operational observation, not a unique universal material constant.