Matter Detectives

Compare materials with evidence from simple physical tests.

SC.8.P.8.4 "Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline every characteristic physical property named in the passage. Circle each sentence that says a property stays the same when the sample amount changes.

Testing Two Solids

1. At the materials lab, students compared two silvery solids, Sample A and Sample B. Each sample had a mass of 20 grams and a volume of 5 cubic centimeters. Dividing mass by volume gave a density of 4 grams per cubic centimeter for both samples. Density helps identify a substance because it compares how much mass is packed into a given volume. A sample's size alone does not tell its density. A large piece can have the same density as a small piece of the same pure substance.

2. To test electrical conductivity, the class placed each solid in a simple circuit. Sample A completed the circuit, so the bulb lit. Sample B did not make the bulb light. When a magnet was brought near them, Sample A was attracted, while Sample B was not. These tests gave students two properties for comparing the solids. Conductivity describes how well electricity moves through a material. Magnetic behavior describes whether a material is attracted to a magnet.

3. Another test used water at the same temperature. After stirring for five minutes, 2 grams of Sample A dissolved in 100 milliliters of water, but Sample B remained as solid grains. The class also heated tiny portions of the solids. Sample A began melting at 1,535 degrees Celsius, whereas Sample B began melting at 660 degrees Celsius. Solubility and melting point can separate substances that look alike. For a pure substance under the same conditions, these characteristic properties do not change when the tested sample amount changes.

2 ANSWER WITH EVIDENCE

Use the passage

1. Using the mass and volume in the passage, what density did both samples have? Show the calculation.

2. Which sample conducted electricity? What observation supports your answer?

3. Give two physical properties, other than electrical conductivity, that distinguish Sample A from Sample B. Include the result for each property.

4. A 40 gram piece of the same pure substance as Sample A is tested under the same conditions. How would its density compare with Sample A's density? Explain.

3 YOUR TURN

Your own words

Choose two solid materials other than Samples A and B that differ in at least one physical property. Fill in the table with two testable characteristic properties and their results, then state whether using more of the same pure material would change either property.

MATERIAL	PROPERTY 1 AND RESULT	PROPERTY 2 AND RESULT	WOULD A LARGER PURE SAMPLE CHANGE THESE PROPERTIES?

ANSWER KEY # Matter Detectives

GRADE 8 · SC.8.P.8.4

PART 1 · READ AND MARK

Underline every characteristic physical property named in the passage. Circle each sentence that says a property stays the same when the sample amount changes. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Using the mass and volume in the passage, what density did both samples have? Show the calculation.	**20 g ÷ 5 cm³ = 4 g/cm³ for both samples.**
2	Which sample conducted electricity? What observation supports your answer?	**Sample A conducted electricity because it completed the circuit and made the bulb light.**
3	Give two physical properties, other than electrical conductivity, that distinguish Sample A from Sample B. Include the result for each property.	**Answers may include any two: Sample A was attracted to a magnet while B was not; A dissolved in water while B remained solid; A melted at 1,535°C while B melted at 660°C.**
4	A 40 gram piece of the same pure substance as Sample A is tested under the same conditions. How would its density compare with Sample A's density? Explain.	**It would have the same density, 4 g/cm³, because density does not change when the amount of a pure substance changes.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

MATERIAL	PROPERTY 1 AND RESULT	PROPERTY 2 AND RESULT	WOULD A LARGER PURE SAMPLE CHANGE THESE PROPERTIES?
Copper	Electrical conductivity: completes a circuit	Melting point: 1,085°C	No, not under the same conditions.
Sulfur	Electrical conductivity: does not complete a circuit	Melting point: about 115°C	No, not under the same conditions.

Accept any accurate, testable characteristic physical properties and results. The student should show at least one meaningful comparison between the two materials and state that amount does not change characteristic properties of the same pure substance under the same conditions.