Matter Properties Practice: Cook, Play, and Test

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Lesson:

Read the passages and examples below to learn about comparing and contrasting matter by looking at properties you can measure, test, or observe. Use each property clue to tell materials apart.

> Matter can be described by its physical properties. A physical property is a feature you can observe, measure, or test without changing what the material is. Some properties are mass, magnetism, volume, physical state, solubility in water, relative density, and whether a material conducts or insulates thermal energy or electric energy.

Measure it, test it, or observe it

MEASURE it	TEST it	OBSERVE it
volume, in mL	solubility in water	solid, liquid, or gas
mass, in grams	thermal conductivity	color and texture
	electrical conductivity	floats or sinks

Every property below can be compared. The group tells you HOW you find it out.

> Mass tells how much matter an object has. Volume tells how much space it takes up. A solid keeps its own shape, a liquid flows and takes the shape of its container, and a gas spreads out to fill the space available.

Solubility in water tells whether a material dissolves in water. Relative density tells whether something sinks or floats in water. Materials can also be tested for conductivity. A metal spoon in soup conducts thermal energy well, while a plastic spatula handle insulates thermal energy better. Some materials also conduct electric energy, while others insulate it.

Five properties and how to test them

	How you test it	Example
volume	measure the space it fills, in mL	a bottle holds 500 mL
solubility in water	stir it in and watch	sugar dissolves; sand does not
thermal conductivity	feel how fast heat moves through	metal spoon gets hot fast
electrical conductivity	see if electricity passes through	copper yes, rubber no
relative density	see if it floats or sinks	foam floats; a rock sinks

Use this table to name the property a question is really asking about.

When you compare two materials, look for both sameness and differences. For example, two playground materials may both be solids, but one may have more volume, one may sink in water, and one may insulate thermal energy better. Comparing properties helps scientists choose the best material for cooking, sports drinks, and playground materials.

Read the table, then decide

	Volume	Mass	Dissolves in water?
Drink C	150 mL	155 g	no
Drink D	300 mL	310 g	no
Drink mix powder	not measured	25 g	yes

Compare one column at a time. A material can be greater in one property and not another.

A metal spoon is a solid and conducts thermal energy well.

A plastic spatula handle is a solid and insulates thermal energy.

Powdered sports drink mix dissolves and seems to vanish into water, but tiny pebbles from the playground just sit at the bottom of the bottle.

A cork may float in water, while a stone sinks.

A plastic bottle can hold a certain volume of sports drink.

Aluminum foil may conduct electric energy better than rubber.

Instructions:

Read each question carefully. Use the clues about matter properties, then choose the best answer. Some questions show a worked example or a set of facts to help you think. Pick one answer for each question.

1. A plastic bottle holds 500 mL of sports drink. Which property is being measured?

- ◯ A) volume
- ◯ B) mass
- ◯ C) solubility in water
- ◯ D) magnetism

2. A student writes: 'Sugar dissolves in water, so sand dissolves in water too.' What is wrong with the statement?

- ◯ A) Sand dissolves in water.
- ◯ B) Sugar does not dissolve in water.
- ◯ C) Both sugar and sand dissolve in water.
- ◯ D) Sugar dissolves in water, but sand does not.

3. A coach is comparing materials for a sports drink cooler. Which choice is most likely to float in water because it is less dense than water?

- ◯ A) metal spoon
- ◯ B) glass cup
- ◯ C) foam lid
- ◯ D) sand-filled pouch

4. A student tests two solids for a sports drink recipe. Material A has a volume of 200 mL, dissolves in water, and is brittle. Material B has a volume of 200 mL, does not dissolve in water, and is brittle. Which material would be better to mix evenly into the sports drink, and why?

- ◯ A) Both materials, because they have the same volume and are both brittle.
- ◯ B) Material B, because it does not dissolve and stays unchanged in water.
- ◯ C) Neither material, because solids cannot be tested in water.
- ◯ D) Material A, because it dissolves in water and would mix evenly.

5. Which material would let heat move into a cold sports drink more slowly?

- ◯ A) Metal, because it lets heat move in fast.
- ◯ B) Plastic, because it slows heat moving in.
- ◯ C) Glass, because it always changes into a liquid.
- ◯ D) Paper, because it makes more thermal energy.

6. A playground designer needs a material that does not let electric energy pass through easily. Which choice fits best?

- ◯ A) steel nail
- ◯ B) rubber
- ◯ C) copper wire
- ◯ D) aluminum foil

7. A coach compares two sports drinks for a practice team. Drink A has a volume of 180 mL and a mass of 190 g. Drink B has a volume of 240 mL and a mass of 250 g. Which statement is correct based on the measurable properties?

- ◯ A) Drink A has the greater volume, but Drink B has the greater mass.
- ◯ B) Drink B has the greater volume and the greater mass.
- ◯ C) The drinks cannot be compared because volume and mass are different properties.
- ◯ D) Drink A and Drink B have the same volume and the same mass.

8. A student says, 'The plastic spoon is a good conductor because it is in hot soup.' What is the best correction?

- ◯ A) Plastic is a good conductor because it is in soup.
- ◯ B) Plastic insulates thermal energy better than metal.
- ◯ C) Plastic conducts electric energy better than metal.
- ◯ D) Plastic is a solid and always floats.

9. Which choice best explains why two playground materials can both be solids but still be different?

- ◯ A) They must have the same volume and same solubility.
- ◯ B) They can differ in volume, relative density, or conductivity.
- ◯ C) Solids cannot sink or float in water.
- ◯ D) Only liquids can be compared by properties.

10. A sports drink bottle is made from a material that is a solid, does not dissolve in water, and can insulate electric energy. Which material best matches those clues?

- ◯ A) plastic
- ◯ B) sugar
- ◯ C) water
- ◯ D) salt

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(Answer Key)

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1. A plastic bottle holds 500 mL of sports drink. Which property is being measured?
Hint: Think about how much space the drink container holds.

Answer: A) volume

Explanation: Volume tells how much space something takes up or can hold.

2. A student writes: 'Sugar dissolves in water, so sand dissolves in water too.' What is wrong with the statement?
Hint: Compare sugar and sand using the lesson facts.

Answer: D) Sugar dissolves in water, but sand does not.

Explanation: Sugar dissolves in water, but sand does not. The statement gives the wrong result for sand.

3. A coach is comparing materials for a sports drink cooler. Which choice is most likely to float in water because it is less dense than water?
Hint: Compare the materials by density, not by how useful they are.

Answer: C) foam lid

Explanation: A foam lid would float because foam is less dense than water, while the metal, glass, and sand-filled choices would sink.

4. A student tests two solids for a sports drink recipe. Material A has a volume of 200 mL, dissolves in water, and is brittle. Material B has a volume of 200 mL, does not dissolve in water, and is brittle. Which material would be better to mix evenly into the sports drink, and why?
Hint: Compare the materials by their solubility, not just their volume.

Answer: D) Material A, because it dissolves in water and would mix evenly.

Explanation: Material A is better because it dissolves in water, so it can mix evenly into the sports drink. Material B does not dissolve, so it would not mix as well.

5. Which material would let heat move into a cold sports drink more slowly?
Hint: Think about thermal energy.

Answer: B) Plastic, because it slows heat moving in.

Explanation: Plastic is a poorer conductor than metal, so heat moves through it more slowly and the drink stays cold longer.

6. A playground designer needs a material that does not let electric energy pass through easily. Which choice fits best?
Hint: Think about conduct or insulate.

Answer: B) rubber

Explanation: Rubber insulates electric energy, so it is a good choice when electricity should not pass through easily.

7. A coach compares two sports drinks for a practice team. Drink A has a volume of 180 mL and a mass of 190 g. Drink B has a volume of 240 mL and a mass of 250 g. Which statement is correct based on the measurable properties?
Hint: Compare both the volume and the mass.

Answer: B) Drink B has the greater volume and the greater mass.

Explanation: Drink B has the greater volume because 240 mL is more than 180 mL, and it also has the greater mass because 250 g is more than 190 g.

8. A student says, 'The plastic spoon is a good conductor because it is in hot soup.' What is the best correction?
Hint: Think about the spoon material, not the soup.

Answer: B) Plastic insulates thermal energy better than metal.

Explanation: Plastic is an insulator, so it does not conduct thermal energy as well as metal.

9. Which choice best explains why two playground materials can both be solids but still be different?
Hint: Compare more than one property.

Answer: B) They can differ in volume, relative density, or conductivity.

Explanation: Two solids can still differ in volume, relative density, or conductivity.

10. A sports drink bottle is made from a material that is a solid, does not dissolve in water, and can insulate electric energy. Which material best matches those clues?
Hint: Think about a bottle or container.

Answer: A) plastic

Explanation: Plastic fits because it is a solid, it does not dissolve in water, and it insulates electric energy.