

Matter detectives

Name: _____ Date: _____

Look at the named material. Circle its state.

Solid

Keeps its own shape.

Liquid

Flows and takes the shape of its container.

Gas

Spreads out to fill the available space.

Material	Circle one
1. A rock	Solid / Liquid / Gas
2. Juice in a cup	Solid / Liquid / Gas
3. Air inside a balloon	Solid / Liquid / Gas
4. An ice cube	Solid / Liquid / Gas
5. Water droplets in fog	Solid / Liquid / Gas
6. Water vapor (invisible water gas)	Solid / Liquid / Gas
7. A pencil	Solid / Liquid / Gas
8. Rain drops	Solid / Liquid / Gas
9. Air inside a soap bubble	Solid / Liquid / Gas

Be precise: The air inside a balloon is different from the balloon. The water droplets in fog are different from the air around them.

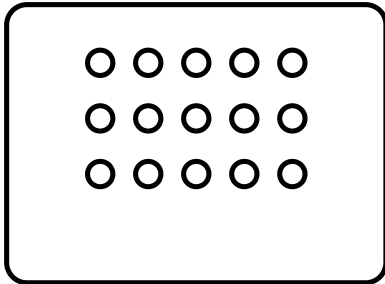
Explain one answer

I chose material number _____. My clue was:

Tiny particles, big clues

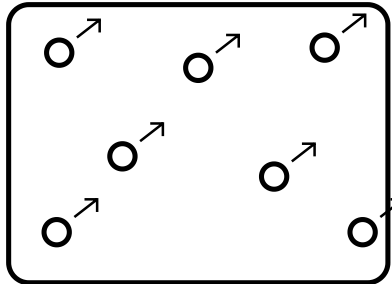
Name: _____ Date: _____

These pictures are models of particles, too small to see with our eyes. Write **solid**, **liquid**, or **gas** under each.

A

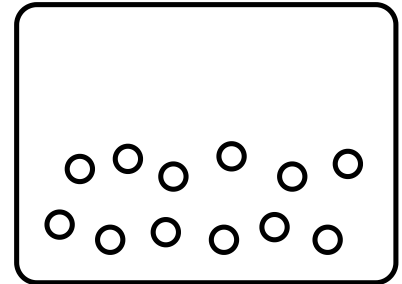
Particles stay in place and wiggle.

State: _____

B

Particles are far apart and move around.

State: _____

C

Particles are close and slide past each other.

State: _____

Draw your own model

Choose one state. Draw dots for its particles. Add arrows or words to explain how they move.



I drew a _____. The particles:



Model reminder: particles do not have hands. The dots and arrows help us think about spacing and movement; they are not photographs.

Water can change

Name: _____ Date: _____

Use the word bank to name each change.

Word bank: melting • freezing • evaporation • condensation • boiling

1. An ice cube becomes liquid water.

Change: _____

2. Liquid water becomes ice in a freezer.

Change: _____

3. A puddle dries without boiling.

Change: _____

4. Water vapor becomes drops on a cold cup.

Change: _____

5. Water boils and becomes water vapor.

Change: _____

True or false?

1. Water vapor is invisible. True / False

2. The water droplets in fog are gas. True / False

3. Evaporation only happens when water boils. True / False

Water vapor is invisible gas. Visible white mist is tiny liquid water droplets. A puddle can evaporate without boiling.

Observe an ice cube

Name: _____ Date: _____

With an adult, see what happens to ice at room temperature.

You need: one ice cube, a clear cup or small bowl, a tray, a pencil, and a clock.

Keep it safe: use ice and room-temperature water only. No stove, kettle, hot water, tasting, or drinking. Wipe spills; wash hands after the activity.

1. Put the ice cube in the cup on the tray. Look without tasting.
2. Draw what you see now. Describe the shape.
3. Wait about 10 minutes. Look again. If the ice has not changed much, wait longer.
4. Draw what you see next. Tilt the cup gently over the tray: does any water flow?

At the start



Later



1. What changed? What stayed the same?

2. What clue shows the state of the ice? What clue shows the state of any water?

3. Which water change did you observe?

Answers • sorting & particles

For adults. Learner pages are 1-4. Accept spoken answers, pointing, or a scribe.

Page 1 • Matter detectives

Material	Answer and clue
1. A rock	Solid - keeps its own shape
2. Juice in a cup	Liquid - flows / takes the container's shape
3. Air inside a balloon	Gas - spreads out in available space
4. An ice cube	Solid - keeps its own shape
5. Water droplets in fog	Liquid - tiny liquid drops suspended in air
6. Water vapor (invisible water gas)	Gas - spreads out in available space
7. A pencil	Solid - keeps its own shape
8. Rain drops	Liquid - flows / takes the container's shape
9. Air inside a soap bubble	Gas - spreads out in available space

Explain one answer (example): "Number 4 is solid because the ice cube keeps its own shape." Other sound property explanations are welcome.

Page 2 • Tiny particles

A = Solid • B = Gas • C = Liquid

Own drawing: accept a labelled solid with close, orderly dots and wiggles; a liquid with close, irregular dots and movement past neighbors; or a gas with widely spaced dots and movement arrows. Labels or oral explanations may replace arrows.

A gas fills its container. A liquid has a surface and takes the container's shape while keeping nearly the same volume. Solids can bend or be soft and still be solids.

Answers • changes & observation

Page 3 • Water can change

Prompt	Answer
1. An ice cube becomes liquid water.	Melting: solid to liquid.
2. Liquid water becomes ice in a freezer.	Freezing: liquid to solid.
3. A puddle dries without boiling.	Evaporation: liquid to gas.
4. Water vapor becomes drops on a cold cup.	Condensation: gas to liquid.
5. Water boils and becomes water vapor.	Boiling: liquid to gas.

True / false answers

1. True

Water vapor is invisible.

2. False: the droplets are liquid.

The water droplets in fog are gas.

3. False: evaporation also happens below boiling.

Evaporation only happens when water boils.

Page 4 • Observation examples

1. The ice became smaller; liquid water appeared. The material was still water. If little change happened, accept that observation and allow more time.

2. Ice keeps its own shape: solid. Meltwater flows when the cup tilts and takes the cup's shape: liquid. A child might observe both states together.

3. Melting, when solid ice becomes liquid water. If the ice has not melted yet, record “no change seen yet” and observe later.

Do not require a fixed outcome after 10 minutes. Ice size and room temperature change the time. Do not tell learners that the ice became gas or “disappeared”; look for the meltwater.

Three important distinctions

Fog: its tiny water droplets are liquid, carried by gas (air).

Water vapor: invisible gas; visible white mist is liquid droplets.

Sun: predominantly plasma, with electrically charged particles. It is not an answer in this three-state sort.

Adult guide

A short, accurate exploration for kindergarten through grade 2.

Plan a 20-30 minute session

Read the state clues aloud. Use page 1 to sort named materials, page 2 to discuss the particle model, and page 3 to name changes. Start the ice observation before sorting and revisit it after about 10 minutes. Learners can continue observing later.

Support younger learners

For kindergarten, use three familiar examples first: rock, water, air inside a balloon. Let learners point, circle, or dictate. For grades 1-2, ask “What property supports your answer?” Accept reasonable observations instead of requiring exact phrasing. Skip particle drawing until the property sort is comfortable.

Teach the material, not the container

A balloon’s rubber is solid; its air is gas. Fog is a mixture: liquid water droplets suspended in air. Ask specifically about the droplets. Water vapor is invisible gas. The white mist above warm water is droplets produced when vapor cools and condenses; do not use hot water with children.

Water temperatures need context

For pure water at standard atmospheric pressure, melting/freezing occurs at 0 °C (32 °F), and boiling at 100 °C (212 °F). Pressure and dissolved substances can change these points. Two states may coexist during a change. Evaporation is liquid becoming gas at the surface and occurs below boiling; boiling occurs throughout the liquid.

An extension: plasma

The Sun is predominantly plasma: a state containing electrically charged particles. Solid, liquid, and gas are useful starting categories, but they are not all the states of matter. Do not force the Sun into one of the three sorting answers. Never look directly at the Sun.

Source notes

NASA describes the Sun as plasma. NWS explains fog as liquid droplets suspended near the ground, and distinguishes invisible water vapor from condensed cloud droplets. The packet’s particle diagrams are simplified models.

- NASA: Sun facts
<https://science.nasa.gov/sun/facts/>
- National Weather Service: Fog tutorial
https://www.weather.gov/lmk/fog_tutorial
- National Weather Service: Cloud development
https://www.weather.gov/source/zhu/ZHU_Training_Page/clouds/cloud_development/clouds.htm

Free for home and classroom use. Print pages 1-4 for learners; retain pages 5-7 for adults. Updated October 2026.