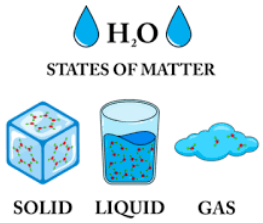
Changes in the State of Water and the Water Cycle

What is Water?

Water is a very special liquid that is essential for all living things. We drink it, we wash with it, and plants and animals need it to live. Water can be found in three different forms, which we call states.

- **Solid:** Hard, like an ice cube.
- **Liquid:** Runny, like the water you drink.
- **Gas:** Invisible, like the steam from a hot kettle.

The Three States of Water



Water can change from one state to another when we add heat (make it warmer) or take away heat (make it cooler).

Key Points and Important Terms

Solid (Ice):

- **What it is:** Water in its frozen, hard form.
- **Examples:** Ice cubes, snow, glaciers, hail.
- **How it happens:** When liquid water gets very cold (at 0° Celsius or 32° Fahrenheit), it freezes.

Liquid (Water):

- **What it is:** Water in its wet, runny form. This is the state we see most often.
- **Examples:** Drinking water, rain, rivers, lakes, oceans.
- **How it happens:** When ice (solid) is heated, it melts into liquid water.

Gas (Water Vapor):

- **What it is:** Water in its invisible gas form. It is all around us in the air.
- **Examples:** Steam from a boiling pot, the "mist" you see when you breathe on a cold day.
- **How it happens:** When liquid water is heated, it evaporates and turns into water vapor.

How Water Changes Its State: Detailed Examples

Melting (Solid → Liquid)

- **Definition:** The process of a solid changing into a liquid by adding heat.
- **Example:** You take an ice cube out of the freezer and place it on the kitchen counter.
- **Solution:** The warm air in the room adds heat to the ice cube. The ice cube slowly turns from a solid into a puddle of liquid water. This is melting.

Freezing (Liquid → Solid)

- **Definition:** The process of a liquid changing into a solid by taking away heat (cooling).
- **Example:** You fill an ice cube tray with water and put it in the freezer.
- **Solution:** The freezer is very cold and takes heat away from the water. The liquid water turns into solid ice cubes. This is freezing.

Evaporation (Liquid → Gas)

- **Definition:** The process of a liquid changing into a gas (water vapor) by adding heat.
- **Example:** After it rains, a puddle on the sidewalk slowly disappears on a sunny day.
- **Solution:** The sun's heat warms the puddle of water. The liquid water turns into invisible water vapor and rises into the air. This is evaporation.

Condensation (Gas → Liquid)

- **Definition:** The process of a gas (water vapor) changing into a liquid by taking away heat (cooling).
- **Example:** You have a cold glass of lemonade on a warm day, and the outside of the glass gets wet.
- **Solution:** The invisible water vapor in the warm air touches the cold glass. The glass cools the water vapor, causing it to turn back into tiny liquid water droplets on the outside of the glass. This is condensation. This is also how clouds are formed.

The Water Cycle: Water's Never-Ending Trip

The water cycle is the continuous journey that water takes from the Earth's surface, up to the sky, and back down again. The sun's energy powers this whole cycle.

There are four main stages:

- **Evaporation:** The sun heats up water in oceans, lakes, and rivers. The water turns into water vapor (a gas) and rises into the air.
- **Condensation:** High up in the sky, the air is colder. The water vapor cools down and changes back into tiny liquid water droplets. These droplets clump together to form clouds.
- **Precipitation:** When the clouds get too full and the water droplets become too heavy, they fall back to Earth. This is called precipitation. Precipitation can be rain (liquid), snow (solid), sleet (icy rain), or hail (balls of ice).
- **Collection:** The water that falls back to Earth is collected in rivers, lakes, and oceans. Some of it soaks into the ground. This collected water is ready to start the cycle all over again.

Practice Problems with Solutions

Problem 1: Matching Match the term on the left with its correct description on the right.

Term	Description
1. Evaporation	A. Water falling from the sky as rain or snow
2. Freezing	B. Liquid water turning into solid ice
3. Condensation	C. Water vapor cooling to form liquid drops
4. Precipitation	D. Liquid water heating up and turning to gas

Problem 2: What Happens Next? Read the sentence and explain what happens next and what the process is called.

Scenario: Mom is boiling water in a pot to make pasta. You see "smoke" rising from the pot.

Question: What is the "smoke" and what process is happening?

Summary of Main Concepts

Water exists in three states: solid (ice), liquid (water), and gas (water vapor). Adding or removing heat causes water to change its state.

- Melting: Solid to liquid.
- Freezing: Liquid to solid.
- Evaporation: Liquid to gas.
- Condensation: Gas to liquid.

The Water Cycle is the constant movement of water on Earth. The four main stages of the water cycle are Evaporation, Condensation, Precipitation, and Collection. The sun provides the energy that drives the water cycle.