

The Water Cycle

Lesson 29

The water cycle plays a vital role on Earth

- What can you not live without?
 - WATER!
- Water is one of the most important ingredients for life
 - We play in it
 - Travel on it
 - Grow food with it
 - We use it to survive!



Distribution of Water



Earth's total water supply: 100%

Earth's available fresh water: 1%

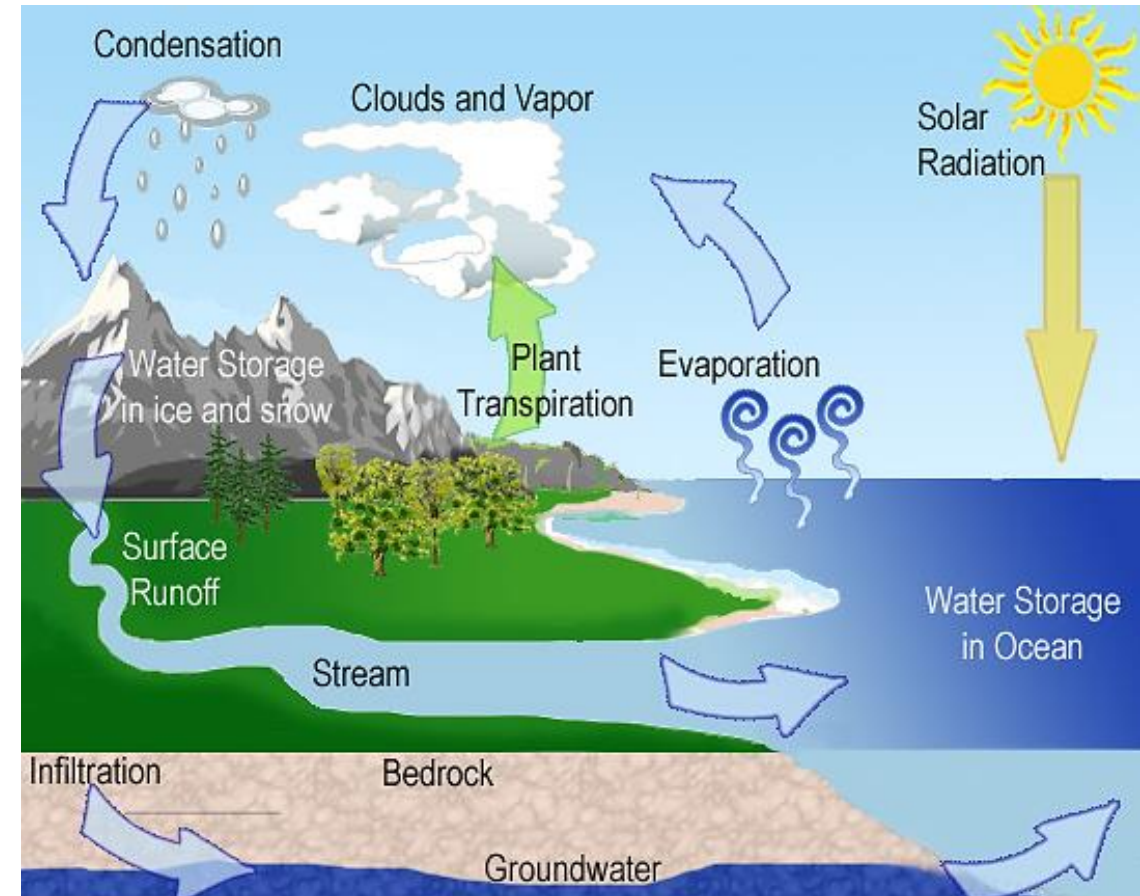


- About 70% of Earth's surface is covered in water
- Of all the water, about 97% is found in oceans
 - Most of the Earth's water is salt water – cannot be drunk by humans
- Only 3% of the planet's water is “fresh water” = not salty
 - Two thirds (about 2% of Earth's total water) is frozen in large areas of ice
 - Ice sheets in Greenland, close to the North Pole, Antarctica

That leaves about 1% of all Earth's water available as fresh water!

How available is fresh water?

- Most of Earth's supply of liquid fresh water is within the ground
 - By comparison, very little is sitting on the surface in streams, lakes, or other similar water bodies
- In many places around the world, fresh water is being used up faster than nature can recycle it for use
- One of the biggest problems society faces is keeping up with the demand for clean drinking water



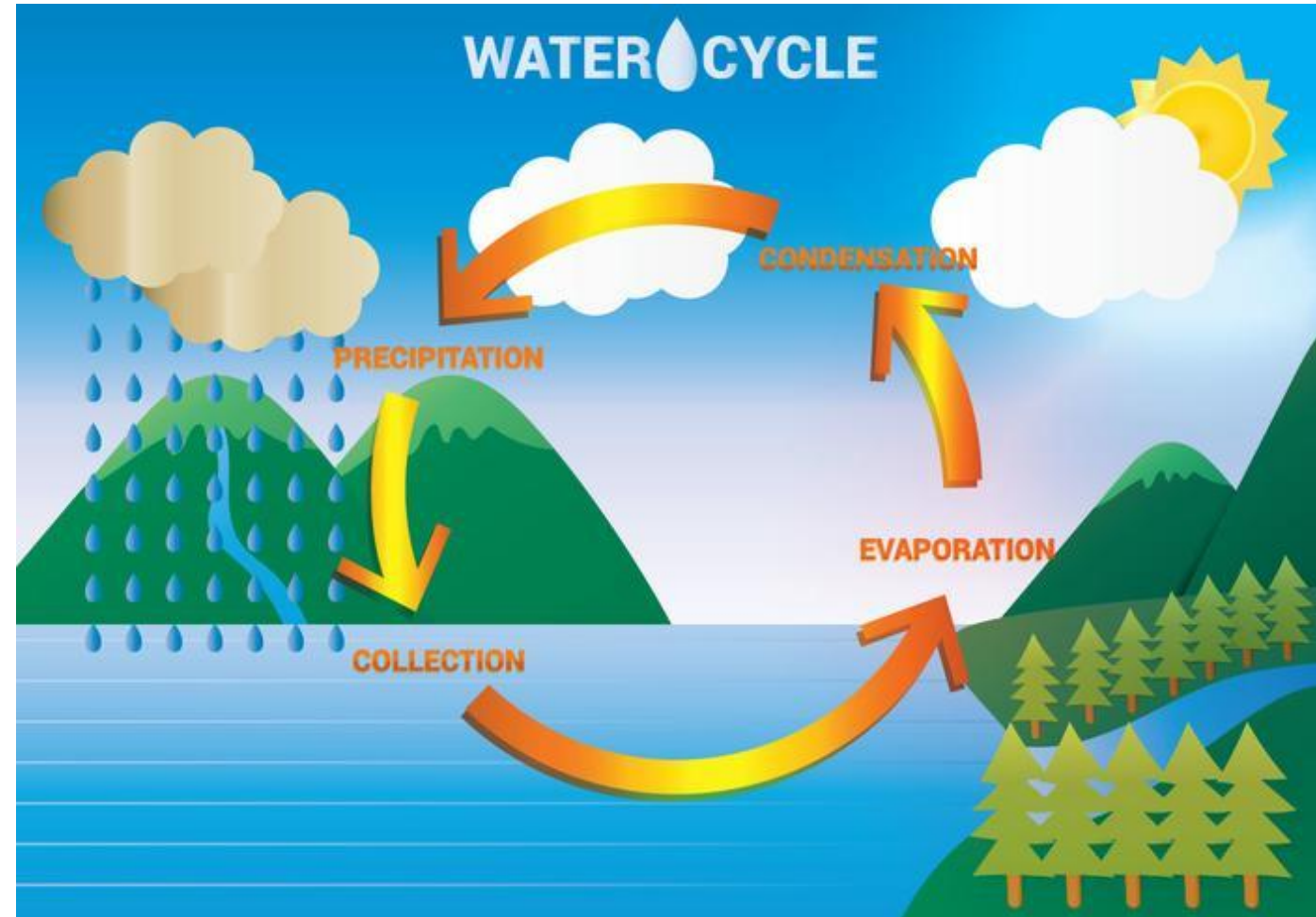
The Water Cycle

- Earth is the only planet that we know contains water in three states or phases
 - Solid (in the form of ice and snow and glaciers)
 - Liquid (in the form of oceans, lakes, and streams)
 - Gas (in the form of water vapour in the atmosphere)
- All of these forms of water are part of one large process called the **WATER CYCLE** aka the **hydrologic cycle**
- The total amount of water on a planet = the **hydrosphere**
 - Includes water that is on the surface of the planet, underground, and in the air
 - A planet's **hydrosphere** can be liquid, vapor, or ice



The Water Cycle

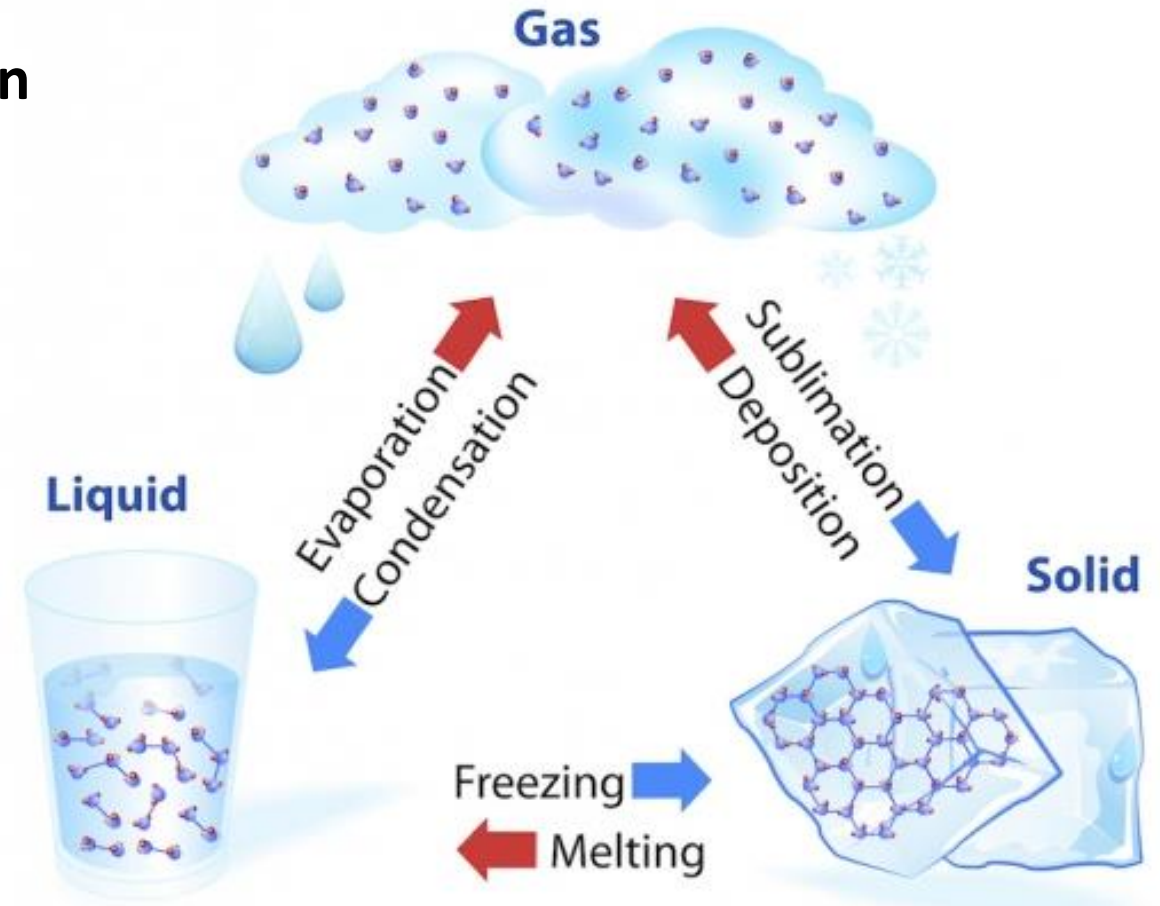
- A cycle is a series of events that repeat themselves over a period of time
- In the **water cycle** there is no beginning or end – water is constantly changing form
- The **water cycle** happens because heat energy is constantly being added or taken away from water in its various states
 - The driving force behind the water cycle is heat from the Sun



Changes of State of Water - Recap

Water changes states when heat is added to it or taken away from it:

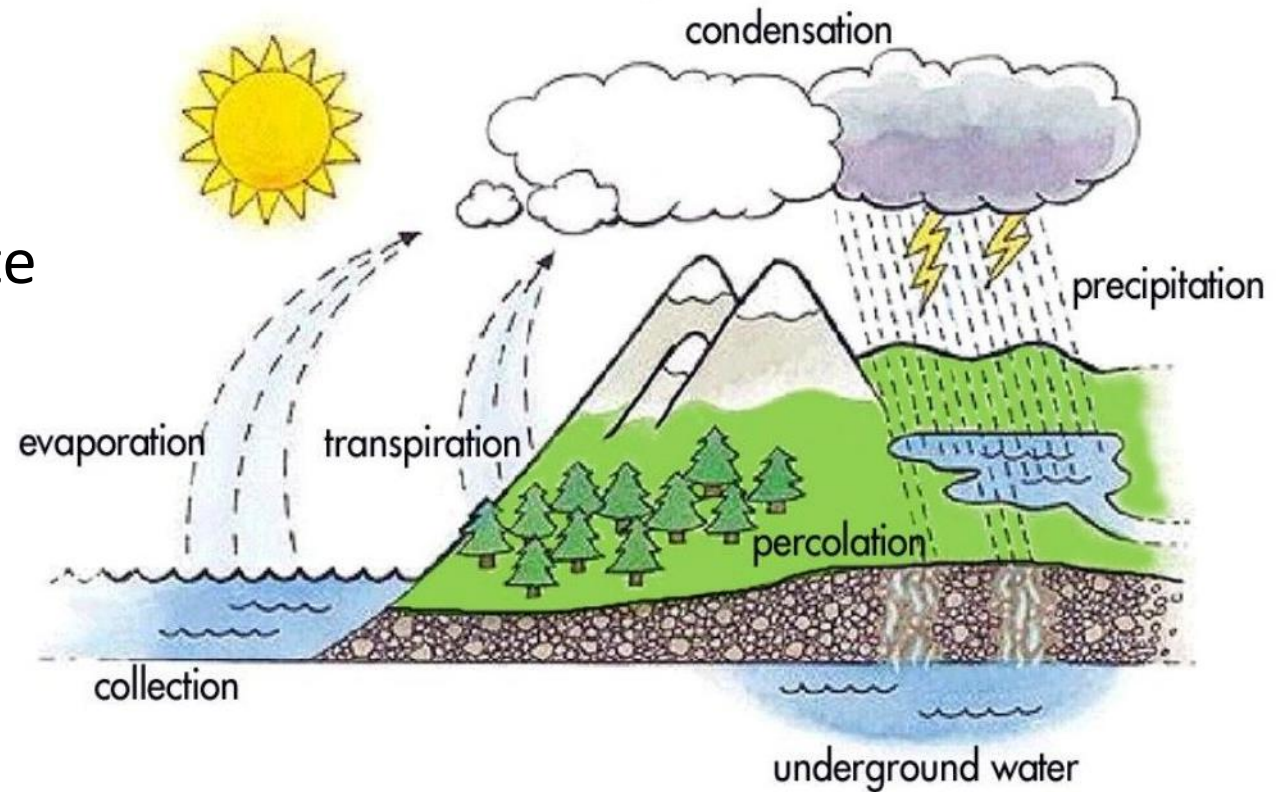
- Heat added to liquid water causes **evaporation** → water turns from a liquid to a gas (water vapour)
- Heat added to frozen water (i.e. ice cubes) causes **melting** → ice turns into a liquid
- Heat taken away from water vapour causes **condensation** → vapour turns into liquid water
- Heat taken away from liquid water causes **solidification** as water reaches its **freezing point** (0°C for fresh water) and turns into ice
- If water vapour turns right into a solid (skipping the liquid state) = **deposition**
- If ice turns right into water vapour (again skipping the liquid state) = **sublimation**



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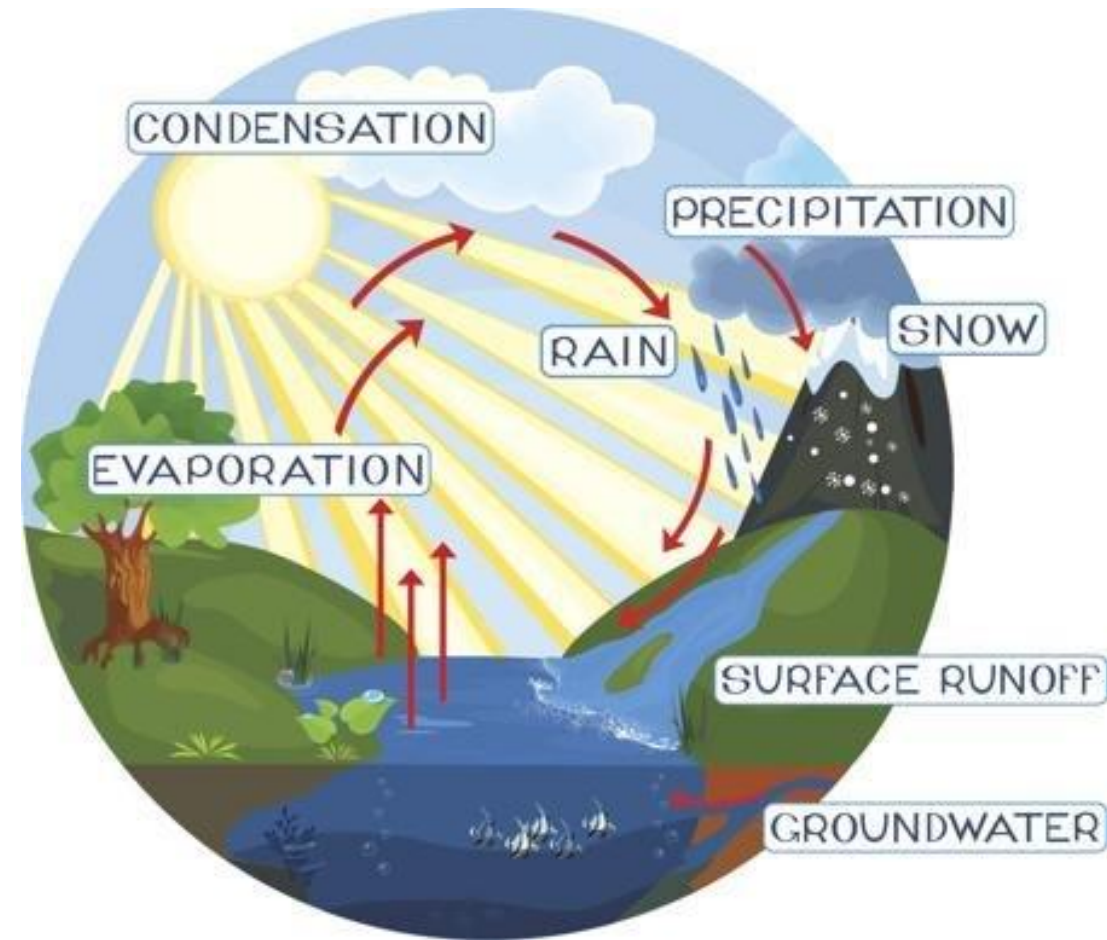
Ocean water makes up such a large percentage of Earth's water, therefore, it is a good starting point for following the water cycle:

- As ocean water is heated by the Sun, the surface water molecules evaporate
- This water vapour rises into the atmosphere and is moved around the globe by winds
- When the air is cooled, condensation begins to occur and water droplets form
- When enough small droplets come together, clouds are created



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- Depending on conditions such as air temperature, air pressure, and winds, the clouds may release their load of water as rain, snow, or another form of precipitation
- Some precipitation falls back to the ocean and some onto the land
- Much of the water that reaches land gradually flows into streams and rivers, eventually returning to the ocean
- Once back to the ocean, the process begins again



Summary

- There is no place on Earth where water cannot be found in some form or another
 - Whether it is frozen in spall spaces between tiny particles in rock or floating as invisible droplets in the air, water is everywhere on our planet
- 70% of Earth's surface is covered in water; 97% found in oceans; 3% is "fresh water"; 2% is frozen; 1% available as fresh water
- Water on Earth is distributed in different forms (solid, liquid, gas)
- When you see water in any form, it is in the process of moving from one part of the **hydrosphere** to another = the **water cycle**

WATER CYCLE

