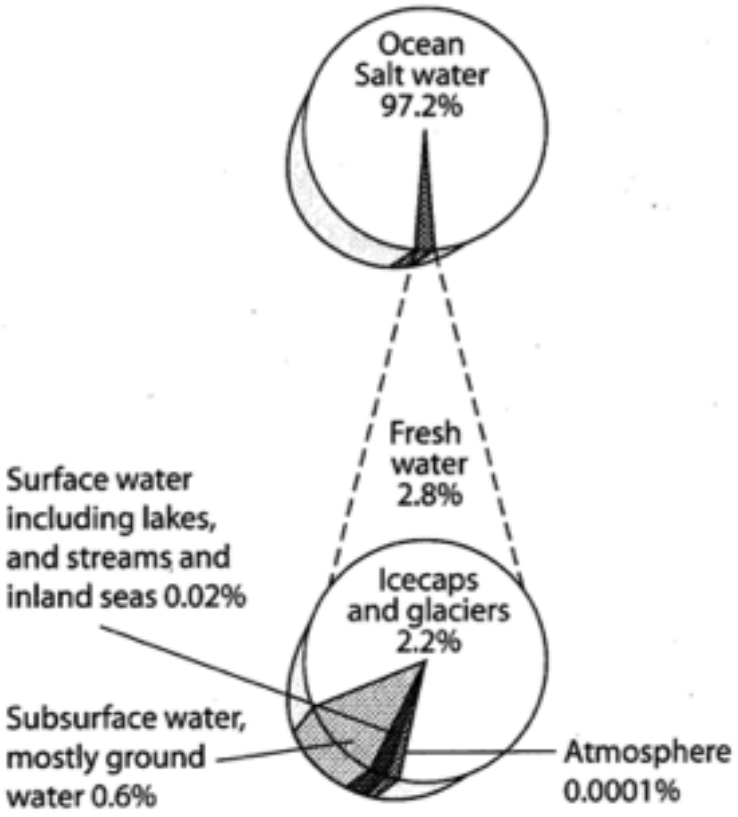
Guided Notes

Water Cycle & Groundwater

Phase Changes of Water
Water Cycle
Infiltration vs. Runoff
Groundwater Zones

1. How is Earth's water distributed?

- **Our Earth is made of 70% water.**
- **Most of Earth's water is in our oceans. Thus, it is too salty for most human uses.**
- **Most freshwater is frozen in glaciers.**
- **Humans can use surface water (lakes, streams, rivers) & groundwater for freshwater.**



2. **What are the names of water in each phase?**

- Solid water = **ice**

- Liquid water = **water**

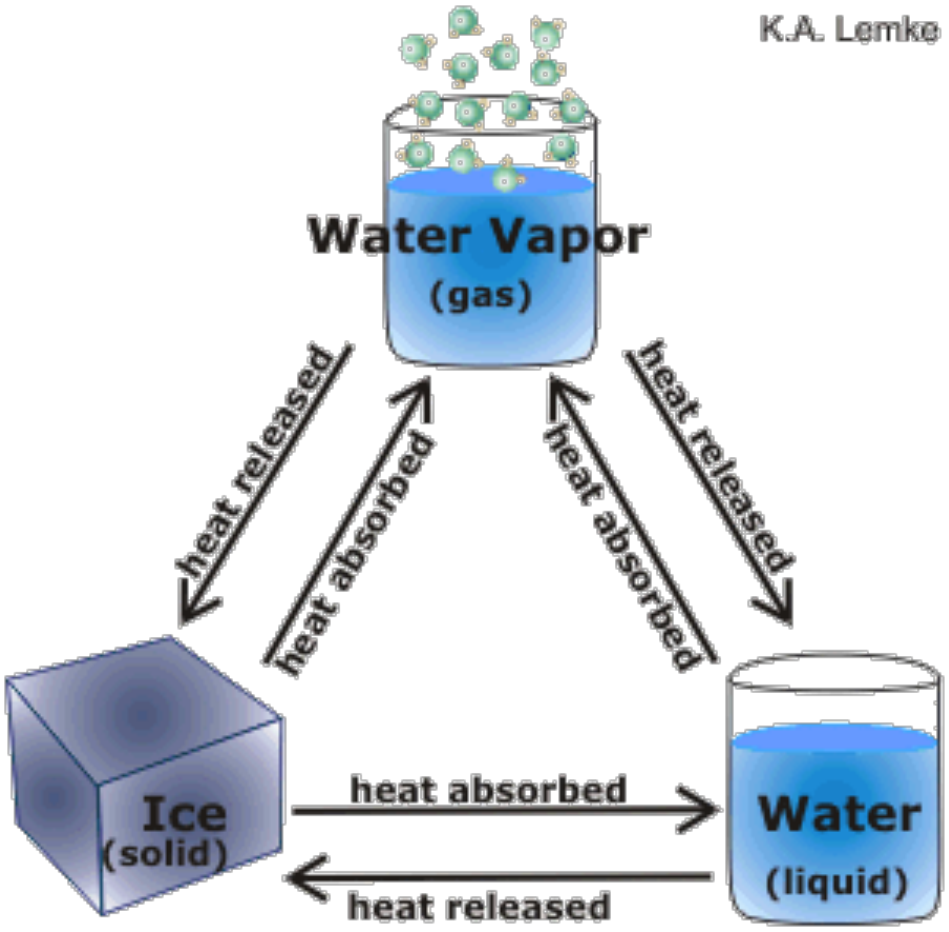
- Gaseous water = **water vapor**

3. **How can the state of matter be changed?**

- Heat energy absorbed **(adding heat):**
  - Melting: **Solid -> Liquid**
  - Evaporation: **Liquid -> Gas**

- Heat energy released **(taking away heat):**
  - Freezing: **Liquid -> Solid**
  - Condensation: **Gas -> Liquid**

3. **How can the state of matter be changed?**



4. How much energy is needed to change the state of matter of water? (ESRT page 1)

Properties of Water

Heat energy gained during melting	334 J/g
Heat energy released during freezing	334 J/g
Heat energy gained during vaporization	2260 J/g
Heat energy released during condensation	2260 J/g
Density at 3.98°C	1.0 g/mL

- Melting requires the **addition** of **334** Joules/gram.

4. How much energy is needed to change the state of matter of water? (ESRT page 1)

Properties of Water

Heat energy gained during melting	334 J/g
Heat energy released during freezing	334 J/g
Heat energy gained during vaporization	2260 J/g
Heat energy released during condensation	2260 J/g
Density at 3.98°C	1.0 g/mL

- Freezing requires the **release** of **334** Joules/gram.

4. How much energy is needed to change the state of matter of water? (ESRT page 1)

Properties of Water

Heat energy gained during melting	334 J/g
Heat energy released during freezing	334 J/g
Heat energy gained during vaporization	2260 J/g
Heat energy released during condensation	2260 J/g
Density at 3.98°C	1.0 g/mL

- Vaporization (evaporation) requires the **addition** of **2260** Joules/gram.

4. How much energy is needed to change the state of matter of water? (ESRT page 1)

Properties of Water

Heat energy gained during melting	334 J/g
Heat energy released during freezing	334 J/g
Heat energy gained during vaporization	2260 J/g
Heat energy released during condensation	2260 J/g
Density at 3.98°C	1.0 g/mL

- Condensation requires the **release** of **2260** Joules/gram.

✓ Review: Water & Energy

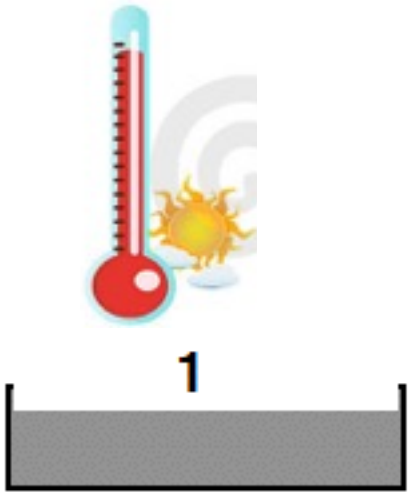
1) How much energy is required for 3 grams of ice to become water? Show your work.

2) How much energy is required for 10 grams of water to become vapor? Show your work.

5. What factors affect evaporation rates?

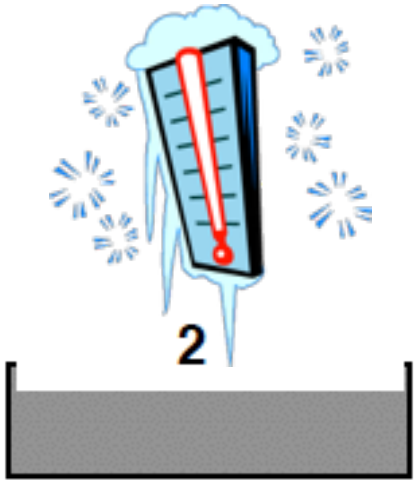
Factor	To Increase Evaporation	To Decrease Evaporation
Temperature	Warm temperatures	Cool temperatures

Warm



OR

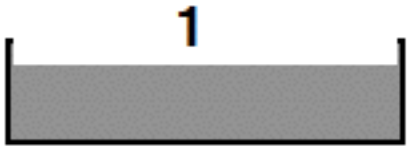
Cold



5. What factors affect evaporation rates?

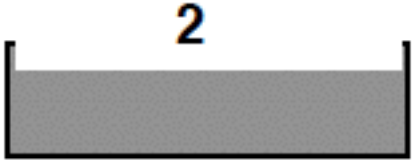
Factor	To Increase Evaporation	To Decrease Evaporation
Humidity	Low humidity	High humidity

Dry



OR

Humid



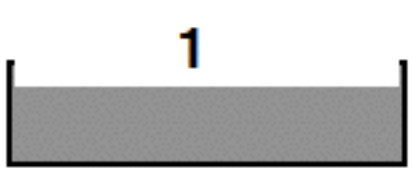
5. What factors affect evaporation rates?

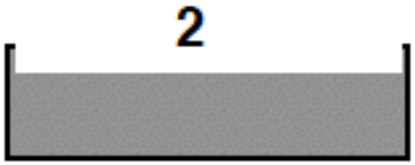
Factor	To Increase Evaporation	To Decrease Evaporation
Humidity	Low humidity	High humidity

Windy

OR

Not windy





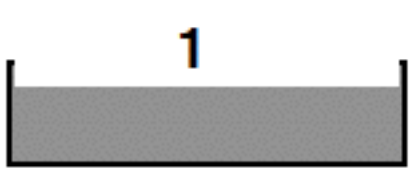
5. What factors affect evaporation rates?

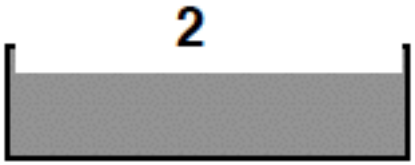
Factor	To Increase Evaporation	To Decrease Evaporation
Winds	High winds	Low winds

Windy

OR

Not windy

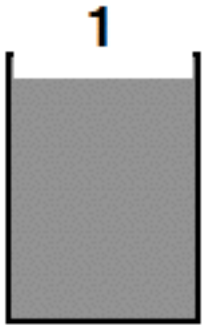




5. What factors affect evaporation rates?

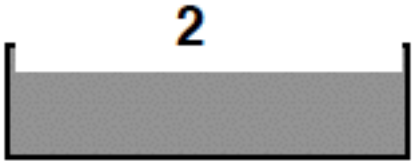
Factor	To Increase Evaporation	To Decrease Evaporation
Surface Area	Large surface area	Small surface area

Small surface area



OR

Large Surface Area



5. What factors affect evaporation rates?

Factor	To Increase Evaporation	To Decrease Evaporation
Covering	Uncovered	Covering (ex: frozen lake)

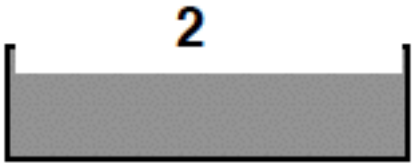
Cover

1

OR

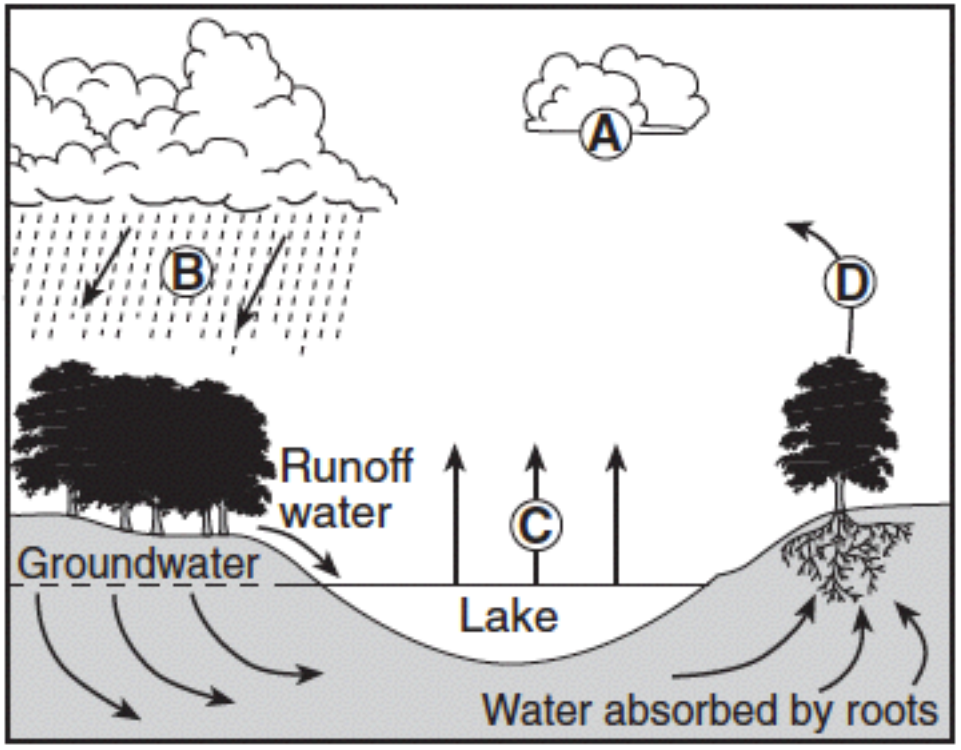
No cover

2

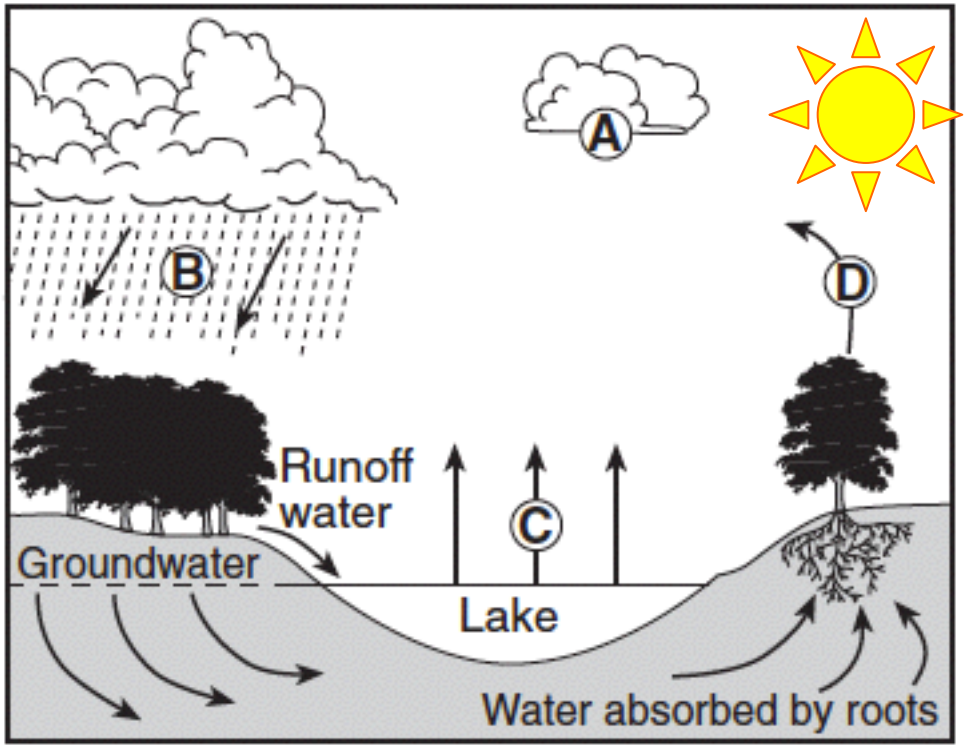


6. How is water naturally recycled?

- **<u>Water cycle</u>: illustrates the movement of phase changes of water at and near Earth's surface**

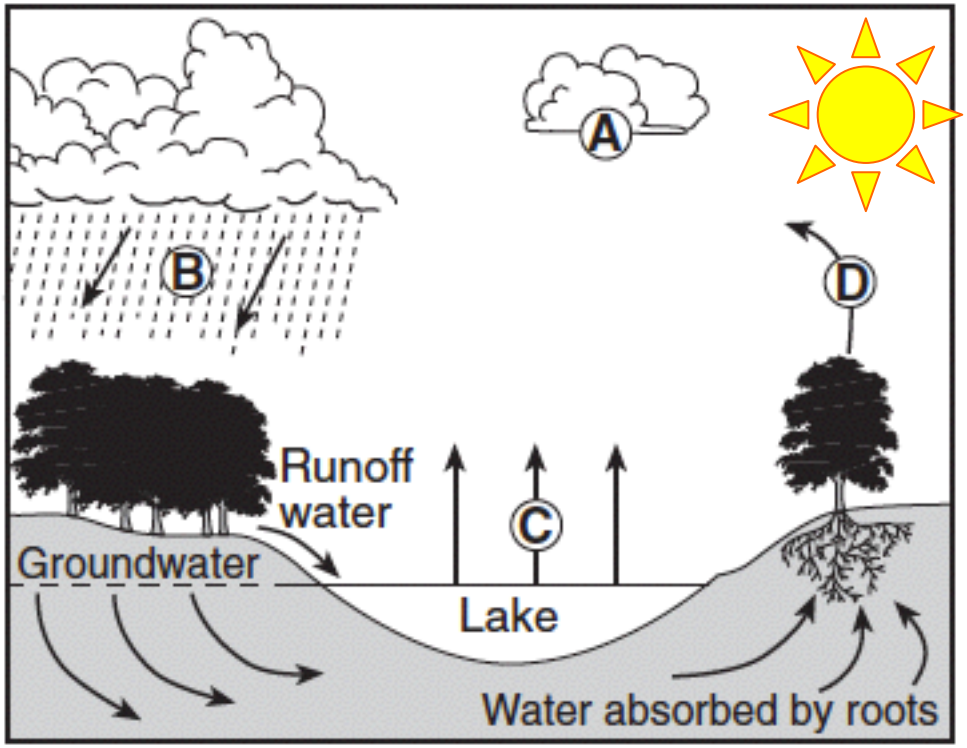


7. **What powers the water cycle?**



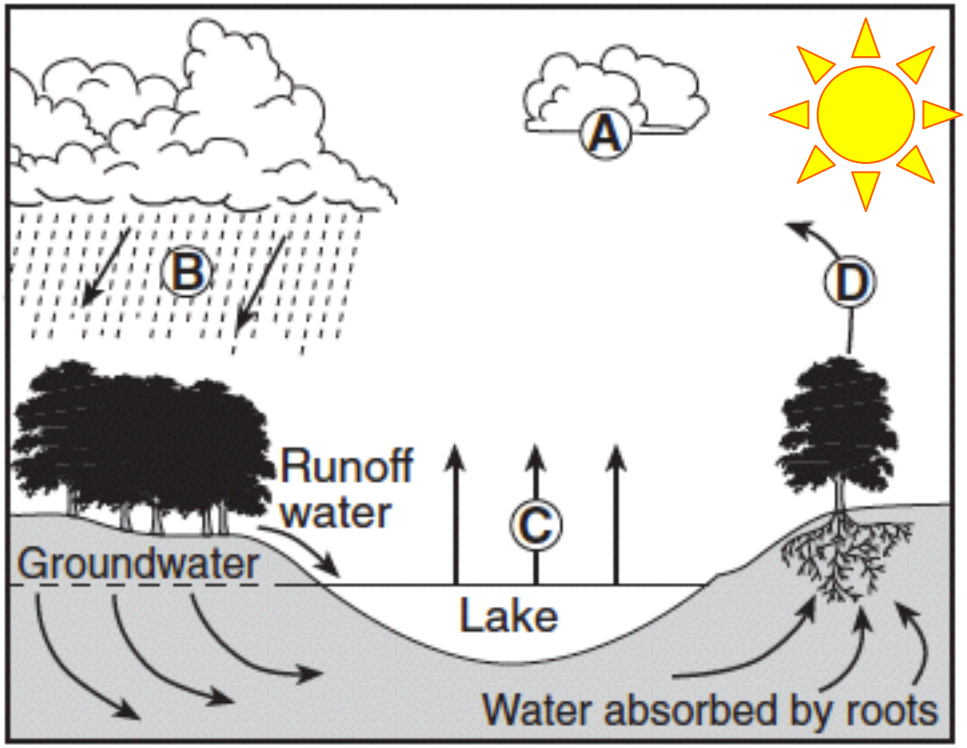
- **The Sun provides heat energy needed to power the water cycle**

7. **What powers the water cycle?**



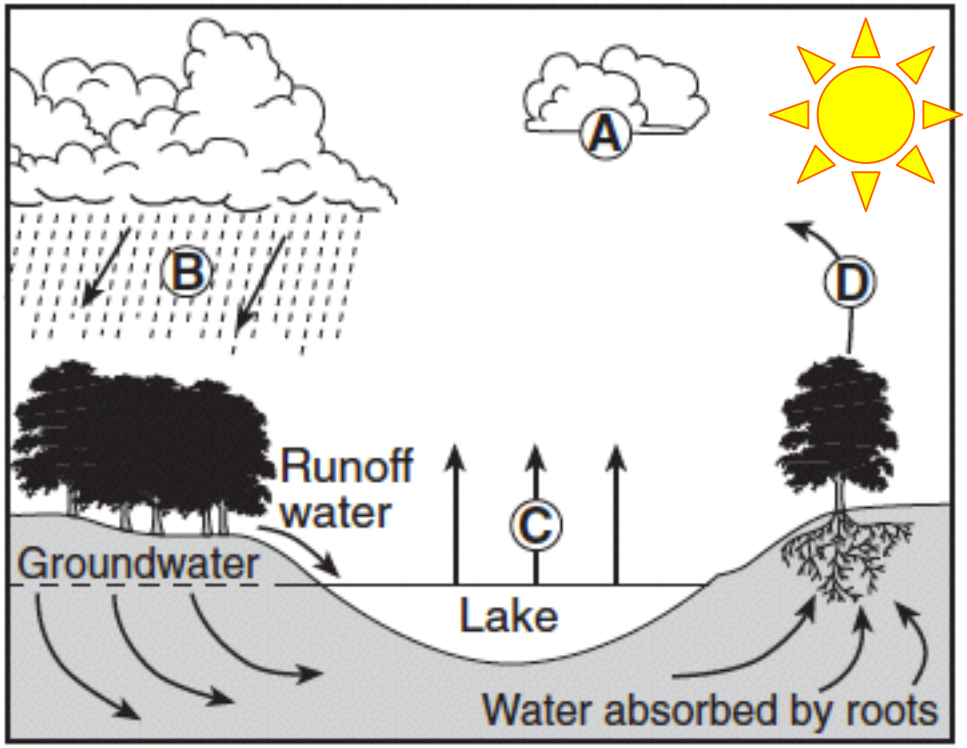
- **<u>Evaporation</u>: (C) liquid water becoming water vapor**

7. **What powers the water cycle?**



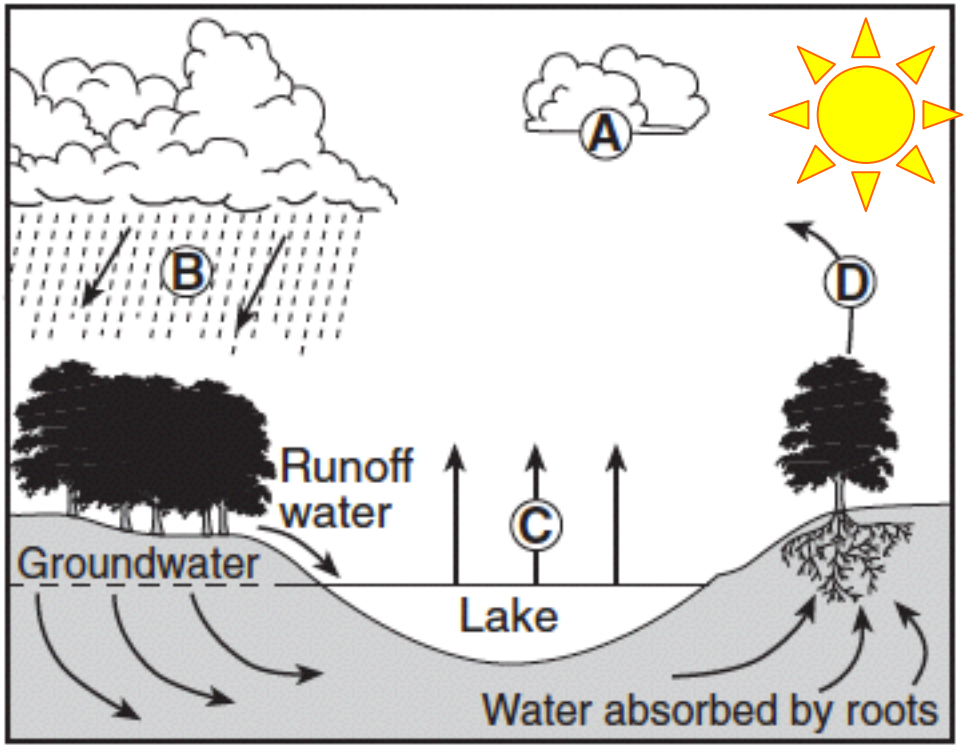
- **<u>Transpiration</u>: (D) release of water vapor into the atmosphere by plants**

7. **What powers the water cycle?**



- **<u>Condensation</u>: (A) water vapor becoming liquid water (forming clouds)**

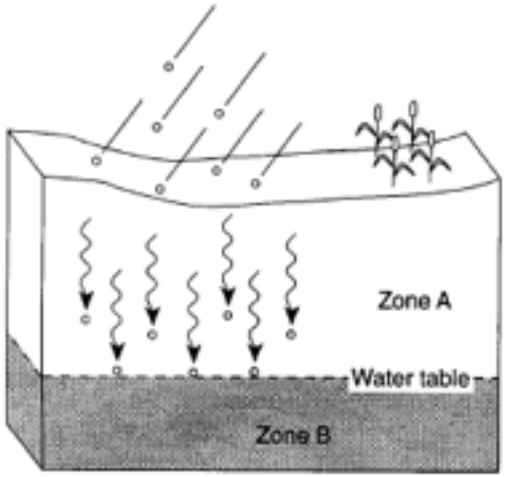
7. **What powers the water cycle?**



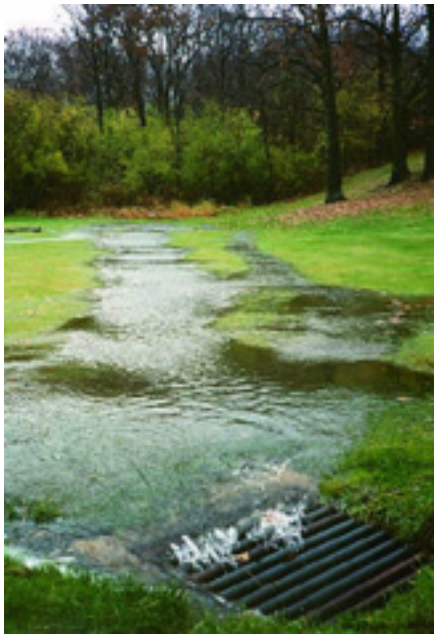
- **<u>Precipitation</u>: (B) water falling to the ground**

8. What happens after precipitation falls on land?

1) <u>Infiltration</u>: the downward movement of water through the soil



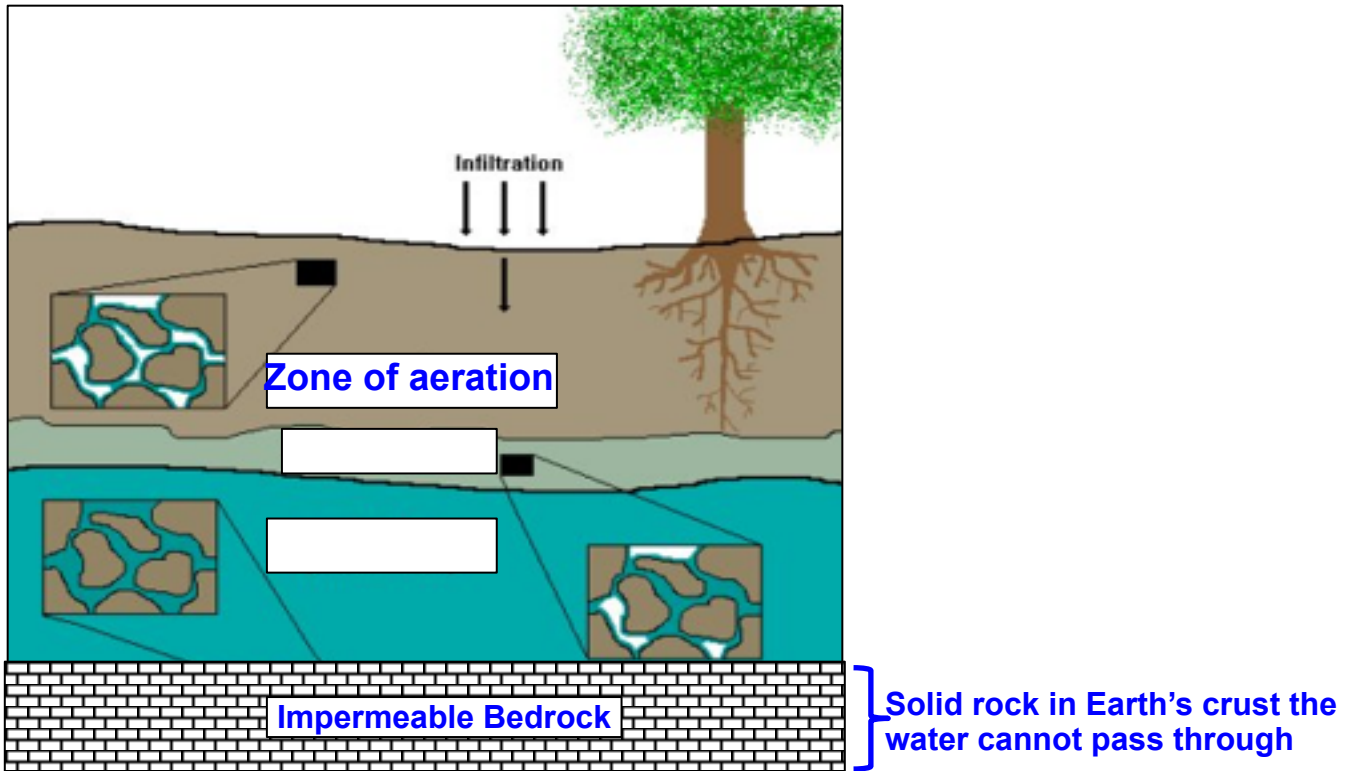
2) <u>Runoff</u>: excess water that cannot infiltrate the ground



9. **Where does the water go when it moves underground?**

- After infiltrating the soil, groundwater occupies distinct zones.

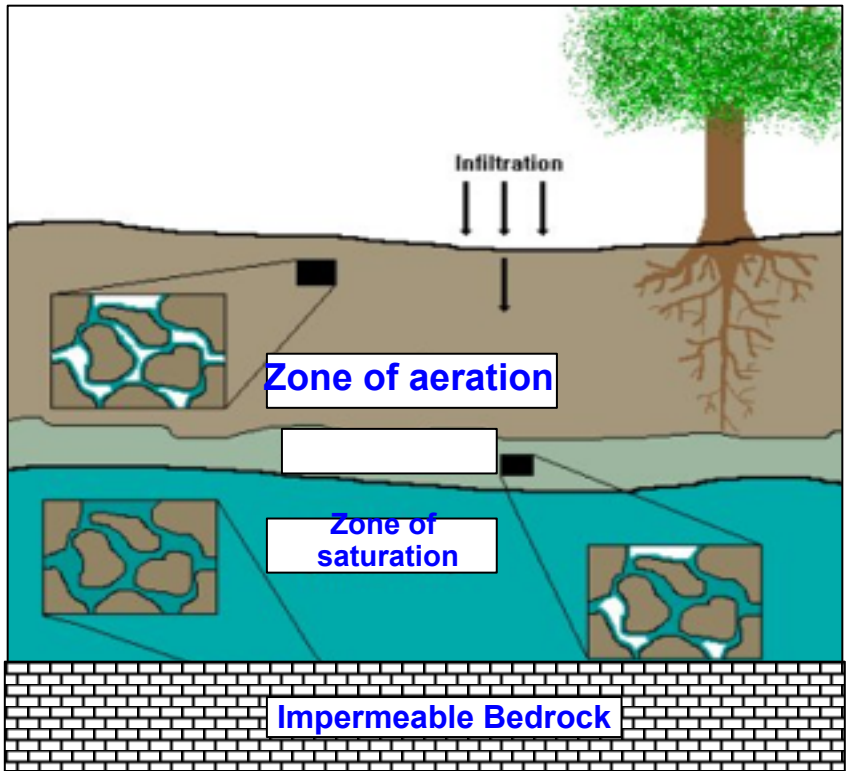
1) <u>Zone of aeration</u>: spaces between rocks filled with air



9. Where does the water go when it moves underground?

2) Zone of saturation: spaces between rocks filled with water

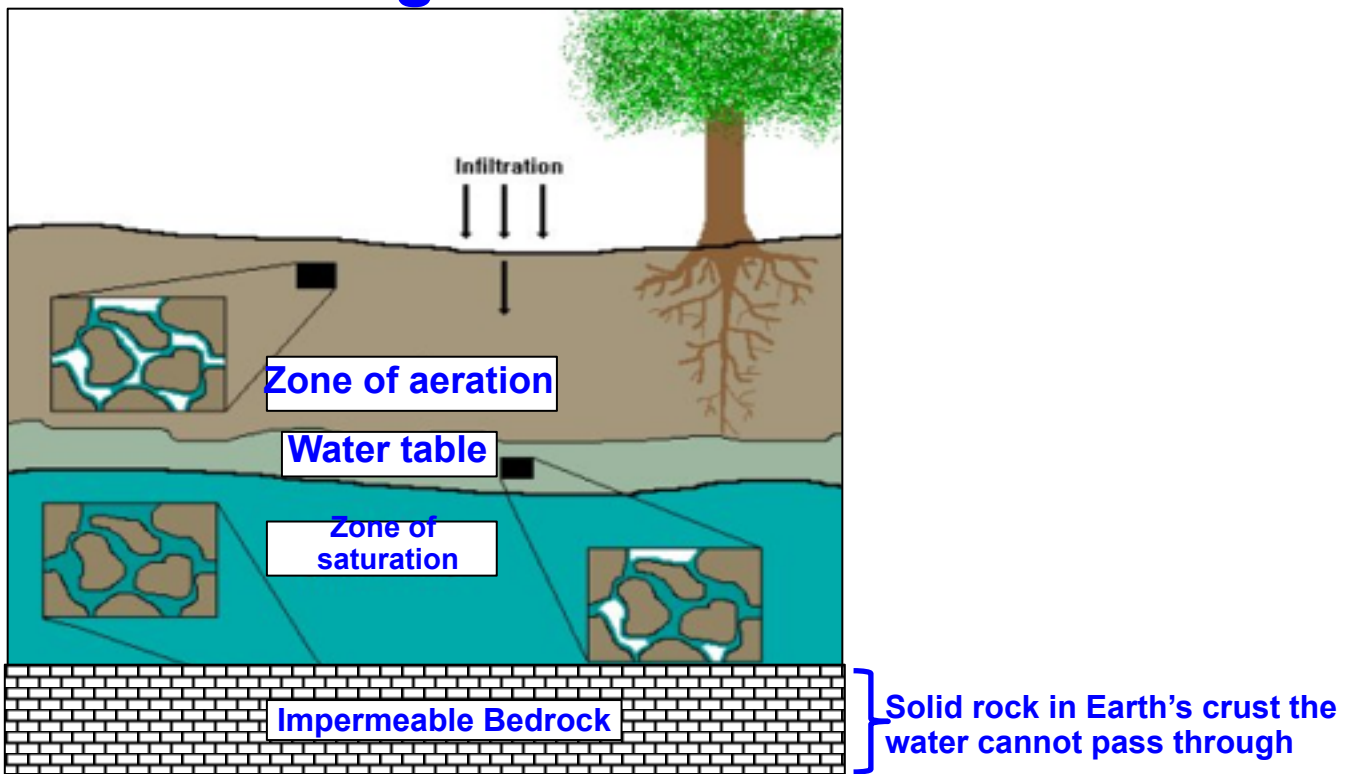
- **Saturated** = filled with water
- **Unsaturated** = not filled with water



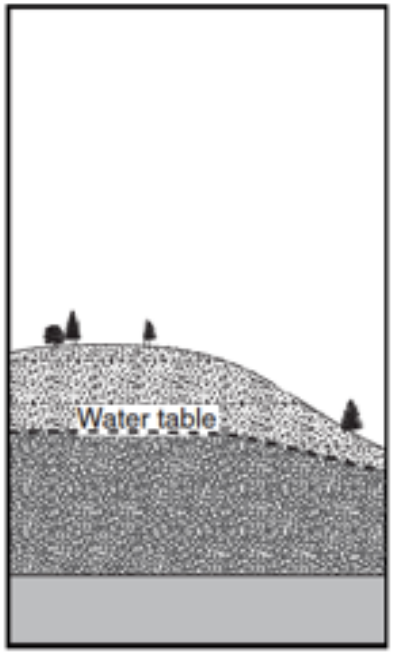
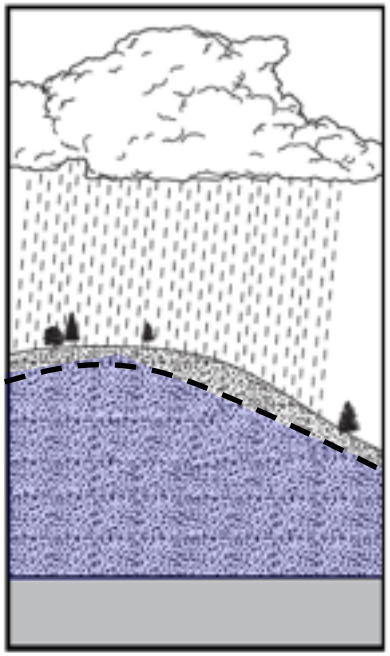
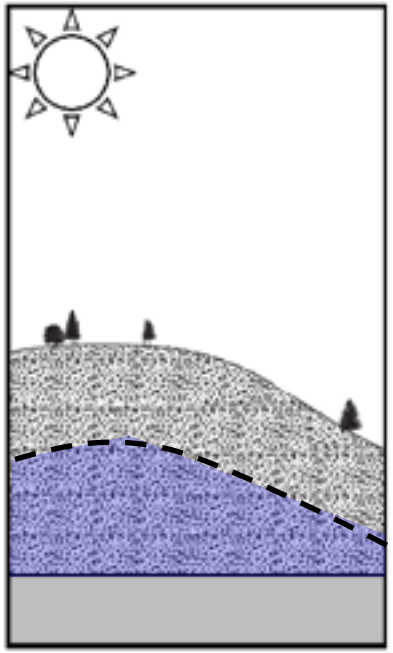
9. Where does the water go when it moves underground?

3) <u>Water table</u>: the boundary between the two zones.

- **The water table moves up and down depending upon the amount of ground water.**

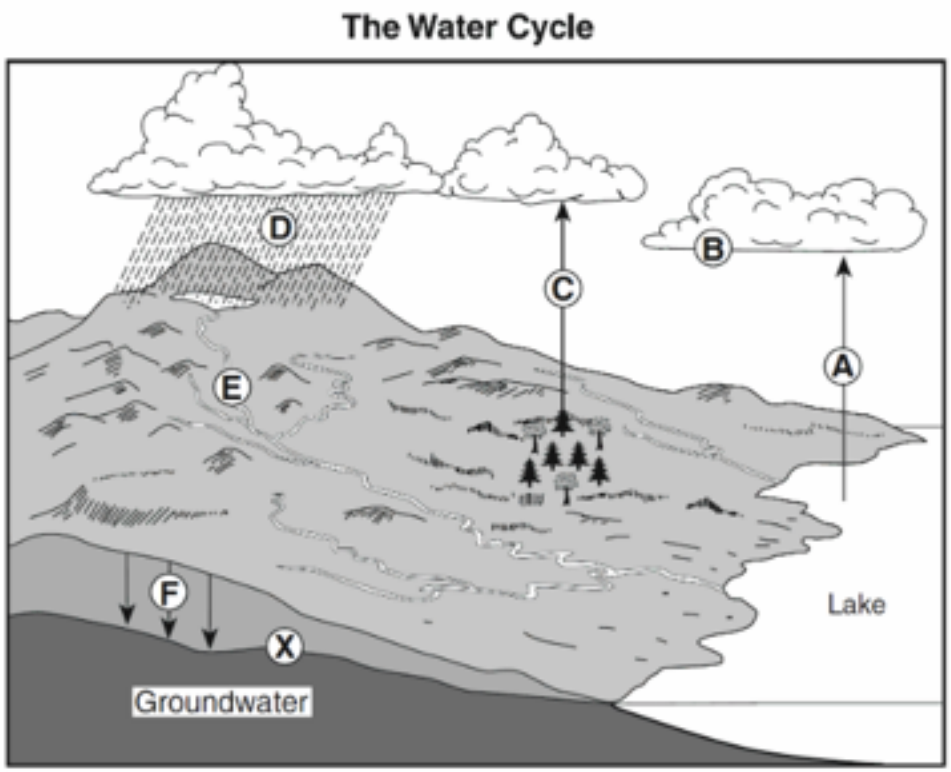


10. **How do conditions cause the water table to change?**

	Average Water Table Height	Prolonged Precipitation	Prolonged Dry Conditions
Diagram			
Height of Water Table	**Average height of water table**	**Increased height of water table**	**Decreased height of water table**
Distance from Water Table to Land Surface	**Average distance**	Fill in	Fill in

✓ Review: Water Cycle

1) Identify the processes A, B, C, D, E and F & the feature labeled X.



A	
B	
C	
D	
E	
F	
X	