

Standard S6E3

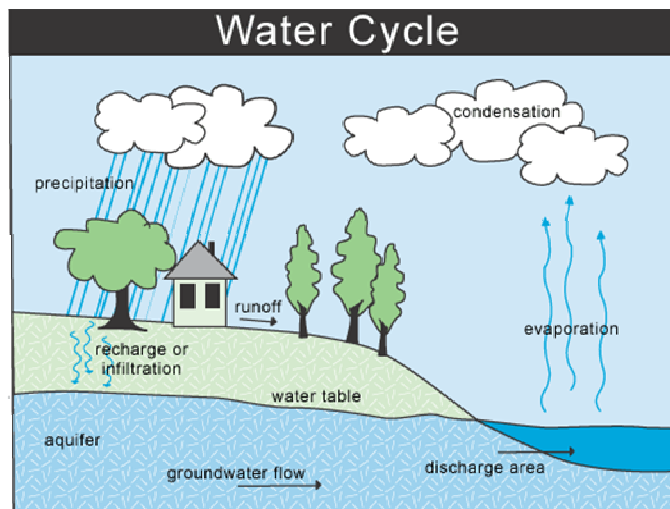
S6E3. Students will recognize the significant role of water in earth processes.

a. Explain that a large portion of Earth's surface is water, consisting of oceans rivers, lakes, underground water, and ice.

-Only a small part of water is available for human use! The majority of the Earth's water is contained in the oceans and seas, and only 3% of the Earth's water is fresh water (drinkable water). Most fresh water is frozen in glaciers and ice caps at the North and South Poles (2.0%). Earth's water is also found as groundwater (.62%), lakes (.09%), our atmosphere (.001%), and rivers (.0001%).

b. Relate various atmospheric conditions to stages of the water cycle.

- The water on the Earth's surface is called the hydrosphere. Water is constantly moving between the hydrosphere and the atmosphere through a process called the water cycle. The Sun heats up water from the hydrosphere, causing the liquid water to turn into a gas and enter the atmosphere through a process called **evaporation**. As the water vapor rises in the atmosphere, it cools off and changes back into a liquid. This process is called **condensation**. As the condensation collects high in the atmosphere, it forms objects called clouds. A **cloud** is a collection of water droplets. As the water droplets grow, they become **precipitation** and fall back to Earth as snow or rain depending on the temperature of the surrounding air. The precipitation is collected in the Earth's hydrosphere, which begins the water cycle again.



****ALL OF THIS IS POWERED BY THE SUN!!****

c. Describe the composition, location, and subsurface topography of the world's oceans.

-Composition: Because ocean water or sea water contains salt, it is not freshwater and therefore can not be used as drinking water. When scientists refer to the salinity of the ocean, they are referring to the amount of all dissolved solids in the water, including the trace elements and minerals that are not salts. Gases, such as oxygen and carbon dioxide are also dissolved in the ocean and can move back and forth between the water and the air.

-Location: Altogether the oceans cover approximately 70% of our planet. Earth is the only planet in the solar system that contains vast areas of water. Most people recognize six oceans: Pacific, Atlantic, Indian, Antarctic, Arctic, and the Southern.

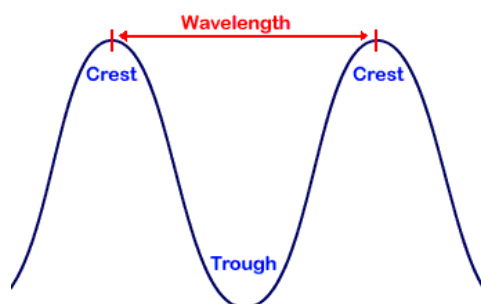


-Subsurface Topography: As technology develops we are learning more and more about our ocean floors. The subsurface topography or bottom of the ocean floor contains ridges, plateaus, volcanoes and many other features.

Continents do not end abruptly at the shoreline. The parts of the continents that continue under the ocean as the continental margin. The continental margin contains the continental shelf, the continental slope, and the continental rise. The continental shelf is the part of the continent closest to the shore. Where the shelf begins to slope under the ocean, the continental slope begins and can sink to several thousand meters. In some places, deep submarine canyons cut into the continental slope. At one time, rivers most likely carved out these canyons. Where the continental slope begins to level is the continental rise which is covered by sediment that was deposited from the continental shelf and slope. The abyssal plains begins at the bottom of the continental rise. Mid-ocean ridges are long continuous mountain ranges that form at divergent boundaries of lithospheric plates.

d. Explain the causes of waves, currents, and tides.

Waves: Waves move across the surface of the ocean carrying the energy of the wind, but the ocean water **does not** move along with the wave. As the energy of a wave moves toward the shore, the particles of water move up and down in a complete circle. Only the energy of the waves moves forward. A wave is simply a pulse of energy that moves from one particle of water to the next. **Most waves are formed by the wind blowing across the surface of the water.** The harder and longer the wind blows, the higher the wave. Seismic waves or Tsunamis are caused by movements of the Earth's crust, such as earthquakes on the ocean floor, volcanic eruptions, and underwater landslides.



-Currents: Ocean water is never still. It is **constantly moving in enormous “rivers” called currents.** These currents circulate throughout the oceans of our world like the blood that moves through our body. Even though the oceans are broken up by continental landmasses, a drop of ocean water could travel from one end of the Earth to the other. Ocean water is mixed by the currents into one huge planetary ocean.

There are two basic types of ocean currents: surface currents and density currents. **Surface currents are caused and moved by global winds. Density currents or subsurface currents flow in the deep water of the ocean below the surface currents, and are caused by differences in temperature and salinity.**

Type of Current	Location	Cause
Surface	1 st several km of ocean water	Global winds
Density	Deep Ocean Waters	Differences in salinity and density

-Tides: Although the wind plays a major role in most ocean motion, it is not the cause of tides. **Tides are the result of the gravitational pull of the moon and sun.** (Inertia also plays a role in tides.) Most coastal areas, with some exceptions along the coast of Alaska and the Gulf of Mexico, experience two high tides and two low tides every lunar day. The gravitational attraction of the sun causes spring and neap tides. The rise and fall of sea level is called a tide. The rise in sea level is called a high tide. The drop in sea level is called a low tide.