New concepts: Radiation, conduction, and convection

Energy The term "**heat**" as used in everyday language refers both to **thermal energy** (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another.

- Energy is spontaneously transferred out of hotter regions or objects and into colder ones
- There are three types of heat transfer: Radiation, conduction, and convection
  Radiation: The transfer of heat through an empty space. ex. Sunlight to Earth
  Conduction: Heat transferred by direct particles of matter.ex. Soup to pot. (**Conductor**: A material the conducts heat well **Insulator:** material that does not conduct heat well)
  Convection: Heat transfer by the mass movement of a heated liquid.
  Convection current: *If two objects are at different temperatures, the heat will flow from the warmer object to the cooler object.*

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Wave Properties overlapping content

Mechanical waves (for example: sound or water waves): discuss sound waves and dolphins & Waves when on the island.

From Molecules to Organisms: Structures and Processes

All living things are made up of **cells**, which is the smallest unit that can be said to be alive.

Multicellular: plants, animals

Unicellular: most **protists and bacteria *Phytoplankton (mostly unicellular)** form the base of the aquatic food chain. Primary producers,effectively producing much of the Oxygen we breathe on land.

Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell**.**

Animal and Plant cell structures:

Cell membrane- controls what enters and leaves a cell. (Diffusion and Osmosi), **Nucleus-** maintains cell function **, mitochondria-** energy producing sites in cell where cellular respiration takes place

Plant cell structures: Cell Wall- provides support and gives shape to plants
Chloroplast- enable plants to perform photosynthesis to make food.
***Sea lettuce (algae)**

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. Cells— Tissues— Organs— Systems

The History of Planet Earth The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. Major historical events include the formation of mountain chains and ocean basins, the adaptation and extinction of particular living organisms, volcanic eruptions, periods of massive glaciation, and development of watersheds and rivers through glaciation and water erosion.

300 million years ago Gondwana and Laurasia collided and formed a single large continent called Pangea. This is when the Appalachian Mountain chain was formed.

ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

ESS2.A: Earth Materials and Systems The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

Mechanical Waves: *Longshore drift is generated by waves and current action. Along the Southeastern U.S. coast, the longshore drift is generally north to south. This motion occurs because waves most often approach and hit the beach at an angle.*

As a wave breaks and washes at an angle up onto the beach, particles of sand are carried with it. The run-up of waves onto the beach is called the swash. The swash of a wave is followed by its inevitable return to the sea, or backwash, down the slope of the beach. A zig- zag pattern of up and down movement results due to the swash and backwash of waves. A particle of sand or silt travels along this zig-zag path, continuously working its way toward the downdrift end of the beach. This pattern of water movement establishes a longshore current moving parallel to the beach, carrying sediment with it.

Because of the longshore drift of sediments southward, many barrier islands along the Southeastern U.S. coast erode on the north end. The south ends generally "grow," grain by grain, often forming an extended hook- shaped lobe of sand known as a spit.

Roles of Water in Earth's Surface Processes Introduced in 5th grade Precipitation, Evaporation**,** Condensation**,** Run-off

Water continually cycles between the atmosphere (**troposphere)**, land, and ocean via the water cycle. **Transpiration** Plants also play an important part in the hydrologic cycle, as their roots take up water from the soil. This water is then actively transported, or transpired, through their leaves back into the atmo- sphere. **Crystallization**

The interactions between air masses, fronts, and pressure systems result in various weather conditions.

- **AIR MASS:** HUGE bodies of air that form over water or land. They will either form in tropical (warm) regions or polar (cold) regions. Certain land formations can affect the movement of air masses, and that will affect the weather conditions a region experiences.
- Temperature and humidity conditions (for example, warm or cold air, humid or dry air) inside the air masses as they form are important to the weather condition that will happen when the air masses move.
- **FRONTS:** Fronts are what form at the boundaries (between) air masses when they collide together. Depending upon the temperature of the air masses involved, different types of fronts will happen (warm front, cold front, stationary front, or occluded front).
- STORMS occur when **pressure difference**s cause rapid air movement.

High/Low Pressure Systems
Warm air rising or cold air sinking combined with the spinning of the Earth causes the air to spin forming high and low pressure regions.

- High pressure systems usually signal more fair weather with winds circulating around the system in a clockwise direction.
- Low pressure systems with counterclockwise circulating winds often result in rainy and/or stormy weather conditions.

Distance from Water: Land and Sea breezes are local convection currents that occur in areas near water because of the unequal heating of Earth materials.

Solar Energy and Effects on Climate Land absorbs heat energy and releases heat energy quickly. Water absorbs heat energy and releases heat energy slowly. The differences in these heating patterns cause convection currents.

Ocean Currents circulate heat energy. Air masses that originate over regions of the ocean are moved with currents and affect the climate of coastal regions.

- Global convection currents are set up in the atmosphere because of the unequal heating of Earth's surfaces. There are three atmospheric convection areas that influence the climate regions on Earth.

The **tropical** region begins at the equator and extends to about 30 degrees latitude; the **temperate** region extends from there to about 60 degrees latitude, and the **polar** region extends from there to the north pole, 90 degrees latitude.

Ocean surface currents circulate warm and cold ocean waters in convection patterns and influence the weather and climates of the land masses nearby.

The Gulf Stream influences the eastern Atlantic shoreline of the United States by bringing warm, moist air.