Ozone is a molecule formed by three atoms of oxygen, weakly bonded together in an unstable arrangement. As oxygen levels in Earth's atmosphere increased over billions of years, some oxygen gas (O₂) migrated into the stratosphere where it encountered increased levels of ultraviolet radiation. These reactions between oxygen and ultraviolet radiation formed the ozone layer, or ozonosphere (see next page). The atmosphere acts as a natural filter, absorbing harmful shorter wavelengths yet allowing life-giving visible light wavelengths to pass.
The ultimate source of energy in most ecosystems is sunlight. **Click** Start Animation to view the flow of energy to and from the earth
Cooking and Heating

Heat can travel by three different processes:
- convection
- conduction
- radiation

We use these processes everyday to cook food
Carbon dioxide: The burning of fossil fuels and deforestation contribute the most to increasing atmospheric levels of carbon dioxide. Click to view information about a different greenhouse gas.
Sunlight is the radiation that Earth receives from the Sun. Solar radiation travels to Earth at the speed of light, traveling 93 million miles through space in just 8 minutes.
Shortwave energy budget
The global carbon cycle. Click Start Animation.
Conducting Energy
Before You Begin

Specific Heat simulates an experiment that demonstrates the different heat capacities of land and water. As the simulation progresses, pay close attention to the graphs showing how the temperature of each substance changes over time.

Use the instructions tab to reveal the specific instructions to operate this interactive simulation.
Milankovitch Cycles

Thousands of Years

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Oxygen Isotopes

Interglacial Period

Seawater

$^{16}\text{O}$ enriched

$^{18}\text{O}$ enriched
In the hydrologic cycle, water slowly moves on a global scale from the oceans, through the atmosphere, onto land, and then back into the ocean. **Click** each blue arrow to learn more about the processes involved in water movement and the amount of water (in cubic kilometers) moved by that process each year.
Air molecules in a sealed container.
Before You Begin

Specific Heat simulates an experiment that demonstrates the different heat capacities of land and water. As the simulation progresses, pay close attention to the graphs showing how the temperature of each substance changes over time.

Use the instructions tab to reveal the specific instructions to operate this interactive simulation.
Coriolis Effect

North to South

On a nonrotating earth, the plane would travel straight to its target.
The Coriolis effect illustrated using the flight of a plane travelling from the North Pole to a location on the Equator.

West to East

On a nonrotating earth, the plane would travel straight to its target.
The Coriolis effect illustrated using the flight of a plane travelling from San Francisco to New York.
Consider 4 little parcels of air in a high pressure system
"Consider some air here"
Map of Simple Pressure Gradient in Northern Hemisphere

Click below to see wind patterns

- Pressure Gradient Only (Hypothetical)
- Upper Atmosphere Wind Pattern
- Surface Wind Pattern

Simple Pressure Gradient  High Pressure Cell  Low Pressure Cell
The earth’s global circulation of air and water is set in motion by the unequal heating of the earth’s surface. **Click** Start Animation for a demonstration.
Global air circulation patterns give rise to differences in rainfall and biomes at different latitudes. **Drag** air circulation icons to the blanks on the right side of the graphic to show the pattern of global air circulation. **Drag** cactus or clouds icons to the blanks on the left side to show the latitudes where rainfall is highest and lowest.
Climate Types
Tornadoes
A Look Into the Eye of the Storm

Hurricanes are among the most destructive forces on the planet. They can flatten vast areas with their winds, and inundate coastal areas with the wall of water, or storm surge, that they push before them. They can spawn tornadoes and cause floods even after they break up.

Hurricane formation requires warm tropical water, high humidity, light winds all coming together between 8 and 20 degrees latitude. The spark that turns these ingredients into a hurricane is convergence of surface winds.

Most hurricanes in the northern hemisphere come from a convergence produced by easterly currents in the trade winds, beginning over Western Africa.

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