

Earth-Sun Relations

The Atmosphere

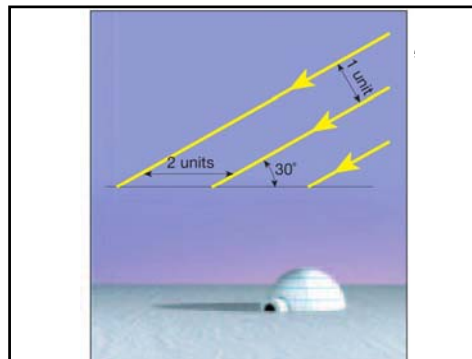
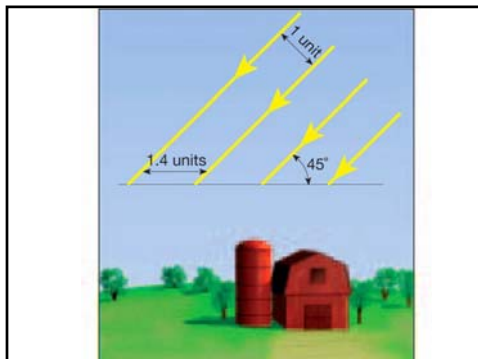
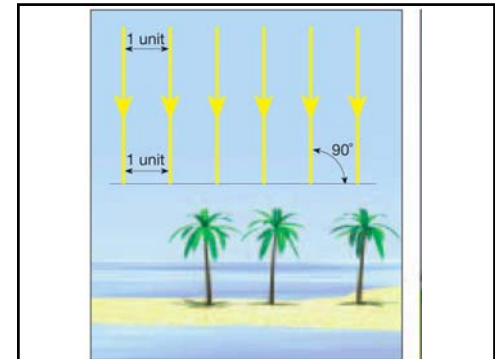
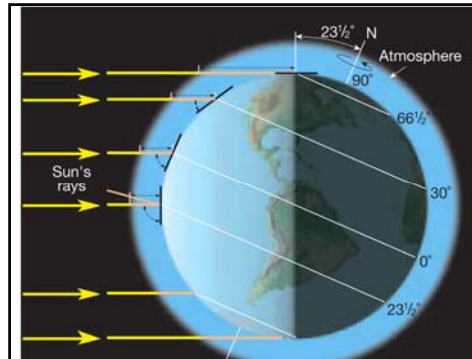
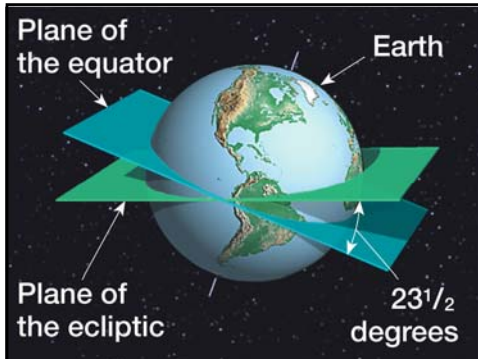
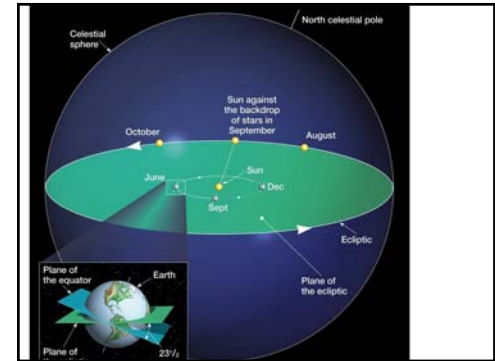
Earth-Sun relations

Earth motions

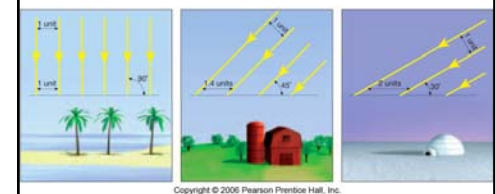
- Rotates on its axis
- Revolves around the Sun

Seasons—Result of constant axial tilt

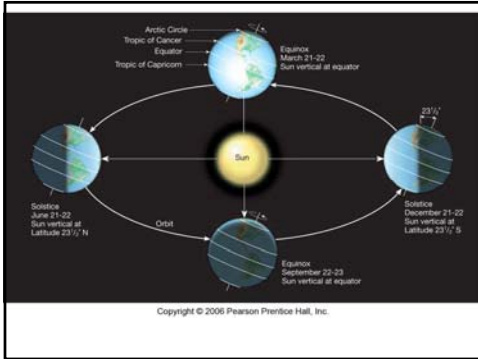
- Changing Sun angle
- Changing length of daylight



Sun Angle with Latitude



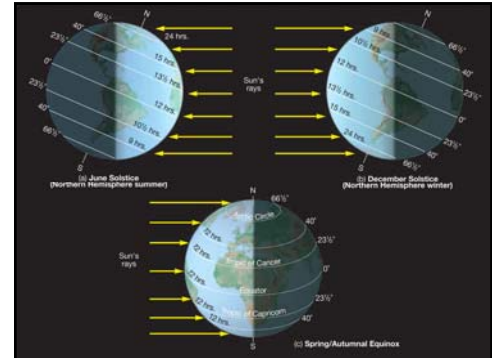
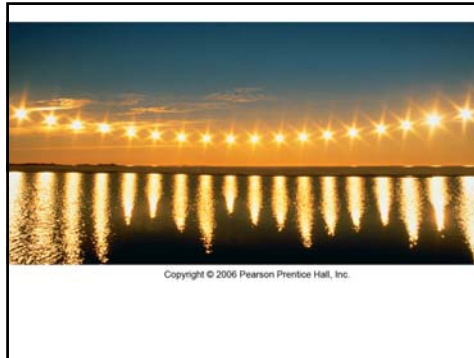
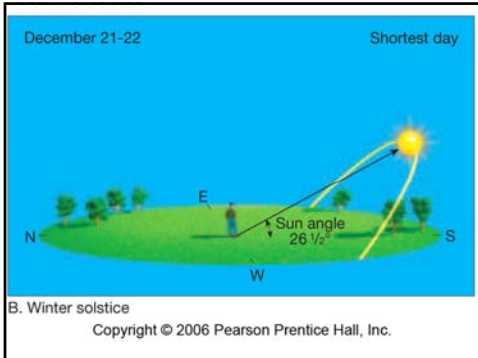
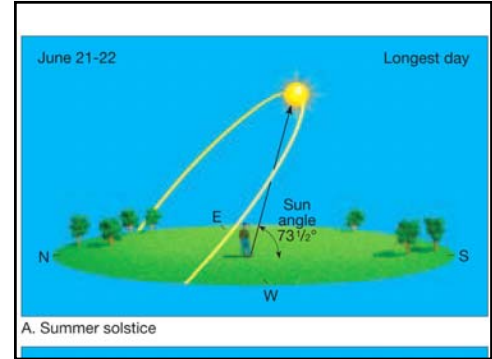
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Earth-Sun relations

Special days

- **Solstice**—Sun's vertical rays are located at the Tropic (23½° latitude)
 - June 21-22
 - December 21-22
- **Equinox**—Sun's vertical rays located at the Equator (0° latitude)
 - March 21-22
 - September 21-22

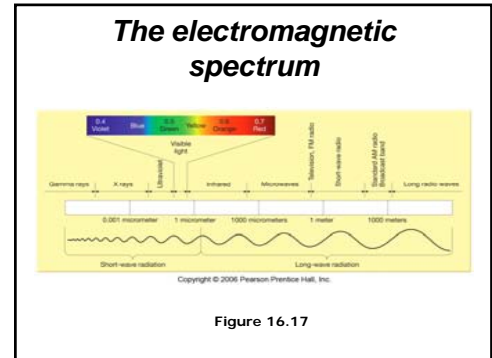
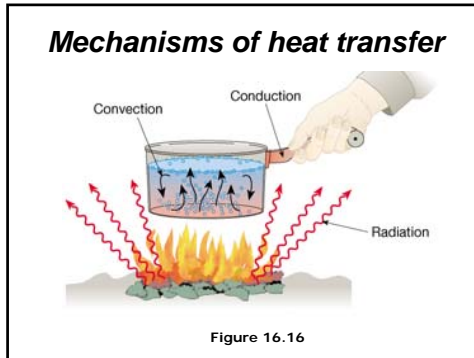


Atmospheric heating

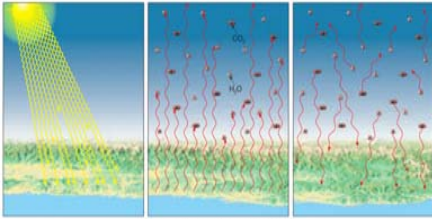
Heat is always transferred from warmer to cooler objects

Mechanisms of heat transfer

- Conduction
- Convection
- Radiation (electromagnetic radiation)

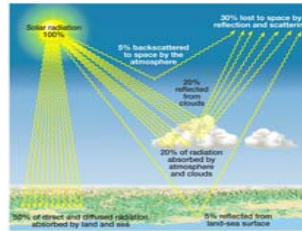


The heating of the atmosphere



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Figure 16.21

Average distribution of incoming solar radiation



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Figure 16.19

Proportional volume of gases that compose dry air

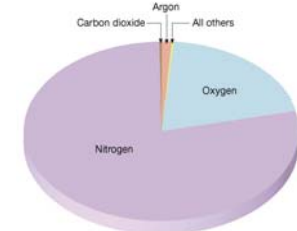


Figure 16.3

Composition of the atmosphere

Air is a mixture of gases

Major components of clean, dry air

- Nitrogen (N) – 78%
- Oxygen (O₂) – 21%
- Argon and other gases
- Carbon dioxide (CO₂) – 0.036% – absorbs heat energy from Earth

Variable components of air

- Water vapor
- Aerosols
- Ozone



Atmospheric pressure variation with altitude

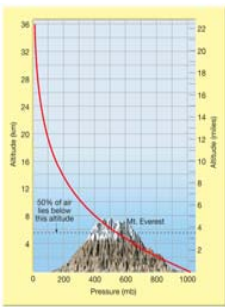
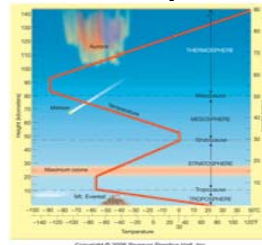


Figure 16.5

Thermal structure of the atmosphere



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Figure 16.7

Atmospheric layers based on temperature

- **Troposphere**
- **Stratosphere**
- Mesosphere
- Thermosphere