



Section 10.2

Energy Transfer in the Atmosphere

Study Notes

By the end of section 10.2 you should be able to understand the following:

- Earth's atmosphere is key to allowing life to exist here.
- Solar radiation transfers large amounts of thermal energy to Earth, and conduction and infrared radiation on Earth's surface help to heat the atmosphere, like a greenhouse.
- Atmospheric pressure, air temperature and humidity vary throughout the atmosphere. These differences are closely related to convective currents in the atmosphere.
- "Weather" is the condition of the atmosphere at a specific place and time.

NOTES

What was Earth's atmosphere like in its earliest times? Where do scientists think that the all-important oxygen came from to support animal life?

- 1.
- 2.

List the four main gases found in Earth's atmosphere, along with the percentage of the atmosphere they make up.

- 1.
- 2.
- 3.
- 4.

List the five layers of Earth's atmosphere, from closest to the surface of Earth to the farthest away from the surface.

- 1.
- 2.
- 3.
- 4.
- 5.

NOTES

Where is the troposphere located, and how thick is it from bottom to top? Why is the troposphere the densest atmospheric layer?

- 1.
- 2.
- 3.

Why does most weather occur in the troposphere? List 4 other important qualities of the troposphere.

- 1.
- 2.
- 3.
- 4.
- 5.

What atmospheric layer is above the troposphere? What is the name of the boundary between these two layers?

- 1.
- 2.

Describe the conditions found in the stratosphere.

- 1.
- 2.
- 3.
- 4.

NOTES

The mesosphere is the third layer up from Earth's surface. List three important facts about the mesosphere.

1.

2.

3.

The next layer of Earth's atmosphere is the thermosphere. List three important facts about the thermosphere.

1.

2.

3.

The atmospheric layer farthest from Earth, just before entering outer space, is the exosphere. Between what altitudes does the exosphere exist?

1.

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What is insolation? Where on Earth receives the most insolation? What does the angle of incidence of the Sun's rays have to do with insolation?

1.

2.

3.

NOTES

Most of the atmosphere's thermal energy comes from the Sun, but almost all solar radiation passes right through the atmosphere without warming it. How does the atmosphere warm from solar radiation?

- 1.
- 2.
- 3.

Earth's radiation budget allows the planet to remain at temperatures that can support life. What happens to the energy from the Sun when it reaches Earth?

- 1.
- 2.
- 3.
- 4.
- 5.

What is albedo? Where on Earth's surface is albedo high? Where is it low?

- 1.
- 2.
- 3.

Do the Reading Check on page 443

NOTES

Define "weather". What type of heat transfer is weather closely connected to?

1.

2.

3.

Define air (atmospheric) pressure. What device is used to measure air pressure? What are the SI units for air pressure?

1.

2.

3.

Why do your ears "pop" when changing altitude?

1.

2.

How does air temperature affect air pressure?

1.

2.

NOTES

Which is more dense; dry air or moist air? What is the name of a scientist who studies weather? What happens to the weather conditions if warm, moist air moves into a region?

- 1.
- 2.
- 3.

What is specific humidity? What is the dew point? What is relative humidity? What does it mean if a meteorologist states that, "the relative humidity is 65%"?

- 1.
- 2.
- 3.
- 4.

What is wind? What is an air mass? How large are air masses?

- 1.
- 2.
- 3.

Do the Reading Check on page 446

NOTES

What is a high pressure system? What direction does wind blow around the center of a high pressure system?

1.

2.

What is a low pressure system? What direction does wind blow around the center of a low pressure system?

1.

2.

What are prevailing winds?

1.

What is the Coriolis effect? What does the Coriolis effect do to the direction of winds in the northern hemisphere?

1.

2.

Convection currents and the Coriolis effect combine to form global wind systems. Describe Earth's three major wind systems?

1.

2.

3.

Do the Reading Check on page 451

NOTES

What is a jet stream? How fast is the polar jet stream, and which direction does it flow?

1.

2.

Describe the local winds known as "sea breezes"; "onshore breezes" and "offshore breezes".

1.

2.

What is a "front"? Describe the characteristics of three different types of fronts.

1.

2.

3.

4.

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1.

Describe three types of extreme weather.

2.

3.