Date _____ Period _____ Name _____

CHAPTER 11 STUDY GUIDE

ATMOSPHERE

SECTION 11.1 Atmospheric Basics

In your textbook, read about the composition of the atmosphere.

Circle the letter of the choice that best completes the statement.

1. Most of Earth's atmosphere is composed of

a. ~~oxygen and hydrogen~~.
b. ~~hydrogen and nitrogen.~~
c. nitrogen and oxygen.
d. ~~carbon and ozone.~~

2. Water vapor in the atmosphere is the source of

a. clouds and rain.
b. ~~pollution.~~
c. ~~carbon dioxide~~.
d. ~~wind.~~

3. The amount of energy the atmosphere absorbs depends in part on its level of

a. ~~nitrogen.~~
b. ~~argon.~~
c. ~~nitrogen dioxide.~~
d. carbon dioxide.

4. Solid particles in the atmosphere include salt and

a. ~~leaves.~~
b. ~~ozone.~~
c. dust.
d. ~~lightning.~~

5. Ozone in Earth's atmosphere is important because it

a. ~~causes rain to fall.~~
b. absorbs harmful radiation.
c. ~~absorbs harmful pollution.~~
d. ~~helps clouds form.~~

In your textbook, read about the structure of the atmosphere.

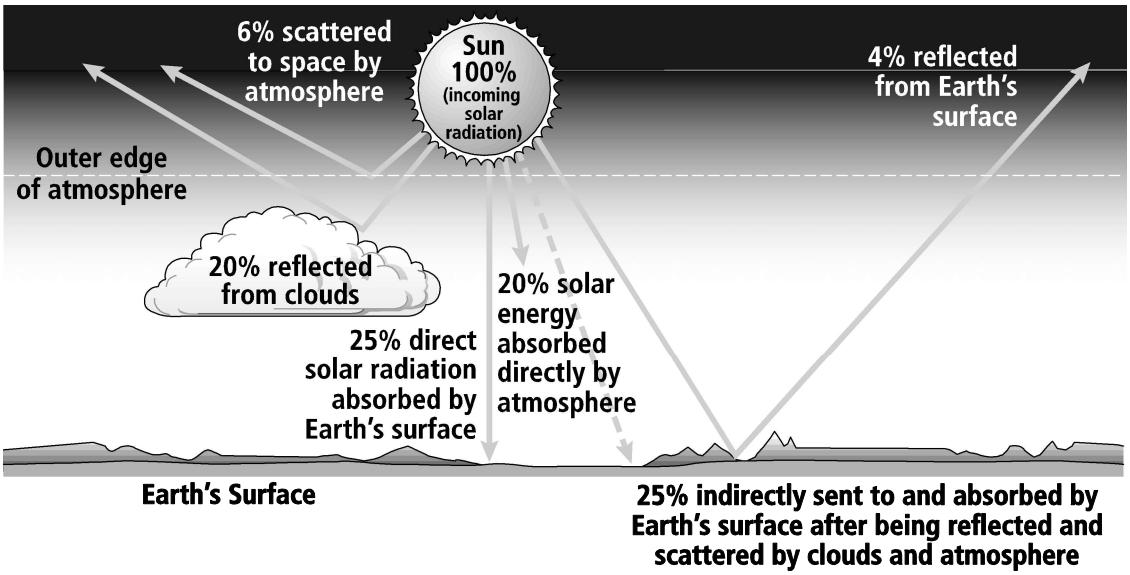
Complete the table by writing the layer of the atmosphere that matches each description.

Characteristic	Layer
6. Contains concentrated ozone	Stratosphere
7. Layer just above the stratosphere	Mesosphere
8. Most weather occurs here.	Troposphere
9. Outermost layer of the atmosphere	Exosphere
10. Between mesosphere and exosphere	Thermosphere

SECTION 11.1 Atmospheric Basics, continued

In your textbook, read about how the atmosphere is heated.

Examine the diagram below. Then answer the questions.



11. What is the source of all energy that reaches Earth? _____**The Sun**_____

12. What percentage of the Sun's energy does Earth's surface absorb directly or indirectly?___**50%**_____

13. What percentage of the Sun's energy is scattered or reflected back into space? What causes this loss of solar energy?

About 30%; lost energy is scattered by the atmosphere, reflected from clouds, and reflected from Earth's surface (snow/ water).

14. Earth's surface is heated by energy from the Sun. For the most part, the rereleased energy from the surface heats the atmosphere. Describe the method by which energy is transferred from Earth's surface to the air above it.

Particles of air on Earth's surface collide with and transfer energy to particles of air in the very lowest part of the atmosphere by conduction.

15. Describe convection.

Convection is the transfer of energy by the flow of a heated substance. Heated air near Earth's surface rises, expands, and starts to cool. When it cools below the temperature of surrounding air, it increases in density and sinks, creating a convection current.

SECTION 11.2 Properties of the Atmosphere

In your textbook, read about heat, temperature, and moisture in the atmosphere.

Use each of the terms below just once to complete the passage.

water vapor	**altitude**	**Fahrenheit**	**heat**
condensation	**dew point**	**temperature**	**lifted condensation level**

Heat and temperature are not the same. **(1)** ___**temperature**_____ is a measure of how rapidly or slowly molecules move. In contrast, **(2)** ____**heat**_____ is the transfer of energy that takes place because of temperature differences. Temperature can be measured in degrees Fahrenheit, degrees Celsius, or kelvins. The most commonly used temperature scale in the United States is **(3)** ____ **Fahrenheit** _____.

The atmosphere's temperature plays a role in the formation of rain. Rain drops form when **(4)** ___**water vapor**_____ in the atmosphere cools and turns from a gas to a liquid. This change in state is called **(5)** ____**condensation**____.

Air must be saturated before condensation can occur. Saturation is the point at which the air holds as much water vapor as it possibly can. The **(6)** ___**dew point**___ is the temperature to which air must be cooled at constant pressure to reach saturation. Until this temperature is reached, condensation cannot occur and rain cannot fall.

Temperature in the lower atmosphere generally decreases with increased **(7)** ___**altitud**e____. As air rises, it cools and eventually reaches the temperature at which condensation occurs. The height above the surface at which condensation occurs is the **(8)** _____**lifted condensation level**____.

SECTION 11.2 Properties of the Atmosphere, continued

In your textbook, read about air pressure and wind.

For each statement below, write true *or* false.

_____**True**_____ **9.** Air is denser near Earth's surface than high in the atmosphere.

_____ **True** _____ **10.** Particles of air in the atmosphere exert pressure on Earth's surface.

_____ **False**_____ **11.** Air pressure is greater at the top of a mountain than at lower elevations.

_____ **True** _____ **12.** In the troposphere, as air temperature increases with decreasing altitude, generally air pressure increases, too.

_____ **False** _____ **13.** Wind is the movement of air from an area of low pressure to an area of high pressure.

_____ **True** _____ **14.** As you move upward from Earth's surface, wind speeds increase because the air meets with less friction from Earth's surface.

In your textbook, read about temperature inversion and relative humidity.

Answer the following questions.

15. What is a temperature inversion? Explain how one can form.

A temperature inversion is an increase in temperature with height in an atmospheric layer. On a clear, winter night where there is a rapid cooling of land, the lower layers of the atmosphere lose heat to Earth's surface. As a result, the lower layers of air become cooler than the air above.

16. What is relative humidity?

Relative humidity is the ratio of water vapor in a volume of air relative to how much water vapor that volume of air is capable of holding at saturation.

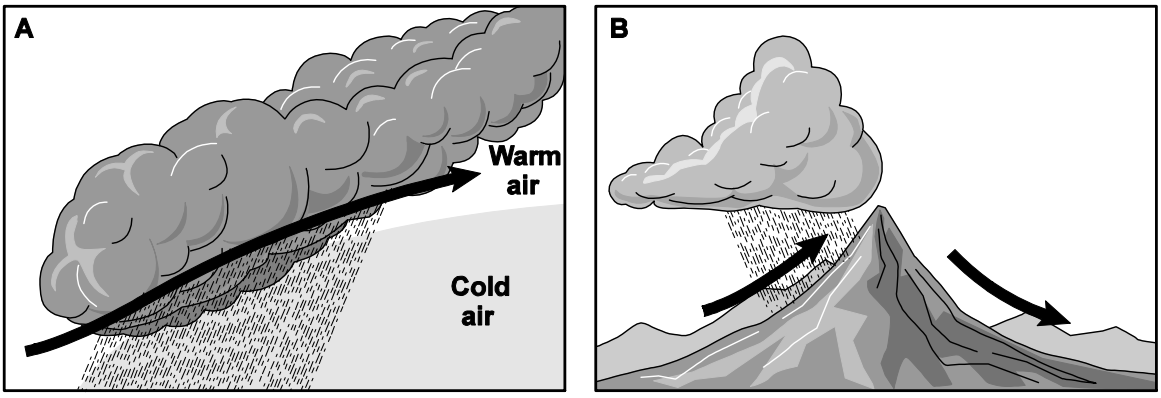
17. What is the relative humidity of fully saturated air?

100%

SECTION 11.3 Clouds and Precipitation

In your textbook, read about the formation of clouds.

Examine the diagram below. Then answer the questions.



1. What is happening to the air in both A and B that leads to the formation of clouds?

Air is rising, expanding, and cooling, which leads to water vapor condensing to form clouds.

2. What is causing the air to rise in A?

The collision of the warm air mass with a colder one is causing the air to rise in A.

3. What is causing the air to rise in B?

The air encounters a mountain, forcing the air upward.

4. What type of cloud formation is shown in B?

Orographic Lifting

5. Explain how condensation nuclei help clouds form.

These Particles in the atmosphere provide objects around which water vapor can condense to form cloud droplets.

SECTION 11.3 Clouds and Precipitation, continued

In your textbook, read about moisture in the atmosphere and clouds.

For each item in Column A, write the letter of the matching item in Column B.

		Column A	Column B
__C__	**6.**	All forms of water that fall from clouds	**a.** stratus
__A__	**7.**	Low, layered clouds	**b.** cirrus
__D__	**8.**	Small cloud droplets join to form larger ones	**c.** precipitation
__B__	**9.**	Wispy, high clouds made of ice crystals	**d.** coalescence

In your textbook, read about the movement of water between the atmosphere and Earth's surface.

Circle the letter of the choice that best completes the statement.

10. The constant movement of water between the atmosphere and Earth's surface is

~~**a.** cloud formation.~~ ~~**c.** precipitation.~~

b. the water cycle. ~~**d.** temperature inversion.~~

11. The process of water changing from a liquid to a gas is

~~**a.** condensation.~~ ~~**c.** coalescence.~~

~~**b.** precipitation.~~ **d.** evaporation.

12. As water vapor rises in the atmosphere, it cools and changes into liquid cloud droplets in a process called

~~**a.** evaporation.~~ **c.** condensation.

~~**b.** precipitation.~~ ~~**d.** vaporization.~~

13. When cloud droplets combine to form larger drops, they fall to Earth as

~~**a.** ozone.~~ **c.** precipitation.

~~**b.** condensation.~~ ~~**d.** water vapor.~~

14. The energy that drives the water cycle comes from the

a. Sun. ~~**c.** ocean.~~

~~**b.** wind.~~ ~~**d.** stratosphere.~~