

**Chapter 17 The Atmosphere: Structure and Temperature**

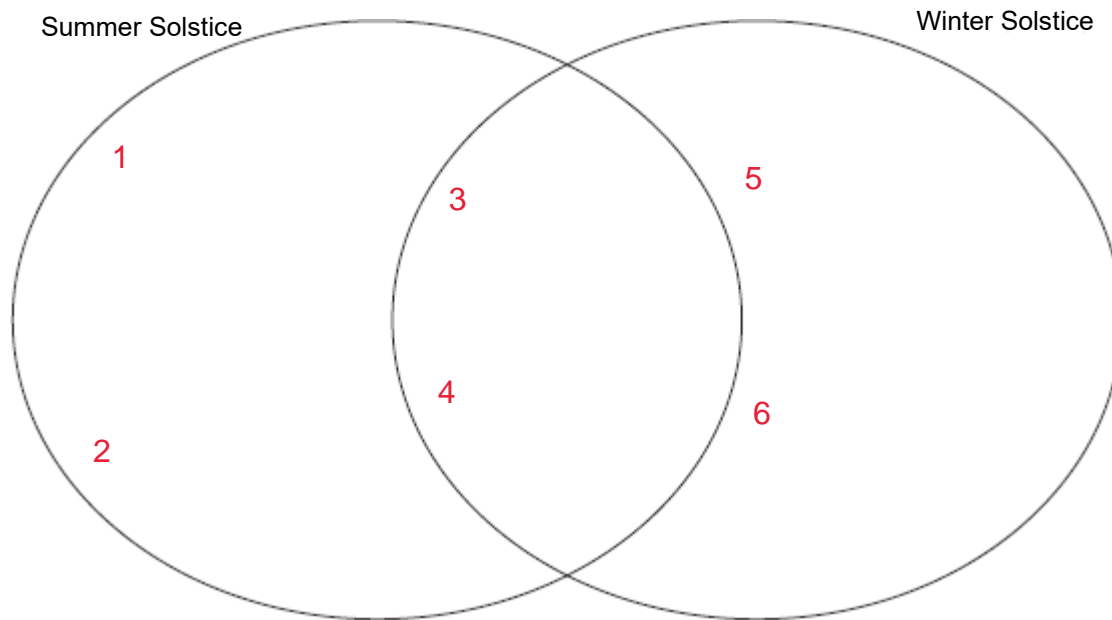
**Section 17.1 Atmosphere Characteristics**

23pts

*This section describes the components and vertical structure of the atmosphere. It also explains how the relationship between Earth and the sun causes the seasons.*

**Reading Strategy**

**Comparing and Contrasting** As you read, complete the Venn diagram by comparing and contrasting summer and winter solstices. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



6pts

1.  \_\_\_\_\_ is the state of the atmosphere at any given time and place.

**Composition of the Atmosphere**

2. Circle the letter of the gas that is the largest component of the atmosphere.
- |                |                   |
|----------------|-------------------|
| a. oxygen      | b. nitrogen       |
| c. water vapor | d. carbon dioxide |
3.  Is the following sentence true or false? The source of all clouds and precipitation is water vapor. \_\_\_\_\_
4.  Why is the ozone layer crucial to life on Earth? \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Height and Structure of the Atmosphere**

5. Is the following sentence true or false? Atmospheric pressure increases with height.
- \_\_\_\_\_

**Chapter 17 The Atmosphere: Structure and Temperature**

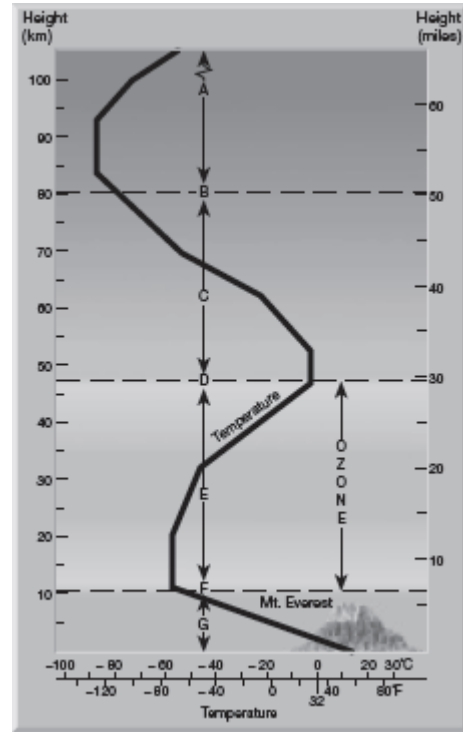
6. Select the appropriate letter in the figure that identifies each of the following layers of the atmosphere.

\_\_\_\_\_ mesosphere      \_\_\_\_\_ thermosphere  
 \_\_\_\_\_ troposphere      \_\_\_\_\_ stratosphere

7. In the figure, the atmosphere is divided vertically into four layers based on \_\_\_\_\_.

8. Circle the letter of the layer of the atmosphere that contains the ozone layer.

- a. troposphere
- b. stratosphere
- c. mesosphere
- d. thermosphere



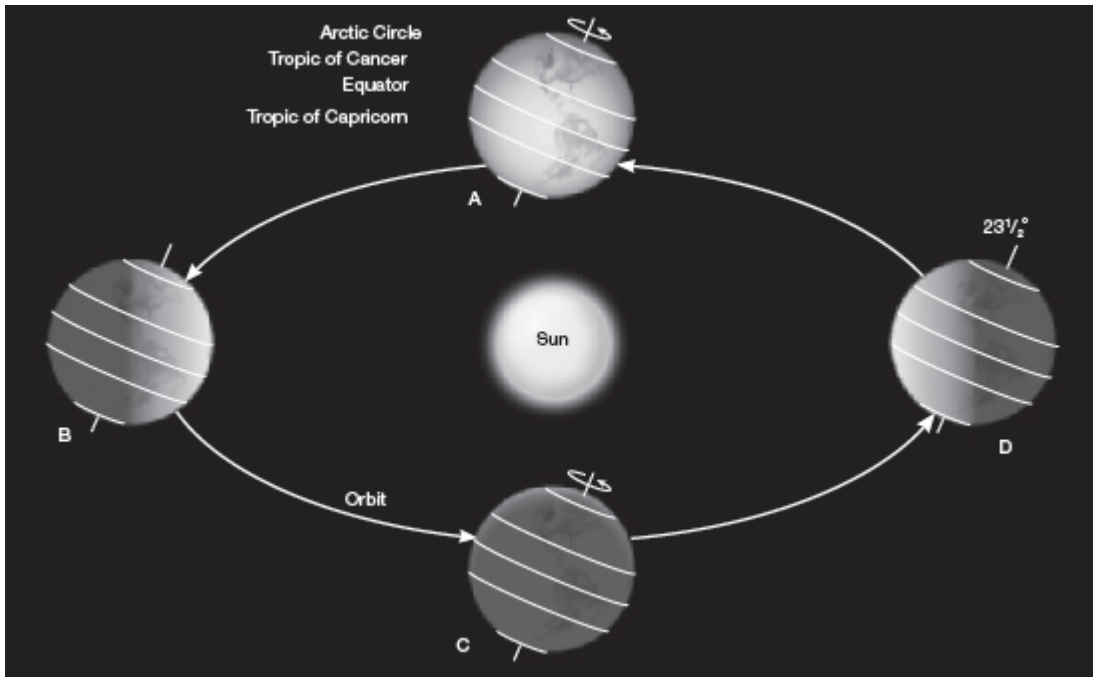
**Earth-Sun Relationships**

9. What are Earth's two principal motions?

\_\_\_\_\_

10. Select the appropriate letter in the figure that identifies each of the following months.

\_\_\_\_\_ March      \_\_\_\_\_ December  
 \_\_\_\_\_ June      \_\_\_\_\_ September



11. Is the following sentence true or false? At position B in the figure, the Northern Hemisphere will have longer daylight than darkness. \_\_\_\_\_

12. What causes seasonal changes? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Chapter 17 The Atmosphere: Structure and Temperature**

**Section 17.2 Heating the Atmosphere**

*This section describes the three ways in which heat can be transferred. It also explains what happens to solar radiation that hits Earth's atmosphere and surface.*

**24pts**

**Reading Strategy**

**Using Prior Knowledge** Before you read, write your definition for each term. After you read, write the scientific definition of each term and compare it to your original definition. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Term	Your Definition	Scientific Definition
Heat		
Temperature		

**4tps**

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**Energy Transfer as Heat**

*Match each description with its mechanism of energy transfer.*

- |       | <b>Description</b>   | <b>Mechanism of Energy Transfer</b> |
|-------|--|-------------------------------------|
| _____ | 1. transfer of heat by mass movement or circulation within a substance | a. radiation                        |
| _____ | 2. transfer of heat through matter by molecular activity               | b. convection                       |
| _____ | 3. ☉ transfer of heat without requiring a medium to travel through     | c. conduction                       |
| 4.    | Circle the letter of the act of light bouncing off an object.          |                                     |
|       | a. absorption  |                                     |
|       | b. scattering  |                                     |
|       | c. reflection  |                                     |
|       | d. radiation   |                                     |

**Chapter 17 The Atmosphere: Structure and Temperature**

5. Complete the chart below.

5pts

Mechanism of Energy Transfer		
Mechanism	Requires direct contact?	Requires a medium?
Conduction	yes	
Convection		
Radiation		

6.  Is the following sentence true or false? All objects at any temperature emit radiant energy. \_\_\_\_\_
7.  Hotter objects emit \_\_\_\_\_ total energy per unit area than colder objects do.
8.  Is the following sentence true or false? The hotter a radiating body is, the longer the wavelengths of maximum radiation it will produce. \_\_\_\_\_
9.  Objects that are good absorbers of radiation are also good \_\_\_\_\_ of radiation.

**What Happens to Solar Radiation?**

10.  List three things that can happen when radiation strikes an object. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3pts

11. Circle the letter of the process that produces rays that travel in all directions.
  - a. absorption
  - b. transmission
  - c. reflection
  - d. scattering
12. About \_\_\_\_\_ percent of the solar energy reaching the outer atmosphere is reflected or scattered back into space.
13. What is the greenhouse effect? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
14. Is the following sentence true or false? Another term for the greenhouse effect is global warming. \_\_\_\_\_

**Chapter 17 The Atmosphere: Structure and Temperature**

**Section 17.3 Temperature Controls**

*This section describes the factors that influence temperature and discusses worldwide temperature distribution.*

23pts

**Reading Strategy**

**Previewing** Before you read, use Figure 15 to describe the temperature variations for Vancouver and Winnipeg. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

4pts

<b>Temperature Variations</b>		
	SUMMER	WINTER
Vancouver		
Winnipeg		

**Why Temperatures Vary**

1.  List five factors other than latitude that exert a strong influence on temperature.

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5pts

*Match each location with its effect on temperature. You may use some effects more than once.*

	<b>Location</b>	<b>Effect on Temperature</b>
_____	2. windward of a large body of water	a. lower temperatures
_____	3. at a low altitude	b. higher temperatures
_____	4. on a leeward coast	c. more moderate temperatures
_____	5. behind a mountain range	d. less moderate temperatures
_____	6. at a high altitude	

7.  Circle the letter of the sentence that is true.
- a. Land heats more rapidly and cools more slowly than water.
  - b. Land heats more rapidly and cools more rapidly than water.
  - c. Land heats more slowly and cools more slowly than water.
  - d. Land heats more slowly and cools more rapidly than water.

### Chapter 17 The Atmosphere: Structure and Temperature

8. Why does the Southern Hemisphere have smaller annual temperature variations than the Northern Hemisphere?

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9. Is the following sentence true or false? A location on a windward coast will have a more moderate climate than an inland location at the same latitude. \_\_\_\_\_

10. Mountains can affect temperatures by acting as \_\_\_\_\_.

11. How does altitude affect mean temperature? \_\_\_\_\_


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12. Circle the letter of the correct definition of *albedo*.

- a. line that connects points with the same temperature
- b. fraction of total radiation reflected by a surface
- c. trapping of heat in Earth's atmosphere
- d. transfer of heat by movement within a substance

13.  What effect do clouds have on incoming solar radiation? \_\_\_\_\_

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14. Is the following sentence true or false? Clouds have the same effect on temperatures during the night as they do during the day.

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### World Distribution of Temperature

15. Circle the letter of the lines on a map that connect points with the same temperature.

- a. albedos
- b. altitudes
- c. latitudes
- d. isotherms

16. What general trend does a world isothermal map show? \_\_\_\_\_

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**Chapter 17 The Atmosphere: Structure and Temperature**

18pts

**WordWise**

Complete the sentences by using the scrambled vocabulary terms below.

oureenhgse cefetf	tinrwe etolssic	thae
stohopperre	msrtheiso	psorseheme
gsirnp oenuixq	lauaumtn nexuiqo	nzoeo
mtchrosperhe	rremeauettp	nsatecrigt
msmeur sscotile	oonuncctdi	elodba
oraiiatnd	pssratorhtee	vococentn

The \_\_\_\_\_ is the bottom layer of the atmosphere.

Many clouds reflect a lot of sunlight because they have a high \_\_\_\_\_.

Temperatures decrease in the third layer of the atmosphere, the \_\_\_\_\_.

The \_\_\_\_\_ contains only a tiny fraction of the atmosphere’s mass.

The \_\_\_\_\_ is the first day of summer.

In the Northern Hemisphere, the \_\_\_\_\_ occurs on September 22 or 23.

\_\_\_\_\_ is a form of oxygen with three oxygen atoms in each molecule.

Solar energy reaches Earth by \_\_\_\_\_.

March 21 or 22 is the \_\_\_\_\_ in the \_\_\_\_\_ Northern Hemisphere.

\_\_\_\_\_ is the energy transferred from one object to another due to a difference in their temperatures.

The average kinetic energy of the atoms or molecules in a substance is its \_\_\_\_\_.

The ozone layer is found in the \_\_\_\_\_.

When you touch a hot metal spoon, you experience heat transferred by \_\_\_\_\_.

The lines on a world isothermal map are called \_\_\_\_\_.

Water being heated in a pan circulates because of \_\_\_\_\_.

Light reaches areas that are not in direct light by means of \_\_\_\_\_.

Winter begins on the \_\_\_\_\_.

The \_\_\_\_\_ keeps Earth warm enough to be a suitable habitat for most living things.