# Weather Guided Reading Packet

# Chapter 2

_____

Name

_____

Period

_____

Room Number

Name _____ Date _____ Class _____

CHAPTER 2

# WEATHER FACTORS

## SECTION 2-1 Energy in the Atmosphere (pages 42-45)

*This section explains how the atmosphere, or the air around Earth, is heated.*

### ▶ Energy from the Sun (pages 42-43)

1. Is the following sentence true or false? About half the energy in Earth's atmosphere comes from the sun. _____

2. Energy from the sun travels to Earth as _____.

3. Is the following sentence true or false? Electromagnetic waves are classified according to wavelength, or the distance between waves.

   _____

4. The direct transfer of energy by electromagnetic waves is called

   _____.

Match the type of radiation with its description.

| Type of Radiation | Description |
|---|---|
| _____ 5. visible light | a. It is a mixture of all the colors of the rainbow. |
| _____ 6. infrared radiation | b. It has wavelengths that are shorter than visible light. |
| _____ 7. ultraviolet radiation | c. It has wavelengths that are longer than visible light. |

8. What causes the different colors of visible light? _____

_____

_____

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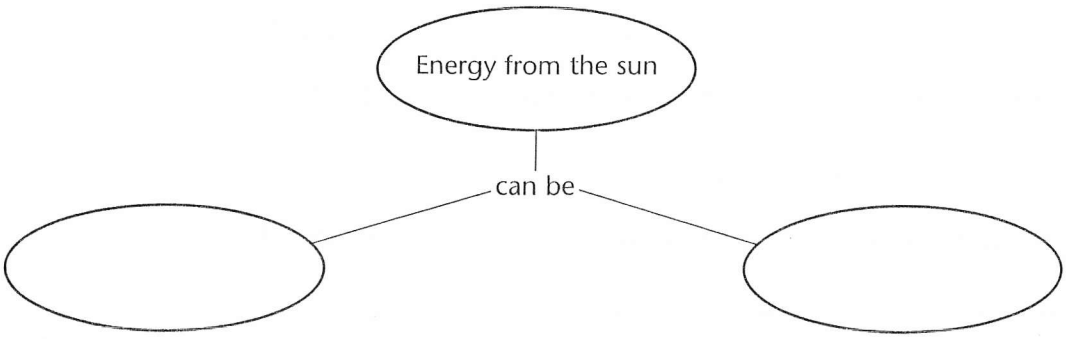
9. Is the following sentence true or false? Red light has a shorter wavelength than blue light. _____

10. Circle the letter of each sentence that is true about infrared radiation.
   a. It is invisible.
   b. It can be felt as heat.
   c. It has longer wavelengths than red light.
   d. It causes sunburn.

11. Circle the letter of each sentence that is true about ultraviolet radiation.
   a. It makes up most of the energy from the sun that reaches Earth.
   b. It can cause skin cancer and eye damage.
   c. It has longer wavelengths than violet light.
   d. It is used in heat lamps.

## ▶ Energy in the Atmosphere (pages 43–44)

12. Complete the concept map.




13. What absorbs or reflects energy from the sun in the atmosphere?

_____

_____

14. Reflection of light in all directions is called _____.

15. Circle the letter of each sentence that is true about scattering.
   a. Short wavelengths of visible light scatter less than long wavelengths.
   b. Blue light scatters less than red light.
   c. Scattered light is bluer than ordinary sunlight.
   d. Scattering explains why the daytime sky looks blue.

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16. What happens to energy from the sun that is neither reflected nor absorbed by the atmosphere? _____

_____

_____

### ▶ Energy at Earth's Surface (page 45)

17. Energy that is absorbed by the land and water is changed into _____.

18. Is the following sentence true or false? When Earth's surface is heated, it radiates some of the energy back into the atmosphere as ultraviolet radiation. _____

19. What absorbs the energy that is radiated from Earth's surface?

_____

_____

20. The process by which gases hold heat in the air is called the _____.

21. Is the following sentence true or false? The greenhouse effect is a natural process. _____



## SECTION 2-2 Heat Transfer (pages 48-51)

*This section explains what temperature measures and how temperature is related to heat. The section also describes three ways that heat can be transferred from a hotter object to a cooler one.*

### ▶ Energy and Temperature (pages 48-49)

1. Is the following sentence true or false? The faster the molecules of a gas are moving, the more energy they have. _____

2. The total energy of motion in the molecules of a substance is called _____.

3. The average amount of energy of motion of each molecule of a substance is called _____.

4. Is the following sentence true or false? Temperature is a measure of how hot or cold a substance is. _____

## ▶ Measuring Temperature (page 49)

5. Air temperature is usually measured with a(n) _____.

6. How does a thermometer work? _____

_____

_____

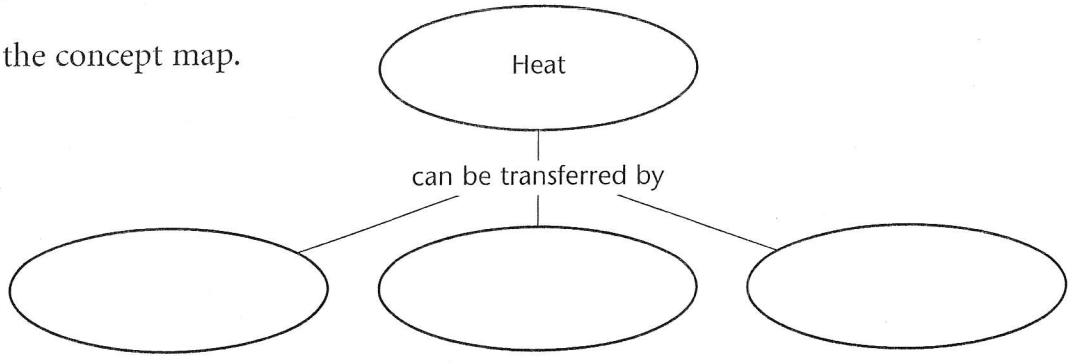
7. Complete the compare/contrast table.

| Temperature Scales | | |
|---|---|---|
| **Scale** | **Freezing Point of Water** | **Boiling Point of Water** |
| Celsius | | |
| Fahrenheit | | |

## ▶ How Heat Is Transferred (pages 49–50)

8. The energy transferred from a hotter object to a cooler one is referred to as _____.

9. Complete the concept map.



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10. Is the following sentence true or false? Radiation is the direct transfer of energy by electromagnetic waves. _____

11. The direct transfer of heat from one substance to another substance that it is touching is called _____.

12. Circle the letter of each sentence that is true about conduction.
    **a.** It works well in some solids. **b.** It works well in metals.
    **c.** It works best in liquids. **d.** It works very well in air.

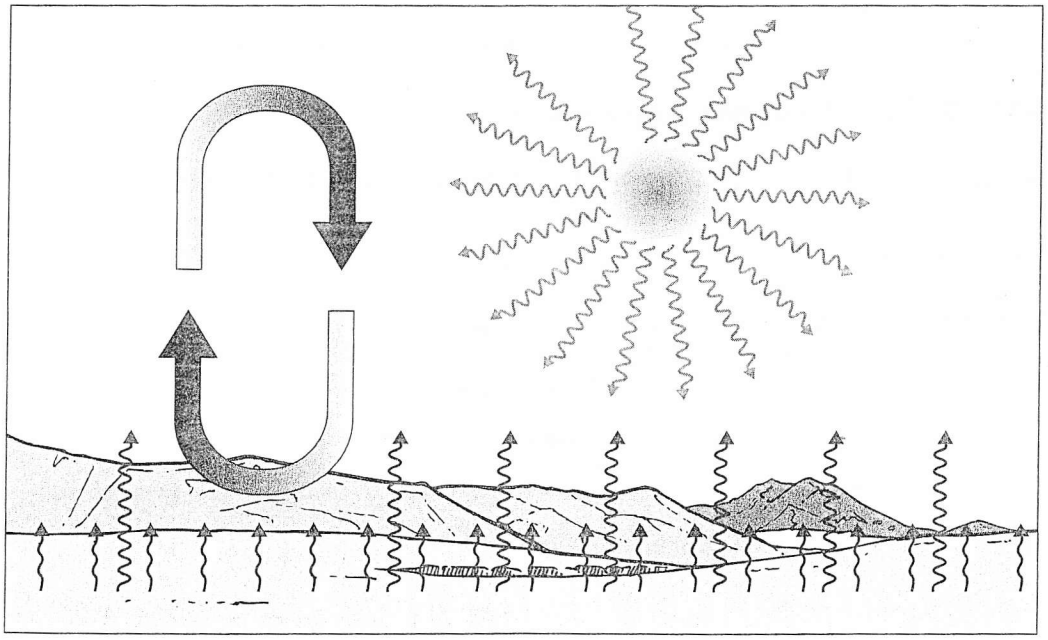
13. The transfer of heat by the movement of a fluid is called _____.

Match the type of heat transfer with its example.

| Heat Transfer | Example |
|---|---|
| _____ 14. radiation | **a.** Drying your boots over a hot-air vent |
| _____ 15. conduction | **b.** Burning your bare feet on hot sand |
| _____ 16. convection | **c.** Feeling the sun's warmth on your face |

## ▶ Heat Transfer in the Troposphere (pages 50–51)

17. In the drawing, label each of the ways that heat is transferred in the troposphere.



18. Most of the heating of the troposphere is caused by _____.

19. The upward movement of warm air and the downward movement of cool air form _____.

## SECTION 2-3 Winds (pages 52-60)

*This section explains what causes winds and how winds are measured. The section also describes different types of winds that blow across Earth's surface.*

### ▶ What Causes Winds? (pages 52–53)

1. The horizontal movement of air from an area of high pressure to an area of lower pressure is referred to as _____.

2. Is the following sentence true or false? All winds are caused by differences in air pressure. _____

3. What is the ultimate source of energy that powers the wind? _____

_____

### ▶ Measuring Wind (page 53)

Match the instrument with what it measures.

| Instrument | What It Measures |
|---|---|
| _____ 4. wind vane | a. wind speed |
| _____ 5. anemometer | b. wind direction |

6. Is the following sentence true or false? A south wind blows toward the south. _____

7. The increased cooling that a wind can cause is called the _____.

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8. Why does the wind blowing over your skin make you feel colder?

_____

_____

## ▶ Local Winds (pages 54–56)

9. Winds that blow over short distances are called _____.

10. What causes local winds? _____

_____

11. Circle the letter of each sentence that is true about the unequal heating of land and water.

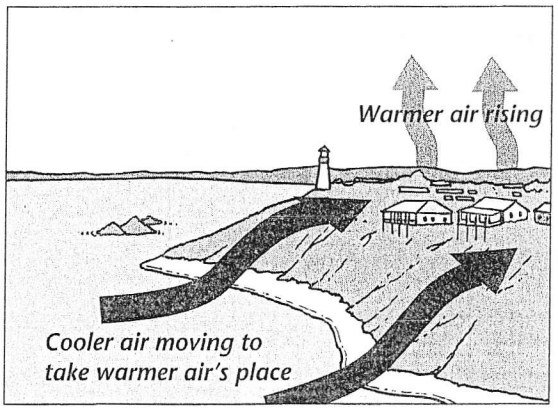
**a.** Land warms up faster than water.

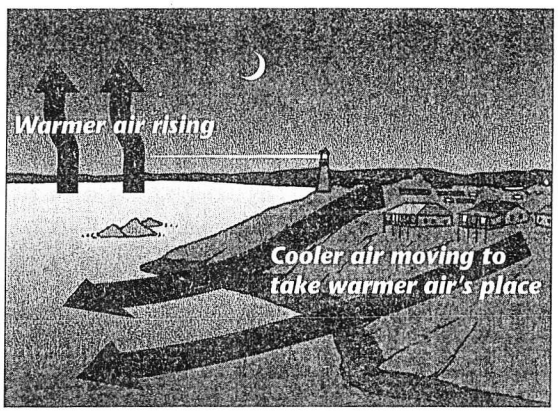
**b.** During the day, air over water is warmer than air over land.

**c.** Water cools more quickly than land.

**d.** At night, air over water is cooler than air over land.

12. Label the drawings to indicate which drawing shows a sea breeze and which drawing shows a land breeze.




_____ _____

## ▶ Monsoons (page 56)

13. Circle the letter of each sentence that is true about monsoons.

**a.** They are caused by unequal heating of land and water.

**b.** They occur in the South Atlantic.

**c.** They always blow in the same direction.

**d.** They supply the rains needed by crops.

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## ▶ Global Winds (page 57)

14. Winds that blow steadily from specific directions over long distances are called _____.

15. Circle the letter of each sentence that is true about global winds.
   a. They are created by unequal heating of Earth's surface.
   b. They are produced by the movement of air between the equator and the poles.
   c. They blow in a straight line from the poles toward the equator.
   d. They curve because of Earth's rotation.

16. As Earth rotates, the Coriolis effect causes winds in the Northern Hemisphere to turn toward the _____.

## ▶ Global Wind Belts (pages 58–60)

17. The calm areas around Earth include the _____ and the _____.

18. Complete the compare/contrast table.

| Directions of Global Wind Belts | |
|---|---|
| **Wind Belt** | **Direction It Blows** |
| | Toward the equator |
| | Toward the poles |
| | Away from the poles |

## ▶ Jet Streams (page 60)

19. Circle the letter of each sentence that is true about jet streams.
   a. They are about 100 kilometers above Earth's surface.
   b. They are hundreds of kilometers wide.
   c. They blow from east to west.
   d. They blow at speeds of 200 to 400 kilometers per hour.

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SECTION 2-4

# Water in the Atmosphere

(pages 61-66)

*This section explains what humidity is and how it is measured. The section also explains how clouds form and describes different types of clouds.*

## ▶ Introduction (page 61)

1. The process by which water molecules in liquid water escape into the air as water vapor is called _____.
2. What is the water cycle? _____

_____

## ▶ Humidity (page 62)

3. A measure of the amount of water vapor in the air is _____.
4. What is relative humidity? _____

_____

_____

5. Circle the letter of each sentence that is true about relative humidity.
   a. It is a percentage.
   b. It is all the water vapor the air can hold.
   c. It depends on air temperature.
   d. It measures how hot it feels.
6. How does evaporation of moisture from your skin help keep you comfortable on a hot day? _____

_____

_____

## ▶ Measuring Relative Humidity (pages 62-63)

7. Relative humidity can be measured with a(n) _____.

8. Circle the letter of each sentence that is true about how a psychrometer works.
   - **a.** The dry-bulb thermometer is cooled by evaporation when the wind blows.
   - **b.** The higher the humidity, the faster water evaporates from the bulb.
   - **c.** The wet-bulb thermometer reading is always higher than the dry-bulb reading.
   - **d.** When relative humidity is high, there is not much difference between wet-bulb and dry-bulb thermometer readings.

## ▶ How Clouds Form (pages 63–64)

9. Is the following sentence true or false? Clouds form when water vapor in the air becomes liquid water or ice crystals. _____

Match the term with its definition.

| Term | Definition |
|---|---|
| _____ **10.** condensation | **a.** Ice that has been deposited directly from the air onto a cold surface |
| _____ **11.** dew point | **b.** Water that condenses from the air onto a cold surface |
| _____ **12.** dew | **c.** Temperature at which condensation begins |
| _____ **13.** frost | **d.** Process by which molecules of water vapor become liquid water |

14. Circle the letter of each sentence that is true about condensation of water vapor.
   - **a.** It occurs when air gets warmer.
   - **b.** It can occur on cold surfaces.
   - **c.** It is why clouds form.
   - **d.** It occurs when air sinks.

15. What causes clouds to form on the windward side of a mountain?

_____

_____

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## ▶ Types of Clouds (pages 64–66)

Match the type of cloud with its height.

| Type of Cloud | Height |
|---|---|
| _____ 16. cumulus | a. About 2 to 18 kilometers above the surface |
| _____ 17. stratus | b. More than 6 kilometers above the surface |
| _____ 18. cirrus | c. At or near the surface |
| _____ 19. fog | d. About 2 to 6 kilometers above the surface |

20. Complete the table.

| Types of Clouds | |
|---|---|
| **Type of Cloud** | **Description** |
| | Looks like fluffy piles of cotton |
| | Forms in flat layers |
| | Looks wispy and feathery |

21. Circle the letter of each sentence that is true about cloud types.

a. Cumulus clouds are usually a sign that a storm is approaching.

b. Cumulonimbus and nimbostratus clouds produce rain or snow.

c. Altostratus clouds are lower than regular stratus clouds.

d. Cirrus clouds are made up mostly of ice crystals.

### Reading Skill Practice

When you read a section with a lot of details, writing an outline can help you organize and remember the material. Outline Section 2-4 by first writing the section headings as major topics in the order in which they appear in the book. Then, beneath each major topic, list important details about it. Title your outline *Water in the Atmosphere.* Do your work on a separate sheet of paper.

## SECTION 2–5 Precipitation (pages 67–70)

*This section explains how rain, snow, and other common types of precipitation occur and how they are measured. The section also describes how scientists try to produce rain from clouds.*

### ▶ Introduction (page 67)

1. What is precipitation? _____

_____

_____

2. Is the following sentence true or false? All clouds produce precipitation.

_____

### ▶ Types of Precipitation (pages 67–69)

3. Complete the compare/contrast table.

| Types of Precipitation | |
|---|---|
| **Type of Precipitation** | **Description** |
| | Drops of water at least 0.5 mm in diameter |
| | Ice particles smaller than 5 mm in diameter |
| | Ice pellets larger than 5 mm in diameter |
| | Ice crystals |

4. Is the following sentence true or false? The most common kind of precipitation is snow. _____

5. How do mist and drizzle differ from rain? _____

_____

_____

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6. Why do ice storms cause power failures? _____

_____

_____

Match the type of precipitation with how it forms

| Precipitation | How It Forms |
|---|---|
| _____ 7. sleet | **a.** Water vapor in a cloud is converted directly into ice crystals. |
| _____ 8. freezing rain | **b.** Ice pellets add layers of ice as they are carried up and down in a storm cloud. |
| _____ 9. hail | **c.** Raindrops freeze after they hit the ground and other surfaces. |
| _____ 10. snow | **d.** Raindrops freeze into tiny particles of ice as they fall through the air. |

11. What damage can large hailstones do? _____

_____

_____

## ▶ Measuring Precipitation (page 69)

12. Meteorologists measure rainfall with a(n) _____.

13. Is the following sentence true or false? On average, 10 centimeters of snow contains about the same amount of water as 5 centimeters of rain. _____

## ▶ Controlling Precipitation (page 70)

14. Long periods of unusually low precipitation are called _____.

15. Circle the letter of each sentence that is true about cloud seeding.

**a.** It is the most common way to produce rain from clouds.

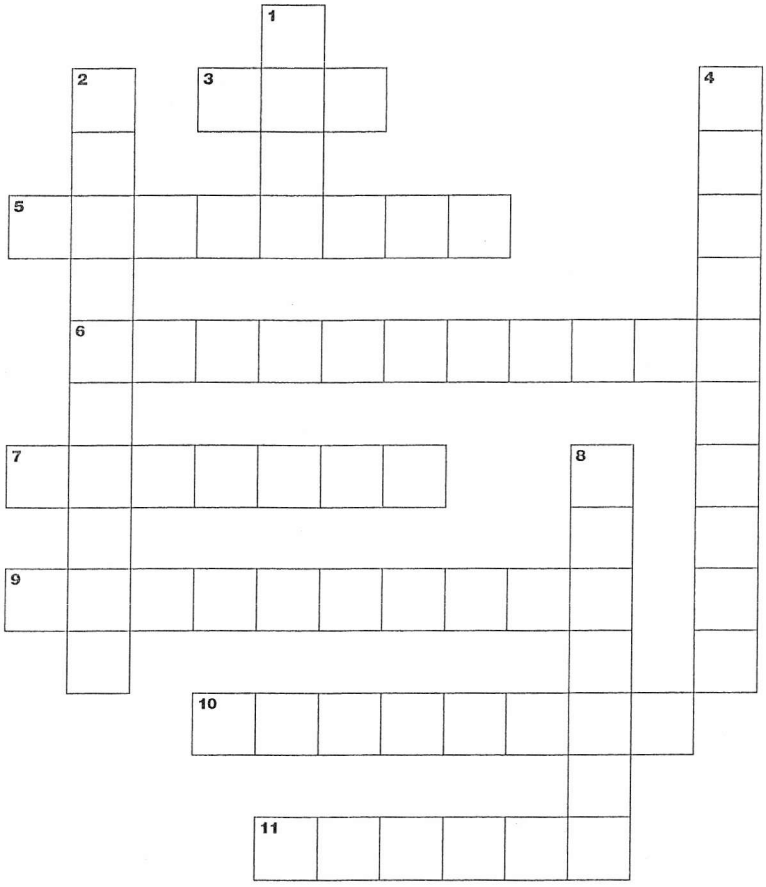
**b.** It adds water vapor to the air so clouds will form.

**c.** It adds particles to clouds so water vapor can condense.

**d.** It has been used to clear fog from airports.

## WordWise

*Test your knowledge of key terms from Chapter 2 by solving the crossword puzzle.*




### Clues down

1. The energy transferred from a hotter object to a cooler one
2. Reflection of light in all directions
4. Transfer of heat by movements of a fluid
8. Clouds that form in flat layers

### Clues across

3. Type of breeze that blows from an ocean or lake to the land
5. Distance north or south from the equator measured in degrees
6. Average amount of energy of motion in the molecules of a substance
7. Water shortage caused by long periods of low precipitation
9. Instrument used to measure wind speed
10. Measure of the amount of water vapor in the air
11. Clouds made mostly of ice crystals that form high above Earth