<table>
<thead>
<tr>
<th>Conditions/Region</th>
<th>Formation</th>
<th>Aftermath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tornado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurricane</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Understanding Weather

**MATCHING**

Match the correct definition with the correct term. Write the letter in the space provided.

1. amount of water vapor in the air  
2. process in which liquid turns to vapor  
3. area of high pressure where air moves apart and sinks  
4. the temperature to which air must cool to be saturated  
5. process in which water vapor turns to liquid  
6. area of low pressure where air masses meet and rise  
7. area in which two types of air masses meet

a. dew point  
b. anticyclone  
c. humidity  
d. evaporation  
e. front  
f. condensation  
g. cyclone

**MULTIPLE CHOICE**

Write the letter of the correct answer in the space provided.

8. What kind of weather does a stationary front bring?
   a. drizzly rain followed by clear weather  
   b. severe storms  
   c. many days of cloudy, wet weather  
   d. cold, dry weather

9. If there is a tornado warning for your area, you should
   a. find a high place to stay.
   b. go to a room with no windows.
   c. cover your windows with plywood.
   d. not listen to the radio

10. Which statement about tornadoes is correct?
    a. They are a very common part of thunderstorms.
    b. Seventy-five percent of the world's tornadoes occur in the United States.
    c. Their danger is mainly from the heavy rains they bring.
    d. They are the strongest storms on Earth.
11. A storm surge is a dangerous part of
   a. a tornado.
   b. a thunderstorm.
   c. the water cycle.
   d. a hurricane.

12. Which describes an altocumulus cloud?
   a. high, feathery cloud
   b. puffy mid-level cloud
   c. low storm cloud
   d. high cloud made of ice crystals

13. Isobars help meteorologists by
   a. creating an image of weather systems
   b. showing what form precipitation will take.
   c. measuring wind speeds.
   d. showing high and low pressure areas.

14. Lightning is an electric discharge between a positively charged area
   and
   a. a rising air mass.
   b. a source region.
   c. another positively charged area.
   d. a negatively charged area.

15. Meteorologists track cyclones and anticyclones because they
   a. are dangerous forms of severe weather.
   b. help predict stormy or clear weather.
   c. help forecast weather weeks in the future.
   d. give more accurate facts than fronts.

16. Which statement about hail is correct?
   a. It is rain that falls through a layer of freezing air.
   b. It may be sent up into the clouds many times.
   c. It forms in winter in low stratus clouds.
   d. It is a liquid form of precipitation.
MATCHING

Match the correct description with the correct term. Write the letter in the space provided.

17. tracks the location, movement, and amount of precipitation
   a. anemometer

18. consists of two thermometers
   b. radar

19. measures air temperature
   c. barometer

20. measures wind speed
   d. psychrometer

21. measures air pressure
   e. thermometer
MATCHING
Match the labels to the map. Write the letters in the space provided.

SOURCE REGIONS FOR AIR MASSES THAT INFLUENCE WEATHER IN NORTH AMERICA

22. mP
23. cP
24. mT
25. cT
**BEFORE YOU READ**

After you read this section, you should be able to answer these questions:

- How is an air mass different from a front?
- How do fronts affect weather?

**STUDY TIP**

Summarize As you read, make a chart comparing the four kinds of fronts. In your chart, describe how each kind of front forms and what kind of weather it can cause.

**READING CHECK**

1. Identify How do scientists classify air masses?

2. Apply Concepts Describe the temperature and moisture content of a CT air mass.
COLD AIR MASSES
Most of the cold winter weather in the United States comes from three polar air masses. Continental polar (cP) air masses form over northern Canada. They bring extremely cold winter weather. In the summer, cP air masses can bring cool, dry weather.

Maritime polar (mP) air masses form over the North Pacific Ocean. They are cool and very wet. They bring rain and snow to the Pacific Coast in winter. They bring fog in the summer.

Maritime polar air masses also form over the North Atlantic Ocean. They bring cool, cloudy weather and precipitation to New England.

WARM AIR MASSES
Four warm air masses influence the weather in the United States. Maritime tropical (mT) air masses form over warm areas in the Pacific Ocean, the Gulf of Mexico, and the Atlantic Ocean. They move across the East Coast and into the Midwest. In summer they bring heat, humidity, hurricanes, and thunderstorms to these areas.

Continental tropical air masses (cT) form over deserts and move northward. They bring clear, dry, hot weather in the summer.

<table>
<thead>
<tr>
<th>Air mass</th>
<th>How It affects weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>cP from northern Canada</td>
<td></td>
</tr>
<tr>
<td>mP from the North Pacific Ocean</td>
<td></td>
</tr>
<tr>
<td>mT from the Gulf of Mexico</td>
<td></td>
</tr>
<tr>
<td>cT from the deserts</td>
<td></td>
</tr>
</tbody>
</table>

What Are Fronts?
The place where two or more air masses meet is called a front. When air masses meet, the less dense air mass rises over the denser air mass. Warm air is less dense than cold air. Therefore, a warm air mass will generally rise above a cold air mass. There are four main kinds of fronts: cold fronts, warm fronts, occluded fronts, and stationary fronts.
COLD FRONTS

A cold front forms when a cold air mass moves under a warm air mass. The cold air pushes the warm air mass up. The cold air mass replaces the warm air mass. Cold fronts can move quickly and bring heavy precipitation. When a cold front has passed, the weather is usually cooler. This is because a cold, dry air mass moves in behind the cold front.

WARM FRONTS

A warm front forms when a warm air mass moves in over a cold air mass that is leaving an area. The warm air replaces the cold air as the cold air moves away. Warm fronts can bring light rain. They are followed by clear, warm weather.

TAKE A LOOK

7. Describe What happens to the warm air mass at a cold front?

8. Define What is a warm front?
SECTION 2 Air Masses and Fronts continued

OCCLUDED FRONTS
An occluded front forms when a warm air mass is caught between two cold air masses. Occluded fronts bring cool temperatures and large amounts of rain and snow.

TAKE A LOOK
9. Describe What happens to the warm air mass in an occluded front?

STATIONARY FRONT
A stationary front forms when a cold air mass and a warm air mass move toward each other. Neither air mass has enough energy to push the other out of the way. Therefore, the two air masses remain in the same place. Stationary fronts cause many days of cloudy, wet weather.

TAKE A LOOK
10. Infer What do you think is the reason that stationary fronts bring many days of the same weather?

A stationary front forms when air masses stay in one place.
How Does Air Pressure Affect Weather?

Remember that air produces pressure. However, air pressure is not always the same everywhere. Areas with different pressures can cause changes in the weather. These areas may have lower or higher air pressure than their surroundings.

A **cyclone** is an area of the atmosphere that has lower pressure than the surrounding air. The air in the cyclone rises. As the air rises, it cools. Clouds can form and may cause rainy or stormy weather.

An **anticyclone** is an area of the atmosphere that has higher pressure than the surrounding air. Air in anticyclones sinks and gets warmer. Its relative humidity decreases. This warm, sinking air can bring dry, clear weather.

Cyclones and anticyclones can affect each other. Air moving out from the center of an anticyclone moves toward areas of low pressure. This movement can form a cyclone. The figure below shows how cyclones and anticyclones can affect each other.

![Diagram of cyclone and anticyclone](image)

**Critical Thinking**

11. Compare and give two differences between cyclones and anticyclones.

---

**TAKE A LOOK**

12. Identify in which direction does air move: from a cyclone to an anticyclone, or from an anticyclone to a cyclone?
**Section 2 Review**

**SECTION VOCABULARY**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Mass</td>
<td>A large body of air throughout which temperature and moisture content are similar.</td>
</tr>
<tr>
<td>Anticyclone</td>
<td>The rotation of air around a high pressure center in the direction opposite to Earth's rotation.</td>
</tr>
<tr>
<td>Cyclone</td>
<td>An area in the atmosphere that has lower pressure than the surrounding areas and has winds that spiral toward the center.</td>
</tr>
<tr>
<td>Front</td>
<td>The boundary between air masses of different densities and usually different temperatures.</td>
</tr>
</tbody>
</table>

1. **Identify Relationships** How are fronts and air masses related?

2. **Compare** Fill in the table to describe cyclones and anticyclones.

<table>
<thead>
<tr>
<th>Name</th>
<th>Compared to surrounding air pressure, the pressure in the middle is...</th>
<th>What does the air inside it do?</th>
<th>What kind of weather does it cause?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclone</td>
<td>Lower than surrounding pressure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anticyclone</td>
<td>Sinks and warms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **List** What are four kinds of fronts?

4. **Identify** What are the source regions for the mT air masses that affect weather in the United States?

5. **Describe** What kind of air mass causes hot, clear, dry summer weather in the United States?
Air Masses and Fronts
USING KEY TERMS
For each pair of terms, explain how the meanings of the terms differ.

1. front and air mass

2. cyclone and anticyclone

UNDERSTANDING KEY IDEAS

3. What kind of front forms when a cold air mass displaces a warm air mass?
   a. a cold front
   b. a warm front
   c. an occluded front
   d. a stationary front

4. What are the major air masses that influence the weather in the United States?

5. What is one source region of a maritime polar air mass?

6. What are the characteristics of an air mass whose two-letter symbol is cP?

7. What are the four major types of fronts?
Section Review continued

8. How do fronts cause weather changes?

9. How do cyclones and anticyclones affect the weather?

MATH SKILLS
10. A cold front is moving toward the town of La Porte at 36 km/h. The front is 200 km away from La Porte. How long will it take for the front to get to La Porte? Show your work below.

CRITICAL THINKING
11. Applying Concepts How do air masses that form over the land and ocean affect weather in the United States?

12. Identifying Relationships Why does the Pacific Coast have cool, wet winters and warm, dry summers? Explain.

Skills Worksheet

Vocabulary and Section Summary

Air Masses and Fronts

VOCABULARY

In your own words, write a definition of the following terms in the space provided.

1. air mass

2. front

3. cyclone

4. anticyclone

SECTION SUMMARY

Read the following section summary.

- Air masses are characterized by their moisture content and temperature.
- A front occurs where two air masses meet.
- Four major types of fronts are cold, warm, occluded, and stationary fronts.
- Differences in air pressure cause cyclones, which bring stormy weather, and anticyclones, which bring dry, clear weather.
Section: Air Masses and Fronts
1. What causes changes in the weather?

---

2. What is a large body of air that has similar temperature and moisture throughout called?

---

AIR MASSES
3. What are the two main characteristics of air masses?
   a. density and moisture
   b. mass and temperature
   c. moisture content and temperature
   d. shape and mass

4. On weather maps, a two-letter symbol system is used to describe the characteristics of each air mass. Give the four letters used in this system, and tell what each letter represents.

---

5. Name three places where polar air masses form and cause cold winter weather in the United States.

---

6. Which warm air mass that influences the weather in the United States develops over land?

---

7. Which air masses cause the hurricanes and thunderstorms that occur on the East Coast and in the Midwest?
FRONTS

8. What usually happens when two types of air masses meet?
   a. Cold air rises.
   b. Warm air rises.
   c. The masses disappear.
   d. Air from the two masses mixes together.

9. The boundary between air masses of different densities and usually different temperatures is called a(n) ____________________.

Match the correct description with the correct term. Write the letter in the space provided.

10. A warm air mass moves over a cold, denser air mass.
    a. cold front
    b. warm front
    c. occluded front
    d. stationary front

11. A warm air mass is caught between two colder air masses.

12. A cold air mass meets a warm air mass but the two remain separated.

13. A cold air mass moves under a warm, less dense air mass.

14. Describe the typical weather brought by each front below.
    Cold front:
    ____________________
    ____________________
    ____________________
    ____________________

    Warm front:
    ____________________
    ____________________
    ____________________
    ____________________

    Occluded front:
    ____________________
    ____________________
    ____________________
    ____________________

    Stationary front:
    ____________________
    ____________________
    ____________________
    ____________________

AIR PRESSURE AND WEATHER

15. An area in the atmosphere that has lower pressure than the surrounding areas, with winds spiraling toward the center, is called a(n) ____________________.
16. The rotation of air around a high-pressure center is called
   an (n) ____________________________

17. How are cyclones formed?
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

18. How does a cyclone affect the weather?
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

19. How does an anticyclone affect the weather?
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
Section Quiz

Section: Air Masses and Fronts
Write the letter of the correct answer in the space provided.

1. Which of the following describes an air mass with the symbol cT?
   a. cold and wet
   b. cold and dry
   c. warm and wet
   d. warm and dry

2. A continental polar air mass forms in
   a. the Pacific Ocean.
   b. northern Canada.
   c. the Gulf of Mexico.
   d. the desert Southwest.

3. How does a warm front form?
   a. Warm air becomes caught between cold air masses.
   b. Two air masses meet and stay separated.
   c. Warm air moves over cold air and replaces it.
   d. Cold air moves under warm air and pushes it up.

4. What kind of weather would an occluded front likely bring?
   a. sunny and warm
   b. much precipitation
   c. thunderstorms
   d. cold and dry

5. How do winds behave in a cyclone?
   a. They spiral toward the center.
   b. They spiral out toward low pressure areas.
   c. They are very calm.
   d. They travel in two different directions.

6. Which of the following statements describes an anticyclone?
   a. It is an area of low pressure.
   b. It is an area of high pressure.
   c. It has air masses that meet and rise.
   d. It moves in the direction of the Earth's rotation.

7. What kind of weather would an anticyclone likely bring?
   a. stormy
   b. cool and wet
   c. dry and clear
   d. changeable
What Is Weather?
Knowing about the weather is important in our daily lives. Your plans to go outside can change if it rains. Being prepared for extreme weather conditions, such as hurricanes and tornadoes, can even save your life.

Weather is the condition of the atmosphere at a certain time and place. Weather depends a lot on the amount of water in the air. Therefore, to understand weather, you need to understand the water cycle.

THE WATER CYCLE
The movement of water between the atmosphere, the land, and the oceans is called the water cycle. The sun is the main source of energy for the water cycle. The sun's energy heats Earth's surface. This causes liquid water to evaporate, or change into water vapor (a gas). When the water vapor cools, it may change back into a liquid and form clouds. This is called condensation. The liquid water may fall as rain, snow, sleet, or hail on the land.
What Is Humidity?

Water vapor makes up only a small fraction of the mass of the atmosphere. However, this small amount of water vapor has an important effect on weather and climate. When the sun's energy heats up Earth's surface, water in oceans and water bodies evaporates. The amount of water vapor in the air is called humidity. Warmer air can hold more water vapor than cooler air can.

RELATIVE HUMIDITY

Scientists often describe the amount of water in the air using relative humidity. Relative humidity is the ratio of the amount of water vapor in the air to the greatest amount the air can hold.

There are two steps to calculating relative humidity. First, divide the amount of water in a volume of air by the maximum amount of water that volume of air can hold. Then, multiply by 100 to get a percentage. For example, 1 m³ of air at 25°C can hold up to about 23 g of water vapor. If air at 25°C in a certain place contains only 18 g/m³ of water vapor, then the relative humidity is:

\[
\frac{18 \text{ g/m}^3}{23 \text{ g/m}^3} \times 100 = 78\% \text{ relative humidity}
\]
FACTORs AFFECTING RELATIVE HUMIDITY

Temperature and humidity can affect relative humidity. As humidity increases, relative humidity increases if the temperature stays the same. Relative humidity decreases as temperature rises and increases as temperature drops if the humidity stays the same.

MEASURING RELATIVE HUMIDITY

Scientists measure relative humidity using special tools. One of these tools is called a psychrometer. A psychrometer contains two thermometers. The bulb of one thermometer is covered with a wet cloth. This is called a wet-bulb thermometer. The other thermometer bulb is dry. This thermometer is a dry-bulb thermometer.

You are probably most familiar with dry-bulb thermometers. Wet-bulb thermometers work differently than dry-bulb thermometers. As air passes through the cloth on a wet-bulb thermometer, some of the water in the cloth evaporates. As the water evaporates, the cloth cools. The wet-bulb thermometer shows the temperature of the cloth.

If humidity is low, the water evaporates more quickly. Therefore, the temperature reading on the wet-bulb thermometer is much lower than the reading on the dry-bulb thermometer. If the humidity is high, less water evaporates. Therefore, the temperature changes very little.

The difference in temperature readings between the dry-bulb and wet-bulb thermometers is a measure of the relative humidity. The larger the difference between the readings, the lower the relative humidity.
USING A RELATIVE-HUMIDITY TABLE

Scientists use tables like the one below to determine relative humidity. Use the table to work through the following example.

The dry-bulb thermometer on a psychrometer reads 10°C. The wet-bulb thermometer reads 7°C. Therefore, the difference between the thermometer readings is 3°C. In the first column of the table, find the row head for 10°C, the dry-bulb reading. Then, find the column head for 3°C, the difference between the readings. Find the place where the row and column meet. The number in the table at this point is 66, so the relative humidity is 66%.

<table>
<thead>
<tr>
<th>Dry-bulb reading (°C)</th>
<th>Difference between wet-bulb reading and dry-bulb reading (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>0</td>
<td>81 64 46 29 13</td>
</tr>
<tr>
<td>2</td>
<td>84 68 52 37 22 7</td>
</tr>
<tr>
<td>4</td>
<td>85 71 57 43 29 16</td>
</tr>
<tr>
<td>6</td>
<td>86 73 60 48 35 24</td>
</tr>
<tr>
<td>8</td>
<td>87 75 63 51 40 29</td>
</tr>
<tr>
<td>10</td>
<td>88 77 66 55 44 34 24</td>
</tr>
<tr>
<td>12</td>
<td>59 78 68 58 48 39 29</td>
</tr>
<tr>
<td>14</td>
<td>90 79 70 60 51 42 34 26</td>
</tr>
<tr>
<td>16</td>
<td>90 81 71 63 54 46 38 30</td>
</tr>
<tr>
<td>18</td>
<td>91 82 73 65 57 49 41 34</td>
</tr>
<tr>
<td>20</td>
<td>91 83 74 66 59 51 44 37</td>
</tr>
</tbody>
</table>

TAKE A LOOK
8. Apply Concepts The dry-bulb reading on a psychrometer is 8°C. The wet-bulb reading is 7°C. What is the relative humidity?

What is Dew Point?
What happens when relative humidity reaches 100%? At this point, the air is saturated with water vapor. The temperature at which this happens is the dew point. At temperatures below the dew point, liquid water droplets can form from the water vapor in the air. What happens when air is saturated with water vapor? Air can become saturated if water evaporates and enters the air as water vapor. Air can also become saturated when it cools below its dew point.
AN EVERYDAY EXAMPLE
You have probably seen air become saturated because of a temperature decrease. For example, when you add ice cubes to a glass of juice, the temperatures of the juice and the glass decrease. The glass absorbs heat from the air, so the temperature of the air near the glass decreases. When the air's temperature drops below its dew point, water vapor condenses on the glass. The condensed water forms droplets on the glass.

How Do Clouds Form?
A cloud is a group of millions of tiny water droplets or ice crystals. Clouds form as air rises and cools. When air cools below the dew point, water droplets or ice crystals form. Water droplets form when water condenses above 0°C. Ice crystals form when water condenses below 0°C.

DIFFERENT KINDS OF CLOUDS
Scientists classify clouds by shape and altitude. The three main cloud shapes are stratus clouds, cumulus clouds, and cirrus clouds. The three altitude groups are low clouds, middle clouds, and high clouds. The figure on the next page shows these different cloud types.
**SECTION 1 Water in the Air continued**

**Say It**
Observe and Describe Look at the clouds every day for a week. Each day, write down the weather and what the clouds looked like. At the end of the week, share your observations with a small group. How was the weather related to the kinds of clouds you saw each day?

**Take a Look**
13. Compare How is a nimbostratus cloud different from a stratus cloud?

**What Is Precipitation?**
Water in the air can return to Earth's surface through precipitation. Precipitation is solid or liquid water that falls to Earth's surface from clouds. There are four main kinds of precipitation: rain, snow, sleet, and hail. Rain and snow are the most common kinds of precipitation. Sleet and hail are less common. 

**Reading Check**
14. Define What is precipitation?
**RAIN**

Water droplets in clouds are very tiny. Each droplet is smaller than the period at the end of this sentence. These tiny droplets can combine with each other. As the droplets combine, they become larger. When a droplet reaches a certain size, it can fall to Earth’s surface as rain.

**SLEET**

Sleet forms when rain falls through a layer of very cold air. If the air is cold enough, the rain freezes in the air and becomes falling ice. Sleet can make roads very slippery. When it lands on objects, sleet can coat the objects in ice.

**SNOW**

Snow forms when temperatures are so low that water vapor turns directly into a solid. That is, the water vapor in the cloud turns into an ice crystal without becoming a liquid first. Snow can fall as single ice crystals. In many cases, the crystals join together to form larger snowflakes.

**HAIL**

Balls or lumps of ice that fall from clouds are called hail. Hail forms in cumulonimbus clouds. Hail can become very large. Hail grows larger in a cycle, as shown in the chart below.

1. Rising air in a cloud carries raindrops to the top of the cloud.
2. Low temperatures at the top of the cloud cause the raindrops to freeze, forming tiny pieces of hail.
3. The hail falls through the cloud, and more raindrops collect on it.
4. Another body of rising air carries the hail into the top of the cloud again. There, the rain freezes to the hail, making the hail larger.
5. Eventually, the hail becomes too heavy to be carried by the rising air. It falls to Earth’s surface.
Section 1 Review

SECTION VOCABULARY

cloud: a collection of small water droplets or ice crystals suspended in the air, which forms when the air is cooled and condensation occurs
condensation: the change of state from a gas to a liquid
humidity: the amount of water vapor in the air
precipitation: any form of water that falls to Earth’s surface from the clouds
relative humidity: the ratio of the amount of water vapor in the air to the amount of water vapor needed to reach saturation at a given temperature
weather: the short-term state of the atmosphere, including temperature, humidity, precipitation, wind, and visibility

1. Identify Relationships How is dew point related to condensation?

2. Identify What is the main source of energy for the water cycle?

3. Explain How do clouds form?

4. Compare What is the difference between sleet and snow?

5. Apply Concepts Fill in the spaces in the table to describe different kinds of clouds.

<table>
<thead>
<tr>
<th>Name</th>
<th>Altitude</th>
<th>Shape</th>
<th>Precipitation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cirrostratus</td>
<td>high</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>Altocumulus</td>
<td></td>
<td>puffy</td>
<td></td>
</tr>
<tr>
<td>Nimbostratus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulonimbus</td>
<td>low to middle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Interactive Textbook 114 Understanding Weather
Section Review

Water in the Air

USING KEY TERMS

1. In your own words, write a definition for each of the following terms: relative humidity, condensation, cloud, and precipitation.

UNDERSTANDING KEY IDEAS

2. Which of the following clouds is most likely to produce light to heavy, continuous rain?
   a. cumulus cloud
   b. cumulonimbus cloud
   c. nimbostratus cloud
   d. cirrus cloud

3. How is relative humidity affected by the amount of water vapor in the air?

4. What does a relative humidity of 75% mean?

5. Describe the path of water through the water cycle.

6. What are four types of precipitation?
CRITICAL THINKING

7. Applying Concepts Why are some clouds formed from water droplets, while others are made up of ice crystals?

8. Applying Concepts How can rain and hail fall from the same cumulonimbus cloud?

9. Identifying Relationships What happens to relative humidity as the air temperature drops below the dew point?

INTERPRETING GRAPHICS

Use the image in your textbook on the Section Review page to answer the following questions.

10. What type of cloud is shown in the image?

11. How is this type of cloud formed?

12. What type of weather can you expect when you see this type of cloud? Explain.
Water In the Air

VOCABULARY

In your own words, write a definition of the following terms in the space provided.

1. weather

2. humidity

3. relative humidity

4. condensation

5. cloud

6. precipitation
SECTION SUMMARY

Read the following section summary.

- Weather is the condition of the atmosphere at a certain time and place. It is affected by the amount of water vapor in the air.
- The water cycle describes the movement of water above, on, and below Earth's surface.
- Humidity describes the amount of water vapor in the air. Relative humidity is a way to express humidity.
- When the temperature of the air cools to its dew point, the air has reached saturation and condensation occurs.
- Clouds form as air cools to its dew point. Clouds are classified by form and by the altitude at which they form.
- Precipitation occurs when the water vapor that condenses in the atmosphere falls back to Earth in solid or liquid form.
Section: Water in the Air

1. The condition of the atmosphere at a certain time and place is called _____________.

THE WATER CYCLE

2. How does water get from Earth's surface into the air?
   a. through precipitation
   b. through condensation
   c. through evaporation
   d. through runoff

3. Clouds form in the process of
   a. precipitation.
   b. evaporation.
   c. condensation.
   d. runoff.

4. Rain, snow, sleet, and hail are all forms of
   a. condensation.
   b. evaporation.
   c. precipitation.
   d. runoff.

5. Water that flows across land and collects in rivers, streams, and the ocean is called _____________.

6. What is the water cycle?
   _____________.
   _____________.
   _____________.
HUMIDITY

Match the correct definition with the correct term. Write the letter in the space provided.

7. an instrument that measures relative humidity
   a. humidity
   b. relative humidity
   c. saturated
   d. psychrometer

8. the amount of water vapor in the air compared with the maximum it can hold at a given temperature

9. air that holds all the water it can at a given temperature

10. the amount of water vapor in the air

11. What happens to air's ability to hold water vapor as the air gets warmer?

12. What is the relative humidity of air that holds all the water it can at a given temperature?

13. What happens to the relative humidity if the amount of water vapor in the air stays the same but the air gets cooler?

14. Explain how you would use a wet-bulb thermometer and a dry-bulb thermometer to find the relative humidity.

CONDENSATION

15. The change of state from a gas to a liquid is called
   a. humidity.
   b. condensation.
   c. water vapor.
   d. saturation.
16. When air cools to a temperature at which it is saturated, the air has reached its
   a. relative humidity.
   b. evaporation point.
   c. dew point.
   d. condensation point.

17. Why do water droplets form on the outside of a glass of ice water?

18. What are two ways in which air can become saturated?

CLOUDS

19. What is a cloud made of?

20. What are two ways in which clouds are classified?

Match the correct description with the correct term. Write the letter in the space provided.

21. cover large areas and form in layers
   a. cirrus clouds

22. found at high altitudes and form when the wind is strong
   b. nimbostratus clouds

23. produce thunderstorms
   c. cumulus clouds

24. have flat bottoms and often indicate fair weather
   d. cumulonimbus clouds

25. produce continuous rain
   e. stratus clouds
Match the correct definition with the correct term. Write the letter in the space provided.

26. prefix for clouds at middle altitudes       a. cirro-

27. prefix for clouds at high altitudes       b. alto-

**PRECIPITATION**

28. Water that returns to Earth in liquid or solid form is
   a. precipitation.
   b. runoff.
   c. cloud formations.
   d. relative humidity.

29. A water droplet in a cloud becomes rain when its diameter increases to how many times its original size?
   a. 10
   b. 5
   c. 50
   d. 100

30. How does sleet form?

31. How does snow form?

32. Why can hail become very large and heavy?
Section Quiz

Section: Water in the Air

Match the correct definition with the correct term. Write the letter in the space provided.

1. amount of water vapor in the air compared to the maximum it can hold
a. precipitation
b. condensation
c. weather
d. humidity
e. relative humidity
f. cloud

2. process in which water vapor cools and turns to liquid

3. collection of water droplets suspended in the air

4. amount of water vapor in the air

5. water that falls to the Earth’s surface as rain, snow, sleet, or hail

6. condition of the atmosphere at a certain time and place

Write the letter of the correct answer in the space provided.

7. What role does runoff play in the water cycle?
   a. It is the process in which liquid turns to water vapor.
   b. It carries water from precipitation into oceans.
   c. It takes water out of the water cycle.
   d. It is not part of the water cycle.

8. What happens when air reaches its dew point?
   a. Condensation occurs.
   b. Relative humidity is 100%.
   c. The humidity decreases.
   d. Clouds form.

9. What kind of weather will nimbostatus clouds likely bring?
   a. sunny
   b. warm
c. rainy
d. thunderstorms

10. How does sleet differ from snow?
    a. It is not a form of precipitation.
    b. It is liquid and not ice.
    c. It starts as rain and freezes in the air.
    d. It starts as water vapor and changes to a solid.
DAY 21

Name/Homeroom:

Greece - Geography

The northern mountain areas of Greece have an alpine climate.

And the black dots. Label these cities correctly.
- Athens
- Sparta
- Rhodes

Lightly shade or color the following items as directed.
- Central plain = orange
- Greece = green
- Water = blue
- Other countries = brown
- Islands (big and small) = green

Greece is a peninsula that is surrounded by three seas. Label each of these seas in the correct location.
- Aegean Sea
- Ionian Sea
- Mediterranean Sea

Greece is surrounded by Albania, Bulgaria, Macedonia, & Turkey. Label them.

Find the following islands and label them correctly.
- Crete
- Rhodes

Greece has over 3000 islands, but only 227 of them are inhabited.

Directions:
2. Look for * the map and label or color items/locations as directed
3. Add a COMPASS Rose on the map including the Cardinal Directions and 4 Intermediate Directions

Total Points: ____/25 (there are 25 things you need to either label, color, or add to the map)
DAY 22

Name/Homeroom:

Directions: Using your map from DAY 21 assignment and textbook pages (Blue SS text 228-233 and R9) and pages (Green SS text 254-259 and R9) complete the document below.

Greece is located on the continent of ___________. Greece is directly south east of the continent of ___________ and directly north of the continent of ___________. Surrounded by water on ______ sides makes Greece a ___________. The three seas that surround Greece are the ________ sea, the ___________ sea and the ___________ sea. Modern day Greece has ______ neighboring countries that it shares a border with. Those neighbors are ___________, ___________, ___________, and ___________.

There are thousands of islands that make up Greece. Although there are over ______ islands in Greece, people only live on about ______ of them. ______ is a major island located _______ of mainland Greece. It was home to one of the earliest Greek cultures. The people living on that island were part of the _________ culture. Living on an island they became expert _______________. Some of the goods they carried included __________, __________, and __________. They traded these goods for ______, ______, ______, and ______ all around the ___________ sea.

Greece is a mountainous country made up of many islands. This made __________ difficult and therefore communities were _________ from each other. As a result, Greeks created their own _________ and ways of life. Rugged mountains made inland travel difficult so Greeks became experts traveling on the _______. Greece has two mountains that were important in ancient times. Mount ____________ is located in the northern part of the country and was home to the Greek gods. Mount ____________, in the center of Greece, was close to the town of Delphi and was sacred to the God Apollo. The majority of Greece has a Mediterranean climate which has ___________ summers. In the north there is an ________ climate with cool and wet weather.

There were many different city-states in Ancient Greece, but the two biggests on mainland Greece were _________ and __________. The Greeks called their city-states a __________. City-states were built on top of a high hill called the __________ and was built around a strong _______ and surrounded by ______ for added protection.

TOTAL POINTS: _______/41
Early Rulers of Athens

Directions: Use SS textbook pages (Green SS text 262-267 and Blue SS text 236-241) to complete the items below.

For each ruler listed below FIRST write down 3 important notes summarizing their time as ruler in Athens, THEN come up with a short hashtag phrase summarizing their rule in Athens. For example #SSRocks!

DRACO

•

•

•

#

SOLON

•

•

•

#

CLEISTHENES

•

•

•

#

PERICLES

•

•

•

#
DAY 24

Name/HR: ____________________________ Total Points: ______/100

Directions: Read the article AND pages (GREEN SS text 264-267 or BLUE SS text 238-241) and then complete the task below.

**What was Democracy like over 2400 years ago in ancient Athens?**

Direct Democracy: A form of direct democracy in ancient Greece was practiced in the ancient city-state of Athens for about 100 years. It was an experiment. The people really liked it. How it worked is that all adult citizens had to take an active part in government (rule by many) if called on to do so. At this time, citizens were free men. Women, children, and slaves were not citizens, and thus could not participate or vote.

![Image of people voting]

Each year, there was a drawing. Five hundred (500) names were drawn from a pool of all the citizens of ancient Athens. Those 500 citizens had to serve for one year. During that year, they were responsible for making new laws and for changing old laws as they saw fit. But, nothing they did became law until all the citizens of Athens had a chance to vote yes or no. To vote, citizens had to attend the assembly on the day the vote was taken. The date was posted. It was not a secret, but you had to be present to vote. Majority ruled.

This form of government is called a direct democracy. Athens' experiment with democracy came to an end after Athens lost a war with Sparta. This was the Peloponnesian War. For a while, Athens was ruled by a small group of Spartans.

But, for about 100 years, thousands of years ago, ancient Athens had a direct democracy, or a government in which all citizens vote on rules and laws. It is one of their finest gifts from the Greeks!

**TASK:**

1. Explain where voting took place in Athens.

2. List 5 steps Athenians took before casting a vote.

3. How is voting in the United States different from ancient Athens?

4. What type of democracy does the United States of America have?

5. What are some differences between democracy in America versus Athenian democracy?
DAY 25
Greek Mythology & Literature

Name/Homeroom:

Directions:
Use the following pages to complete the crossword puzzle:
Blue SS textbook pages 242 to 249
Green SS textbook pages 268-275

TOTAL POINTS: ______/100

Across
2. Have inspired artists for centuries
4. Contests ancient Greeks held to honor their gods
7. King of the gods
9. City named after goddess of wisdom
10. Goddess Greeks believed created the seasons
12. Short stories that teach readers lessons about life
15. City in southern Greece where Olympic games were held every four years
17. Type of poem describing deeds of heroes
18. Fought and killed the hydra

Down
1. Greeks built these to keep gods happy
3. Wrote the Iliad and the Odyssey
4. Greek hero who faced challenges in the Odyssey
5. Tells story of the Trojan War
6. City where female priest of Apollo gave advice
8. Woman who wrote beautiful/emotional lyric poetry
11. Stories about gods/heroes that try to explain how world works
13. Great Greek warrior killed when arrow struck his heel
14. Type of poem set to music
16. God of war
DAY 26

Name
Subject Teacher
Subject/Homeroom
Date

Greece and Persia: Chapter 9/10 - Section 1
(Blue Textbook p.260-265, Green Textbook p.286-291)

If YOU were there...(Read and answer the question)
Whose advice do you take? Why?

Main Ideas
1.
2.
3.

The Big Idea

Key Terms and People
1. Cyrus the Great
2. Cavalry
3. Darius I
4. Persian Wars
5. Xeres I
3. Spartans send 1,400 soldiers to Thermopylae to slow Persian army
   a.
   b.
   c.
   d. After winning battle, Persians head Athens, attack, and burn city

4. Athenians defeat Persian navy with clever plan
   a.
   b.
   c.

5. Following Battle Salamis, Greeks beat Persians at Plataea, end Persian wars, Persians leave Greece
DAY 27

Name
Subject Teacher
Subject/Homeroom
Date

Greece and Persia: Chapter 9/10 - Section 1
(Blue Textbook p.260-265, Green Textbook p.286-291)

Section 1 Assessment

1a. Describe what areas or territories were included in Cyrus the Great's empire.

1b. Why did peoples conquered by Cyrus the Great seldom rebel?

2a. How did Darius I change Persia's political organization?

2b. How did Persia's roads help improve the empire's organization?

3a. Why did Persia want to invade Greece?

3b. How might the Persian wars have ended if the Spartans had not slowed the Persians down at Thermopylae?
DAY 28

Greece and Persia: Chapter 9/10 - Section 1
(Blue Textbook p.260-265, Green Textbook p.286-291)

Study the visual on page 261 (Blue SS text) or page 287 (Green SS text).

1. What is the main idea of the visual?

2. The visual you see on page 261 or 287 is located on what continent?

3. Which Persian leader conquered the most territory?

4. The Royal Road connected which two Persian cities?

5. Study the map key. What color is used to represent the Royal Road?

Study the visual on page 262 (Blue SS text) or page 288 (Green SS text).

1. What is the main idea of the visual?

2. Describe what is going on in the visual?

3. Why do you think Darius appears larger than the official he is meeting with?
DAY 29

Name
Subject/Teacher
Subject/Homeroom
Date

**Greece and Persia: Chapter 9/10 - Section 1**
(Blue Textbook p.260-265, Green Textbook p.286-291)

**Study the visual on page 263 (Blue SS text) or page 289 (Green SS text).**

1. What is the main idea of the visual?

2. Describe what is going on in the visual?

3. With what kind of weapons are the two soldiers in the visual fighting with?

**Study the visual on page 264-265 (Blue SS text) or page 290-291 (Green SS text).**

1. What is the main idea of the visual?

2. Study the map key. What symbols are used to represent Greek victories? Persian victories?

3. What do the arrows in the map key represent?

4. What color is used to represent Neutral and pro-Persian city-states?

5. What color is used to represent the Persian Empire?

6. What color is used to represent Greek city-states allied against the Persians?

7. What city-states in Greece were most of the allies against the Persians located?

8. Study the visual on page 265 (Blue SS text) and page 291 (Green SS text). Describe how the Greeks were able to defeat the Persians at Salamis.
Greece and Persia: Chapter 9/10 - Section 1
(Blue Textbook p.260-265, Green Textbook p.286-291)

- Create a timeline of TEN events you found important in this section.
- Your timeline should begin with the oldest event and end with the most recent.
  - Dates can be approximate because within the text writing the only dates listed are 550 BCE, 529 BCE, 499 BCE, and 480 BCE. HOWEVER they must be listed in the order they happened first, second, third...
- Each date/event should have a one sentence summary explaining why the event is significant to you.

EVENT #1

EVENT #2

EVENT #3

EVENT #4

EVENT #5

EVENT #6

EVENT #7

EVENT #8

EVENT #9

EVENT #10