# Weather

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Directions: Complete the concept map using the terms in the list below.

Sun fronts water air masses

Weather is caused by the interaction of

1. ____________________ of

2. ____________________ of

3. ____________________ of

which form

4. ____________________

which can form

5. ____________________

where air moves from

6. ____________________ areas
to

7. ____________________ areas

Directions: Complete the following sentences using the correct terms.

8. Clouds form as moist air rises and ____________________.

9. When dense, cold air meets less dense warmer air, the warm air is pushed ____________________.

10. Winds form because air moves from an area of high pressure to an area of ____________________ pressure.
Section 1  •  What is weather?

Directions: Write the letter of the correct question next to its answer below.

Questions
a. What is the dew point?
b. What is sleet?
c. What is fog?
d. What is humidity?
e. What is wind?
f. What is relative humidity?
g. What is weather?
h. What is temperature?
i. What are clouds?
j. What are types of precipitation?
k. What is caused by the interaction of air, water, and Sun?

Answers
   ______ 1. a description of the current state of the atmosphere
   ______ 2. the amount of water vapor in the air
   ______ 3. objects that form as warm air rises, expands, and then cools
   ______ 4. the temperature at which condensation forms from saturated air
   ______ 5. the measurement of the amount of water vapor in the air compared to
             the amount needed for saturation at a specific temperature
   ______ 6. rain, snow, sleet, and hail
   ______ 7. a stratus cloud that forms near the ground
   ______ 8. the weather
   ______ 9. air moving in a specific direction
   ______ 10. a measure of the average amount of motion of molecules
   ______ 11. rain drops that pass through a layer of freezing air near Earth’s surface
               forming pellets
Directions: Unscramble the terms in italics to complete the sentences below. Write the terms on the lines provided.

1. A boundary between two different air masses is called a [**norft**].
2. Atmospheric [**serpuser**] is determined by the temperature and density of the air and the amount of water vapor in it.
3. Storms and [**ipitrpitcone**] occur at fronts.
4. Fronts usually bring a change in [**etertermaup**].
5. Fronts always bring a change in wind [**iridot nec**].
6. A(n) [**ria sams**] is a large body of air with the same properties as Earth’s surface under it.
7. A line connecting points of equal temperature is a(n) [**timsrohe**].
8. A(n) [**tiostan em dol**] shows the weather conditions at one specific location.

Directions: Write the descriptive terms for air masses in their proper places on the map. Note that cool/moist and warm/moist appear twice.

<table>
<thead>
<tr>
<th>hot/dry</th>
<th>cool/moist</th>
<th>warm/moist</th>
<th>cold/dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>cool/moist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>warm/moist</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. ________
10. ________
11. ________

12. ________
13. ________
14. ________
Directions: Complete the following sentences using the correct terms. Then circle the terms in the word search puzzle.

1. __________________ is the amount of water vapor in the air compared to the amount of water vapor needed for saturation at a certain temperature.

2. The temperature at which air is saturated and condensation begins is the ____________________.

3. When air is cooled to the dew point near the ground, it forms a stratus cloud called ____________________.

4. When you observe a change in the weather from one day to the next, it is due to the movement of ____________________.

5. A ____________________ is a large swirling low-pressure system that forms over tropical waters.

6. A ____________________ studies weather.

7. An ____________________ connects locations of equal temperature.

8. An ____________________ connects locations of equal pressure.

9. A ____________________ is a violent whirling wind that moves over land.

10. The boundary between cold and warm air masses is a ____________________.
What is weather?

Directions: Answer the following questions on the lines provided.

1. How does temperature affect humidity?

2. Why can't cold air hold much water vapor?

3. How do clouds form?

4. Complete the chart below about the types of clouds in Figures 1 through 4.

<table>
<thead>
<tr>
<th></th>
<th>Figure 1</th>
<th>Figure 2</th>
<th>Figure 3</th>
<th>Figure 4</th>
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<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Description</td>
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<td></td>
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<tr>
<td>Weather</td>
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</table>

Directions: Match the terms in Column I with their descriptions in Column II. Write the letter of the correct description in the blank at the left.

Column I

5. snow
6. rain
7. sleet
8. hail

Column II

a. water drops that fall when the temperature is above freezing
b. water drops that fall and become solid when the temperature is below freezing
c. water drops that freeze in layers around small nuclei of ice during thunderstorms
d. water drops that pass through a layer of freezing air near the surface, forming ice pellets
Weather Patterns

Directions: Use the diagrams to answer the following questions.

1. What kinds of clouds form along the front in Figure 1? __________________________

2. What kind of precipitation might come from these clouds? __________________________

3. What kind of clouds form along the front in Figure 2? __________________________

4. What kind of precipitation might come from these clouds? __________________________

5. Figure 1 represents a ____________________________________________.

6. Figure 2 represents a ____________________________________________.

7. What will happen to the temperature in Columbus, Ohio, when the front passes?

8. Compare the temperatures in Topeka and Kansas City, Kansas. __________________________

9. Fill in the chart about the elements of thunderstorms.

<table>
<thead>
<tr>
<th>Element of Thunderstorms</th>
<th>Caused by</th>
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<tbody>
<tr>
<td>a. heavy rain</td>
<td></td>
</tr>
<tr>
<td>b. strong winds</td>
<td></td>
</tr>
<tr>
<td>c. lightning</td>
<td></td>
</tr>
<tr>
<td>d. thunder</td>
<td></td>
</tr>
<tr>
<td>e. tornado</td>
<td></td>
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Directions: Use the weather map and Weather Map Symbols Reference Handbook to answer the following questions.

1. Which station has the lowest pressure?

2. How would you describe the wind at Station B?

3. Which station is recording the highest wind speed?

4. Which station has the highest pressure?

5. What kind of front is south of Station A?

6. Which station has the most cloud cover?

7. How might the temperature change at station C over the next few hours? Why?

Directions: Answer the following questions on the lines provided.

8. What is the difference between an isobar and an isotherm?

9. On a weather map for county A, the isobars are far apart. On a map for county B, about 100 miles away, the isobars are close together. Which map shows high winds? How can you tell?
Relating Clouds to Weather

Clouds are one indicator of weather. How well can you predict weather by observing the sky?

**Materials**
camera
roll of film
poster board
markers

**WARNING:** Do not aim the camera directly at the Sun. Damage could occur to the eyes if direct sunlight is observed.
(Hint: Catch the same tree or top of a building in the beginning photo each day so you know when each day begins in your information.)

**Procedure**
1. Take photographs of the sky during the day for seven days. Photograph from west to east each day. Record the weather conditions, time of day when each photograph is taken, and number of photos taken each day.
2. Watch or listen to a nightly weather report and briefly record what weather conditions existed that day.
3. Use your textbook and cloud charts to identify the type or types of clouds in each photograph.
4. Look up the weather conditions normally associated with each cloud type in your photographs. Compare this information with your observations.

**Data and Observations**
Make a poster organizing your observations and information. Attach your photographs and include which type of cloud each photograph contains, the type of weather associated with that cloud type, and the weather you actually observed with that cloud type.

**Conclude and Apply**
1. Do you notice any pattern to the clouds observed and the weather experienced? Explain.

2. What do you conclude about using clouds to predict weather?
The symbols on the weather map below show the locations of fronts, high- and low-pressure areas, and different kinds of precipitation across the United States in the afternoon on a particular day in March. The key below the map tells what the symbols mean.

**Directions:** Answer the questions below based on information in the weather map.

1. Would you expect to find clear weather or clouds near Fargo, North Dakota?

2. Where would you expect to find a storm?

3. How is the weather in Salt Lake City, west of the stationary front, different from the weather in Denver, east of the front?

4. What is happening to the air masses at the cold front?
# Making Forecasts

## Materials
- Celsius thermometer
- aneroid barometer
- magnetic compass

## Procedure
1. Make a chart like the one shown below to record your weather observations each day for 7 days. Be sure to make observations at the same time and place each day.
2. Determine the temperature by placing the thermometer in a shaded location.
3. Determine the air pressure using the aneroid barometer.
4. Estimate the amount of sky covered by clouds as clear, overcast, or somewhere in between.
5. Determine the types of clouds using the Cloud Field Guide in the back of your textbook.
6. Use a magnetic compass to determine the direction from which the wind is blowing.
7. Describe the precipitation. Use the terms rain, snow, sleet, hail, fog, or clear.
8. Use the data you collect each day to forecast weather conditions for the following day. Note any trends you see in your observations, such as high cirrus clouds preceding rainy weather.

<table>
<thead>
<tr>
<th>Date</th>
<th>Temp. (°C)</th>
<th>Atmospheric Pressure</th>
<th>% Cloud Cover</th>
<th>Cloud Types</th>
<th>Wind Direction</th>
<th>Precipitation</th>
<th>Forecast</th>
</tr>
</thead>
</table>

## Conclude and Apply
1. Was there a relationship between low barometric pressure and the presence of clouds and precipitation? Explain.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. How accurate were your forecasts for the next day? Give an explanation for any errors that may have occurred in your forecasting.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. What weather observations can you make yourself?

________________________________________________________________________

________________________________________________________________________
Section 1  What is weather?

A. **Weather** is the state of the ___________________ at a specific time and place.

1. Includes such conditions as air pressure, wind, ________________, and moisture in the air.
   a. The ________________ evaporates water into the atmosphere forming clouds; water returns to Earth as rain or snow; the Sun also ________________ air.

2. Temperature is a measure of _____________________ movement.
   a. The Sun’s energy causes air molecules to move rapidly; temperatures are _____________ and it feels ______________.
   b. When less of the Sun’s energy reaches air molecules, they move less rapidly and it feels ______________.

3. Wind—air moving in a __________________________
   a. As the Sun heats air, it expands, becomes less ______________, rises, and has ______________ atmospheric pressure.
   b. Cooler air is _______________ and sinks, causing ______________ atmospheric pressure.
   c. Air moves from _______________ pressure areas to ______________ pressure areas, causing wind.

4. **Humidity**—the amount of ________________ in the air
   a. Warmer air can hold ______________ water vapor, tending to make it more humid.

5. **Relative humidity**—the amount of water vapor in the air compared to what it can hold at a _______________ temperature
   a. When air cools, it can’t hold as much water vapor, so the water vapor ________________ to a liquid or forms ice crystals.

B. _______________—the temperature at which air is saturated and condensation forms

C. Clouds form as ______________ air is forced upward and cools. Then the water vapor condenses in tiny droplets that remain suspended in the air.
D. The shape and height of clouds vary with temperature, pressure and the __________________ in the atmosphere.

1. Shape
   a. ______________—smooth, even sheets or layers at low altitudes
   b. ______________—puffy, white clouds, often with flat bases
   c. ______________—high, thin, white, feathery clouds made of ice crystals

2. Height
   a. ______________—high clouds
   b. _____________—middle-elevation clouds
   c. _____________—low clouds

3. ______________ clouds are dark and so full of water that sunlight can’t penetrate them.

E. Precipitation—__________ falling from clouds

1. When ________________ in clouds combine and grow large enough, precipitation falls to Earth.

2. Air ________________ determines whether the droplets form rain, snow, sleet, or hail.

Section 2 Weather Patterns

A. Because ___________ and ______________ move in the atmosphere, weather constantly changes.

1. Air mass—a large body of air with properties like the part of ________________ over which it formed

2. Highs and lows
   a. Stormy weather is associated with ____________ pressure areas.
   b. Fair weather is associated with _____________ pressure areas.
   c. Air pressure is measured by a ________________.

B. Front—a ______________ between two different air masses

1. Clouds, precipitation, and ______________ occur at frontal boundaries.
   a. Cold front—where ________________ air advances under ______________ air
   b. Warm front—where ________________ air advances over ______________ air

2. ________________ front—involves three air masses of different temperatures

3. ________________ front—air masses and their boundaries stop advancing
C. Severe weather

1. Thunderstorms occur along warm, moist air masses and at _______________.
   a. Warm, moist air is forced rapidly upward, where it cools and _______________.
   b. Strong updrafts of warm air and sinking, rain-cooled air cause strong _______________.

2. Lightning
   a. Movement of air inside a storm cloud causes parts of the cloud to become _______________.
   b. Current flows between the regions of opposite electrical charge, forming a _______________.

3. Thunder—lightning _______________ the air, causing it to expand rapidly and then contract, forming sound waves

4. _______________—a violent, whirling wind that moves in a narrow path over land

5. _______________—a large, swirling, low-pressure system that forms over tropical oceans

6. Blizzard—a winter storm with strong winds, cold temperatures, and low visibility, that lasts more than _______________ hours.

7. Severe weather safety
   a. A National Weather Service _______________ means conditions are favorable for severe weather to develop.
   b. A _______________ means that severe weather conditions already exist.

Section 3   Weather Forecasts

A. _______________ study and predict the weather.

B. The National Weather Service makes _______________.
   1. _______________ show weather conditions at a specific location.

   2. Temperature and pressure
      a. Isotherms are lines on a weather map connecting points of equal _______________.
      b. Isobars are lines on a weather map that connect points of equal atmospheric _______________.
   3. Weather fronts move from _______________ to _______________.

Meeting Individual Needs