Chapter 11 Weather and Climate

Introduction

Chapter 11 presents the factors that describe weather conditions and how these conditions change to produce different types of weather. Weather variables and how they are measured are discussed. The composition and layered structure of the atmosphere is explained in this chapter. The idea that energy from the sun powers weather changes on Earth is a major concept developed throughout the chapter.

A distinction between ***weather*** and ***climate*** is made. There are a variety of factors that can affect both the weather and climate of an area. *Relative* ***humidity***, *temperature*, ***air pressure*** and ***precipitation*** are some factors that describe the weather and climate of a given area. ***Latitude***, ***altitude***, ocean currents, and geological formations are other factors that enter into describing an area's climate.

Large-scale weather systems such as ***air masses***, *air pressure systems*, ***fronts***, and ***storms*** show how weather conditions change and affect humans. ***Weather forecasting***, both long-term and short-term, is also discussed in this chapter, as well as weather maps.

Students Should Understand the Following Concepts

- Weather is the atmospheric conditions that exist at present, whereas climate is the average weather conditions over an extended period of time.
- Nitrogen and oxygen are gases that make up most of the atmosphere. The atmosphere has layers determined by temperature differences and temperature changes. The lowest level of the atmosphere is called the *troposphere* and that is where most weather occurs.
- The sun supplies all the energy that causes weather. The uneven heating of Earth's surface is responsible for weather changes.
- Moving air masses cause changes in weather conditions. Air masses are large bodies of air that have similar temperature and humidity conditions. *Fronts* form along the leading edges of air masses.
- There are two types of air pressure systems, high- and low-pressure. *High-pressure* systems usually mean fair weather and *low-pressure* systems bring stormy weather conditions.
- Weather maps are used to produce a visual form of weather conditions.

Activities to Develop the Topic

Use one or more of the following activities to help your students review this topic.

Before beginning your review, place the weather forecast on the board each day. Include present temperature, humidity, air pressure, and cloud cover conditions. If possible, have a student gather the information and place it on the board. Start the weather review by asking students what this weather information means. Ask the class if they know how meteorologists come up with weather forecasts. Place the responses on the board and fill in any missing ones. Discuss how developments in technology have improved the accuracy of weather forecasting.

Once the students understand the tools used by meteorologists to predict the weather, discuss the data those instruments measure. Some of the aspects of weather you will need to discuss are air masses, humidity, precipitation, and wind. Point out that all Earth's weather takes place in a very small section of the atmosphere called the troposphere. Now is also a good time to point out to the class that just as the sun supplies the energy for

photosynthesis, it also supplies the energy for weather.

As you move through the chapter, have the students collect weather data and make forecasts. Encourage students to watch the weather forecast on television and compare their forecasts with predictions in the local newspaper or newscast. Discuss the accuracy and the reasons for inaccuracy of weather forecasts.

Weather events are commonly found in newspaper articles. Blizzards, hurricanes, tornadoes, local thunderstorms, droughts, and floods are events described in newspaper articles. Have students gather articles and share them daily with the class. Classify and place the articles on a bulletin board. These articles can provide an introduction to large-scale weather events and how people are affected.

As a wrap-up to this chapter, bring in a videotaped weather report from the local news. Have the students explain what each part of the weather report means.

Name _____ Date _____

Class _____

Review of Chapter 11

1. The present condition of the atmosphere describes the
   (1) climate
   (2) weather
   (3) humidity
   (4) air pressure

2. The layer of the atmosphere that contains all weather is the
   (1) thermosphere
   (2) mesosphere
   (3) stratosphere
   (4) troposphere

3. The coldest air in the troposphere can be found in the
   (1) lower level
   (2) middle level
   (3) upper level
   (4) stratosphere level

4. The most abundant gas in the lower atmosphere is
   (1) oxygen
   (2) water vapor
   (3) nitrogen
   (4) carbon dioxide

5. Air pressure is measured with a
   (1) thermometer
   (2) wind vane
   (3) barometer
   (4) hygrometer

6. Of the four locations listed, the lowest air pressure would most likely be found at
   (1) the top of Mount Everest
   (2) the bottom of the Grand Canyon
   (3) the beach in California
   (4) a corn field in Kansas

7. A wind blowing from southwest toward the northeast is a
   (1) northeast wind
   (2) southwest wind
   (3) northwest wind
   (4) southeast wind

8. Which of the following is *not* considered to be a form of precipitation?
   (1) rain
   (2) snow
   (3) sleet
   (4) fog

9. Weather changes are due to the
   (1) uneven heating of Earth's surface
   (2) interactions between the stratosphere and the troposphere
   (3) fluctuations in humidity levels
   (4) geographic variations in the lithosphere

10. Global winds that blow across the United States between 30° and 60° North latitude are called
    (1) polar easterlies
    (2) trade winds
    (3) prevailing westerlies
    (4) jet streams

11. Global winds are responsible for
    (1) local winds at the beach
    (2) the development of thunderstorms
    (3) the movement of air masses
    (4) daily change in temperature

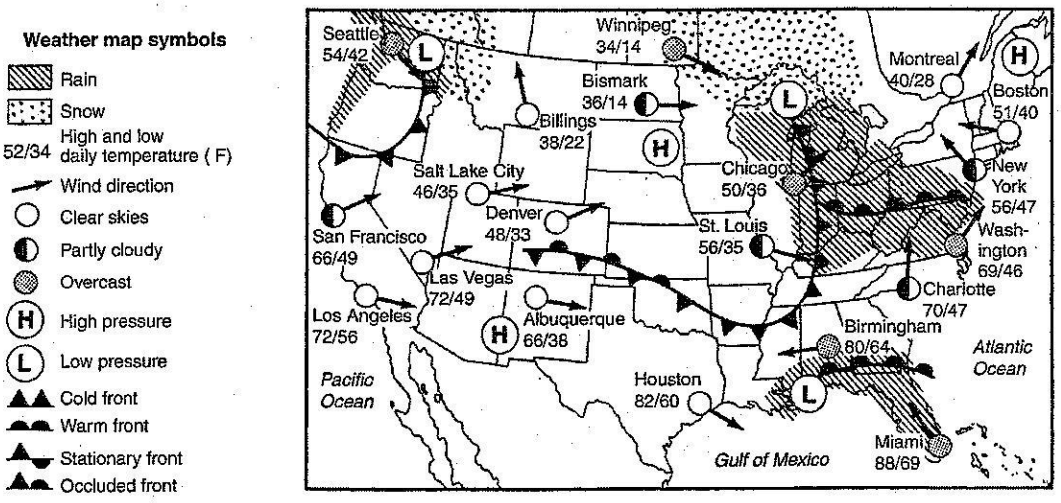
12. Dew, fog, and clouds are produced by
    (1) precipitation
    (2) evaporation
    (3) erosion
    (4) condensation

13. An air mass that forms over northern Canada will be
    (1) cold and dry
    (2) cold and moist
    (3) warm and moist
    (4) warm and dry

14. The weather conditions associated with a low-pressure system are
    (1) low humidity and high temperature
    (2) clear skies and warm temperature
    (3) stormy, cloudy, rainy
    (4) clear skies and cool temperature

15. Rising air produces fair weather clouds called
    (1) cumulus clouds
    (2) stratus clouds
    (3) cirrus clouds
    (4) nimbus clouds

Base your answers to questions 16 and 17 on the accompanying weather map.



16. What type of weather should New York expect within a day or two?
    (1) snow
    (2) rain
    (3) clear skies
    (4) subfreezing temperatures

17. The air mass in the middle of the country could have originated in
    (1) the Arctic
    (2) the Caribbean Ocean
    (3) the Atlantic Ocean
    (4) Mexico

18. During a thunderstorm to protect yourself from lightning, you should be
    (1) on a hilltop
    (2) at the beach
    (3) under a tree
    (4) indoors

19. A state in the United States least likely to be affected by a hurricane is
    (1) North Carolina
    (2) New Jersey
    (3) Kansas
    (4) Florida

20. The greenhouse effect is believed to be causing Earth to become
    (1) colder
    (2) stormier
    (3) warmer
    (4) less stormy