7. The major types of fronts are cold fronts, warm fronts, stationary fronts, and occluded fronts.
8. Fronts are boundaries between air masses. When a front occurs, air masses of different temperatures and humidities interact. The interactions of air masses cause weather changes.
9. The rising air of a cyclone often causes stormy weather. The sinking air of an anticyclone often causes dry, clear weather.
10. 200 km 4 35 km/h 5 5.7 h
11. Sample answer: Air masses that form over land have less moisture than air masses that form over the ocean. The amount of moisture carried in both types of air masses affects the amount of precipitation that the United States receives. Air masses that form over the ocean generally bring precipitation.
12. Sample answer: The Pacific Coast has cool, wet winters because it is affected by a maritime polar air mass during the winter. Summers on the Pacific Coast are warm and dry because the weather is influenced by a dry continental air mass.
13. Answers may vary.

SECTION: SEVERE WEATHER

1. lightning
2. tornado
3. B
4. A tornado develops when wind traveling in two different directions causes the air in the middle to rotate. The rotating column of air is turned upright by updrafts that begin spinning with it. The rotating air works its way down to the bottom of the cloud and forms a funnel cloud. When the funnel cloud touches the ground, it is called a *tornado*.
5. Most hurricanes form between 5° and 20° latitude in both hemispheres.
6. Lightning is a large electric discharge that occurs between two oppositely charged surfaces. When lightning strikes, the air expands rapidly to cause thunder.
7. Answers may vary

. 8. When a hurricane moves over land, it begins to lose energy because there is less warm, moist air over land.
9. Point C is the eye of the hurricane, which is an area of warm, relatively calm air with low pressure and light winds.
10. Point B is the eye wall. It is composed of a group of cumulonimbus clouds that produce very strong winds.
11. Point A is in the rain band. In the rain band, winds can be strong and rain can be heavy.

SECTION: FORECASTING THE WEATHER

1. Sample answer: A thermometer is a device used to measure temperature. A barometer is an instrument used to measure atmospheric pressure. An anemometer is an instrument used to measure wind speed.
2. B
3. Sample answer: Radar can detect the location, movement, and amount of precipitation.
4. A station model represents the location of a weather station and the weather data collected there.
5. 75°F = 5 (°C × 3 9/5) + 1 32°C
   = (75 - 2 32) ÷ 4 9/5°C
   =43 ÷1.8°C = 23.9°C
6. Answers may vary. Sample answer: Meteorologists would compare a new weather map with one that is 24 h old to see how fast a front is moving.
7. Sample answer: Because the United States is very large, a large number of station models helps give a more complete picture of weather and helps make weather forecasts more accurate.
8. Sample answer: Several station models plotted on a map would help a meteorologist get a better visual representation of weather across the United States.

Chapter Review

1. Relative humidity is the amount of water vapor that the air contains relative to the maximum amount the air can hold at a given temperature. Dew point is the temperature to which air must cool to be saturated.

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. 2. Condensation is the change of state from gas to a liquid. Precipitation is water that falls from the atmosphere to the Earth.
3. An air mass is a large body of air that has the same moisture and temperature throughout. A front is the boundary between two air masses.
4. Lightning is a large electric discharge that occurs between two oppositely charged surfaces. Thunder is the sound that results from the rapid expansion of air along a lightning strike.
5. A tornado is a small, rotating column of air that has high wind speed and that touches the ground. A hurricane is a large, rotating tropical weather system with wind speeds equal to or greater than 119 km/h.
6. A barometer is an instrument used to measure air pressure. An anemometer is an instrument used to measure wind speed.
7. C
8. D
9. C
10. D
11. B
12. D
13. A
14. C
15. B
16. C
17. Air must cool to a temperature below its dew point before condensation can occur.
18. Stationary fronts generally bring many days of cloudy, wet weather.
19. An air mass that forms over the Gulf of Mexico is warm and wet.
20. A hurricane begins as a group of thunderstorms moving over tropical ocean waters. Winds traveling in two different directions collide, which causes the storm to rotate over an area of low pressure. The hurricane is fueled by the condensation of water vapor.
21. The water cycle is the continuous movement of water from the Earth's surface, to the air, and back to the surface. Weather is affected by evaporation, condensation, and precipitation of water in the air.
22. Sample answer: Both begin as a result of thunderstorms and are centered around low pressure. Hurricanes occur over water, and tornadoes generally occur over land.
23. Cold, dry air meets warm, moist air and starts to spin. Updrafts of air turn the spinning column vertical. The column moves to the bottom of the cloud and becomes a funnel cloud. A funnel cloud becomes a tornado when it touches the ground.
24. Sample answer: Evaporating ocean water fuels hurricanes in tropical regions.
25. Sample answer: A station model represents the location of a weather station and shows temperature, precipitation, wind direction, and other data.
26. Radar is used to find the location, movement, and amount of precipitation.
27. Sample answer: Turn the TV and radio to local stations for weather information.
28. Sample answer: Even shallow water can be dangerous if moving quickly.
29. An answer to this exercise can be found at the end of the Teacher Edition.
30. Sample answer: If air temperature rises, then the air can hold more water. If vapor content in the air also increases, then relative humidity could stay the same.
31. Sample answer: It can be assumed that the relative humidity is 100% because no water evaporated.
32. Sample answer: Precipitation can occur only when the air is saturated, which is when the relative humidity is 100%.
33. Thunderstorms are most likely to occur in Chicago because a cold front is approaching.
34. Tulsa is experiencing a stationary front and is probably receiving drizzly precipitation.

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