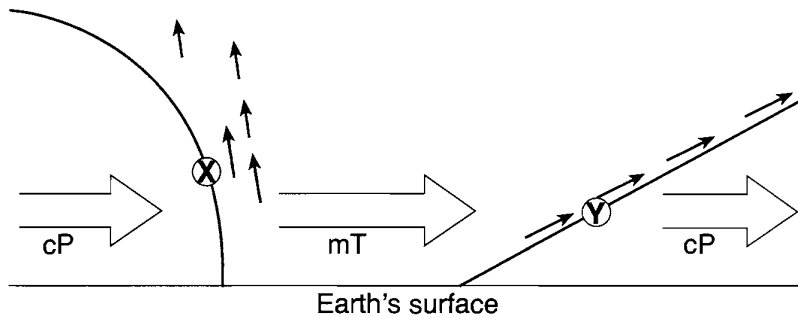


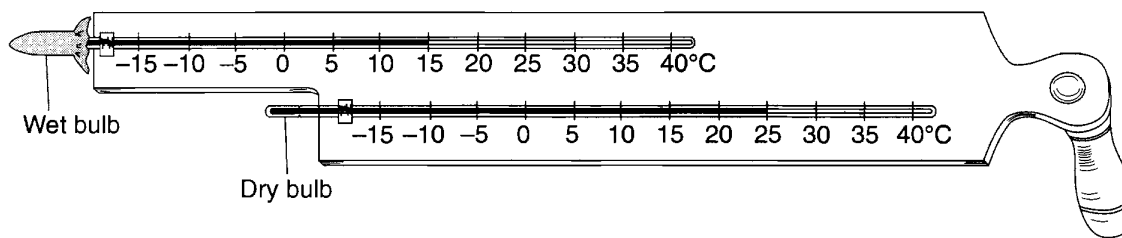
Ch 7 Weather Practice Questions

1. Base your answer to the following question on the cross section below, which shows two weather fronts moving across New York State. Lines *X* and *Y* represent frontal boundaries. The large arrows show the general direction the air masses are moving. The smaller arrows show the general direction warm, moist air is moving over the frontal boundaries.



Explain why the warm, moist air rises over the frontal boundaries.

2. The diagram below shows the temperature readings on a weather instrument.



Based on these readings, the relative humidity of the air is closest to

- A) 8% B) 11% C) 32% D) 60%

Base your answer to questions 3 and 4 on the passage below.

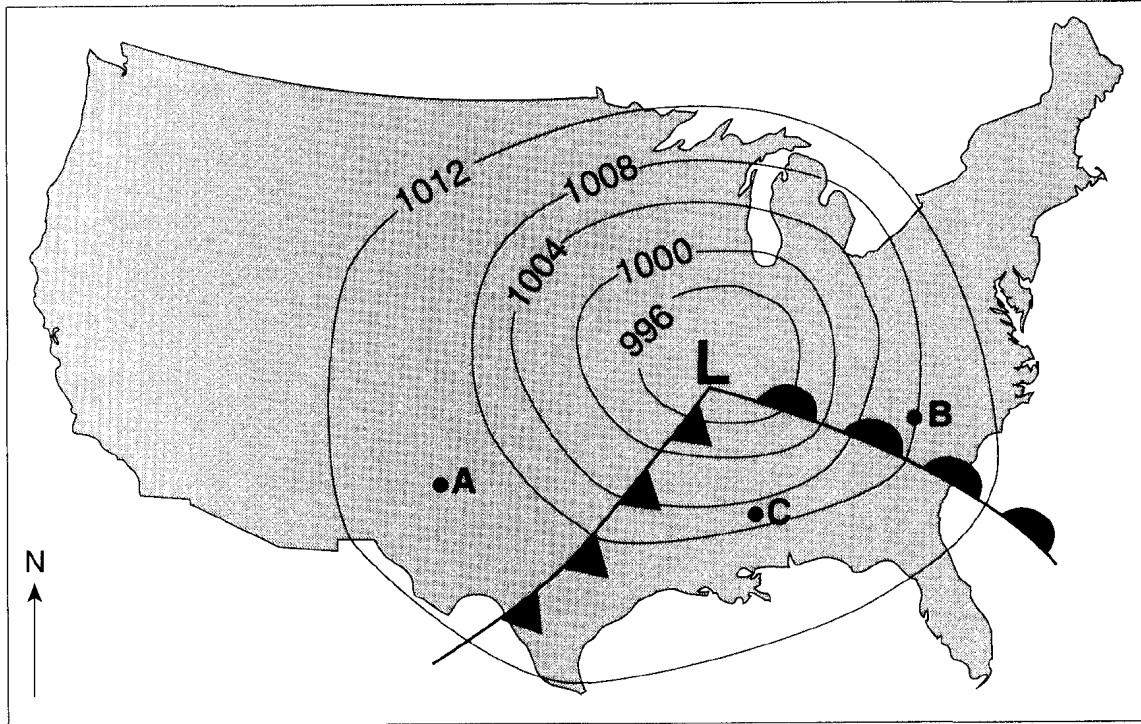
Earth's Early Atmosphere

Early in Earth's history, the molten outer layers of Earth released gases to form an early atmosphere. Cooling and solidification of that molten surface formed the early lithosphere approximately 4.4 billion years ago. Around 3.3 billion years ago, photosynthetic organisms appeared on Earth and removed large amounts of carbon dioxide from the atmosphere, which allowed Earth to cool even faster. In addition, they introduced oxygen into Earth's atmosphere, as a by-product of photosynthesis. Much of the first oxygen that was produced reacted with natural Earth elements, such as iron, in the lithosphere and produced new varieties of rocks and minerals. Eventually, photosynthetic organisms produced enough oxygen so that it began to accumulate in Earth's atmosphere. About 450 million years ago, there was enough oxygen in the atmosphere to allow for the development of an ozone layer 30 to 50 kilometers above Earth's surface. This layer was thick enough to protect organisms developing on land from the ultraviolet radiation from the Sun.

3. Identify the temperature zone of the atmosphere in which the ozone layer developed.
 4. Complete the pie graph below to show the percent by volume of nitrogen and oxygen gases currently found in Earth's troposphere. Label each section of the graph with the name of the gas. The percentage of other gases is shown.
-

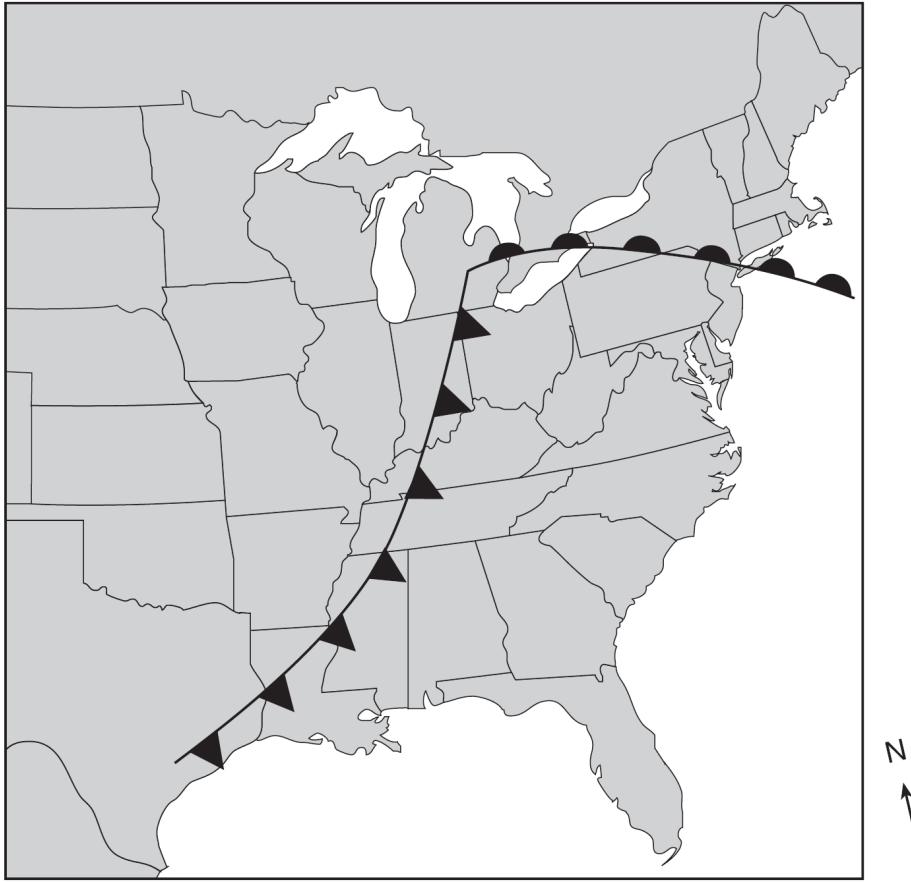
Ch 7 Weather

Base your answer to questions 5 and 6 on the weather map below, which shows a low-pressure system located over central United States. Points A, B, and C represent locations on Earth's surface. The isobars on the map show air pressures in millibars.



- On the map above, draw an arrow, beginning at the L, to show the direction the low-pressure center will most likely move in the next two days.
 - What evidence shown on the map indicates that point B is most likely experiencing precipitation?
-
- By which process do plants add water vapor to the atmosphere?
 - precipitation
 - transpiration**
 - condensation
 - absorption

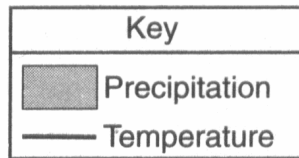
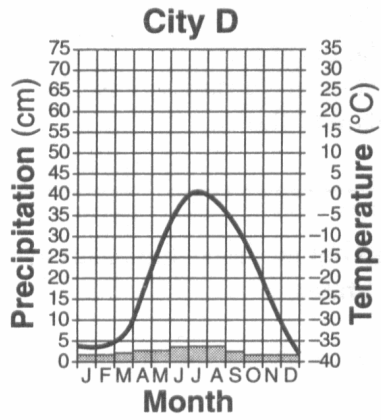
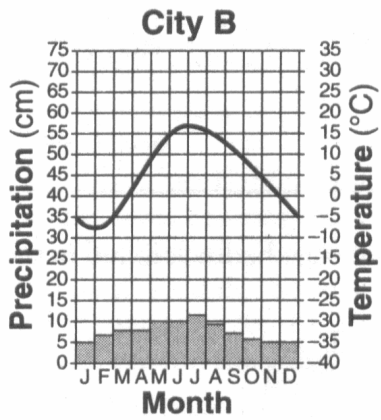
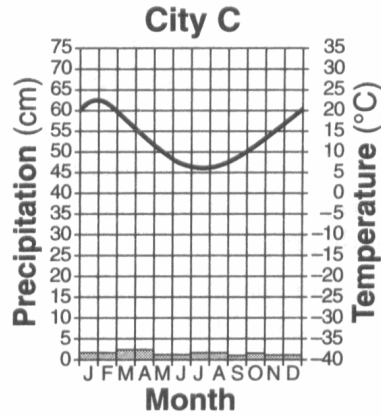
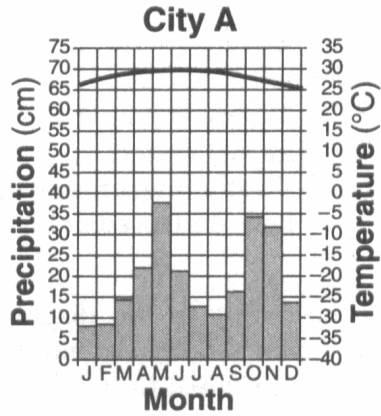
8. Base your answer to the following question on the weather map below, which shows two fronts associated with a low-pressure system.



Warm, moist air is rising along the two frontal surfaces. Describe how the water vapor in this rising air forms clouds. Include *dewpoint* and *condensation* in your answer.

9. The planetary wind belts in the troposphere are primarily caused by the
- A) **Earth's rotation and unequal heating of Earth's surface**
 - B) Earth's revolution and unequal heating of Earth's surface
 - C) Earth's rotation and Sun's gravitational attraction on Earth's atmosphere
 - D) Earth's revolution and Sun's gravitational attraction on Earth's atmosphere

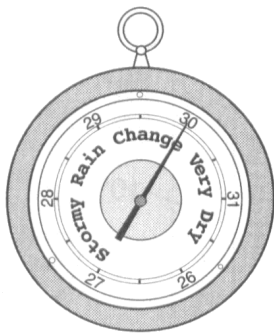
10. Base your answer to the following question on the climate graphs below, which show average monthly precipitation and temperatures at four cities, *A*, *B*, *C*, and *D*.



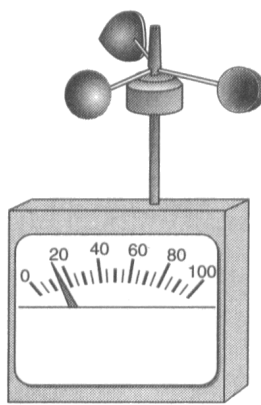
During which season does city *B* usually experience the month with the highest average precipitation?

- A) spring **B) summer** C) fall D) winter

11. The diagram below shows weather instruments *A* and *B*.



A



B

Which table correctly indicates the name of the weather instrument and the weather variable that it measures?

A)

Instrument		Weather Variable Measured
Letter	Name	
A	thermometer	humidity
B	wind vane	wind direction

B)

Instrument		Weather Variable Measured
Letter	Name	
A	thermometer	wind direction
B	wind vane	humidity

C)

Instrument		Weather Variable Measured
Letter	Name	
A	barometer	wind speed
B	anemometer	air pressure

D)

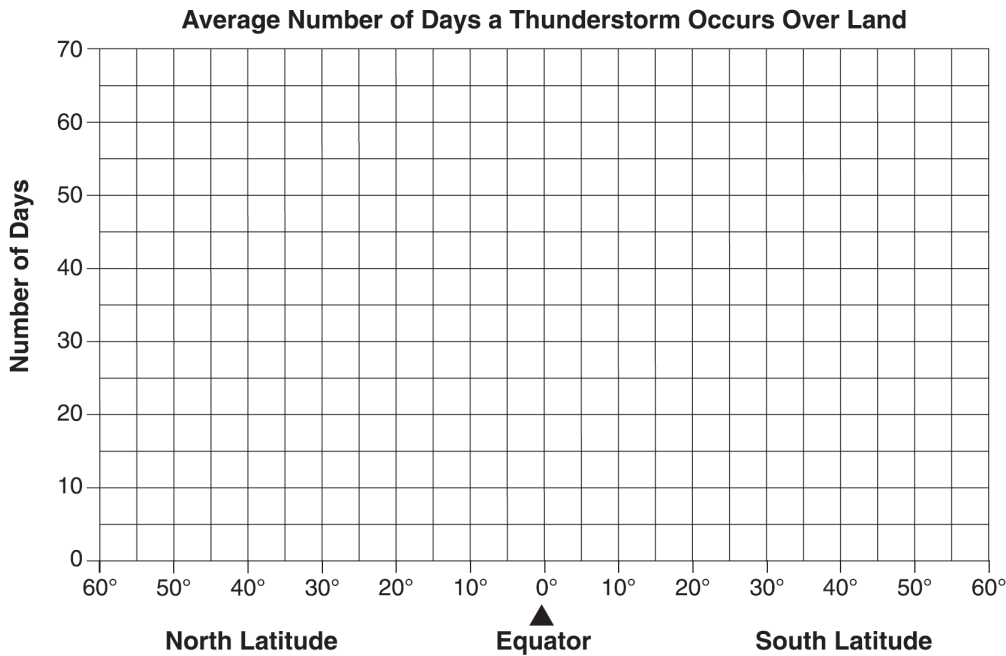
Instrument		Weather Variable Measured
Letter	Name	
A	barometer	air pressure
B	anemometer	wind speed

12. Base your answer to the following question on data table below, which shows the average number of days with thunderstorms that occur over land areas at different latitudes each year.

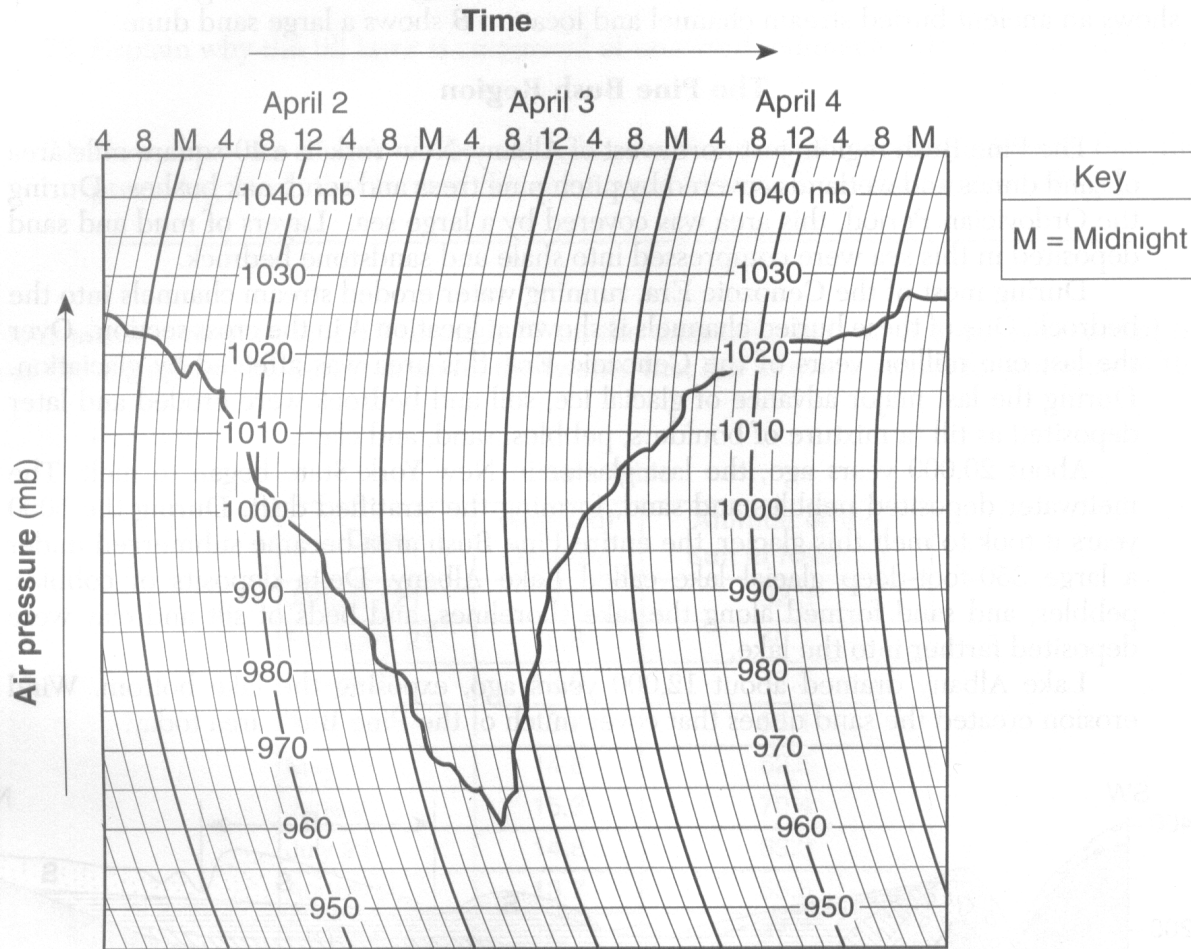
Data Table

Latitude	Average Number of Days a Thunderstorm Occurs Over Land
60° N	5
45° N	14
30° N	19
15° N	30
0° (equator)	56
15° S	44
30° S	21
45° S	8
60° S	0

On the grid below, plot, with an **X**, the average number of days per year a thunderstorm occurs over a land area for each latitude shown on the data table. Connect the centers of the **Xs** with a line.



13. Base your answer to the following question on the barogram below, which shows air pressure recorded in millibars at Green Bay, Wisconsin, from April 2 through April 4, 1982.

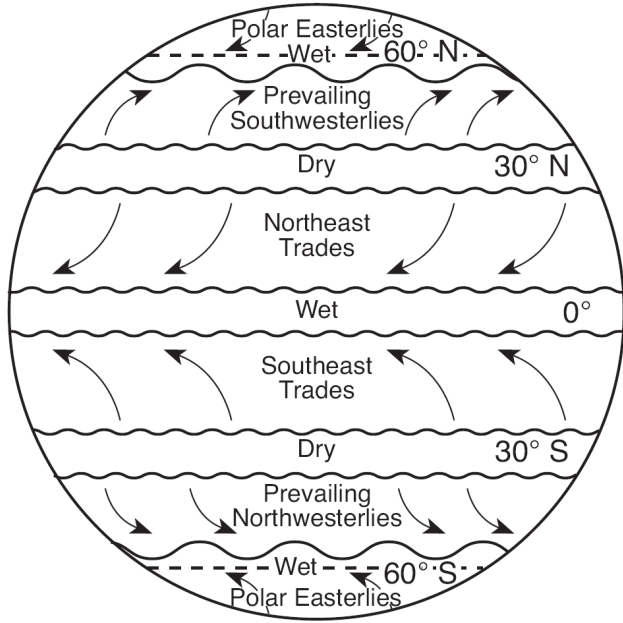


Calculate the rate of change in air pressure from 10 a.m. to 8 p.m. on April 3. Label your answer with the correct units.

14. In the United States, most tornadoes are classified as intense

- A) low-pressure funnel clouds that spin clockwise
- B) low-pressure funnel clouds that spin counterclockwise**
- C) high-pressure funnel clouds that spin clockwise
- D) high-pressure funnel clouds that spin counterclockwise

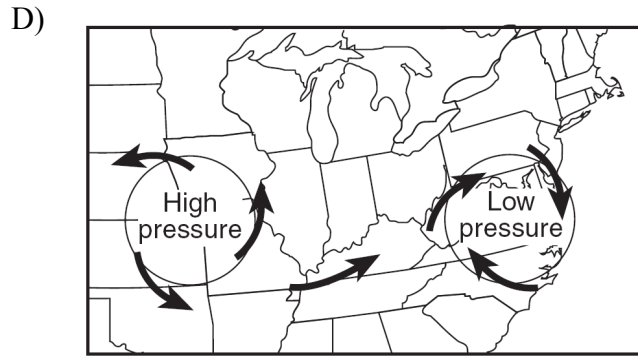
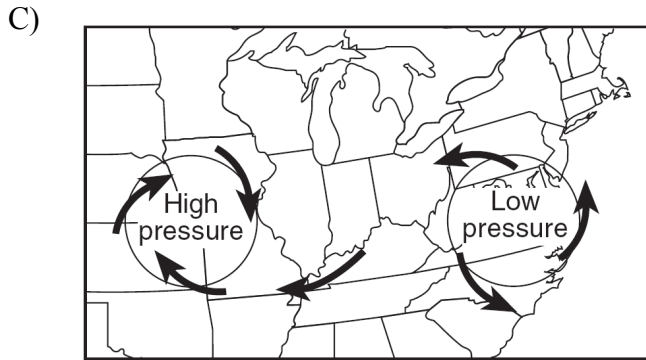
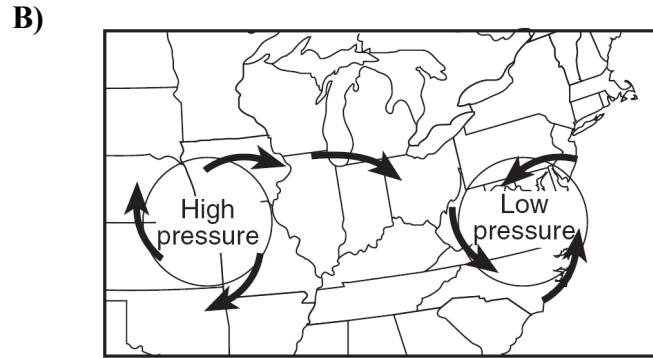
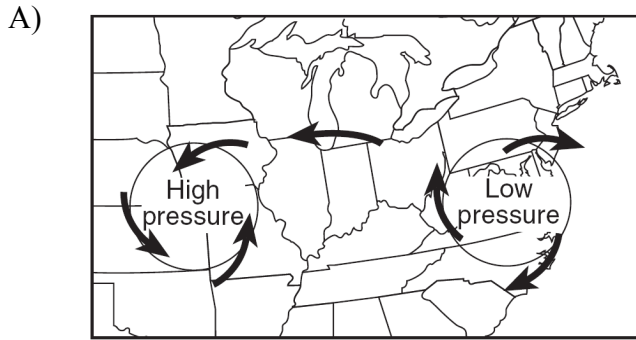
15. Base your answer to the following question on the map below, which shows Earth's planetary wind belts.



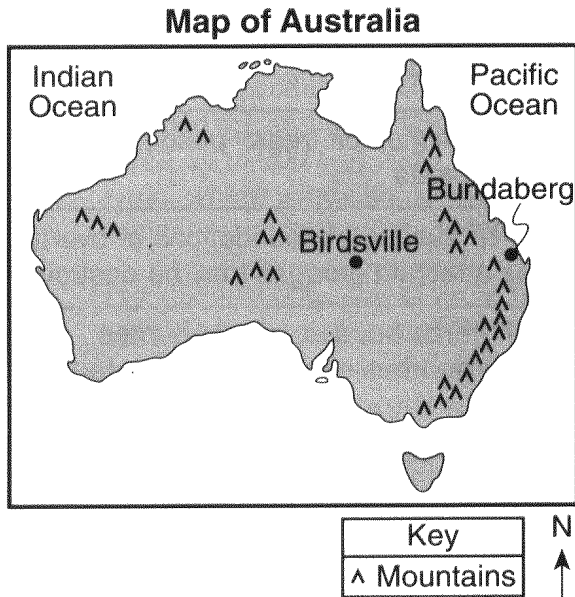
Which wind belt has the greatest effect on the climate of New York State?

- A) prevailing northwesterlies
 - B) prevailing southwesterlies**
 - C) northeast trades
 - D) southeast trades
16. Which weather condition most directly determines wind speeds at Earth's surface?
- A) visibility changes
 - B) amount of cloud cover
 - C) air-pressure gradient**
 - D) dewpoint differences

17. Which map best represents the surface wind pattern associated with high-pressure and low-pressure systems in the Northern Hemisphere?



18. Base your answer to the following question on the map and data tables below. The map shows the location of Birdsville and Bundaberg in Australia. Data table 1 shows the average monthly high temperatures for Birdsville. Data table 2 includes the latitude and longitude, elevation above sea level, and the average rainfall in January for Birdsville and Bundaberg.



Data Table 1
Average Monthly High Temperatures
for Birdsville, Australia

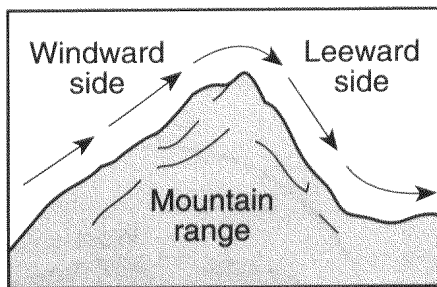
Month	Temperature (°C)
January	39
February	38
March	35
April	30.5
May	25
June	22
July	21
August	23.5
September	28
October	32.5
November	36
December	38

Data Table 2
Information about Two Australian Cities

City	Latitude (° S)	Longitude (° E)	Elevation (m)	Average January Rainfall (mm)
Birdsville	25.9	139.4	47	25
Bundaberg	24.9	152.4	14	105

Explain why Bundaberg will experience solar noon before Birdsville each day.

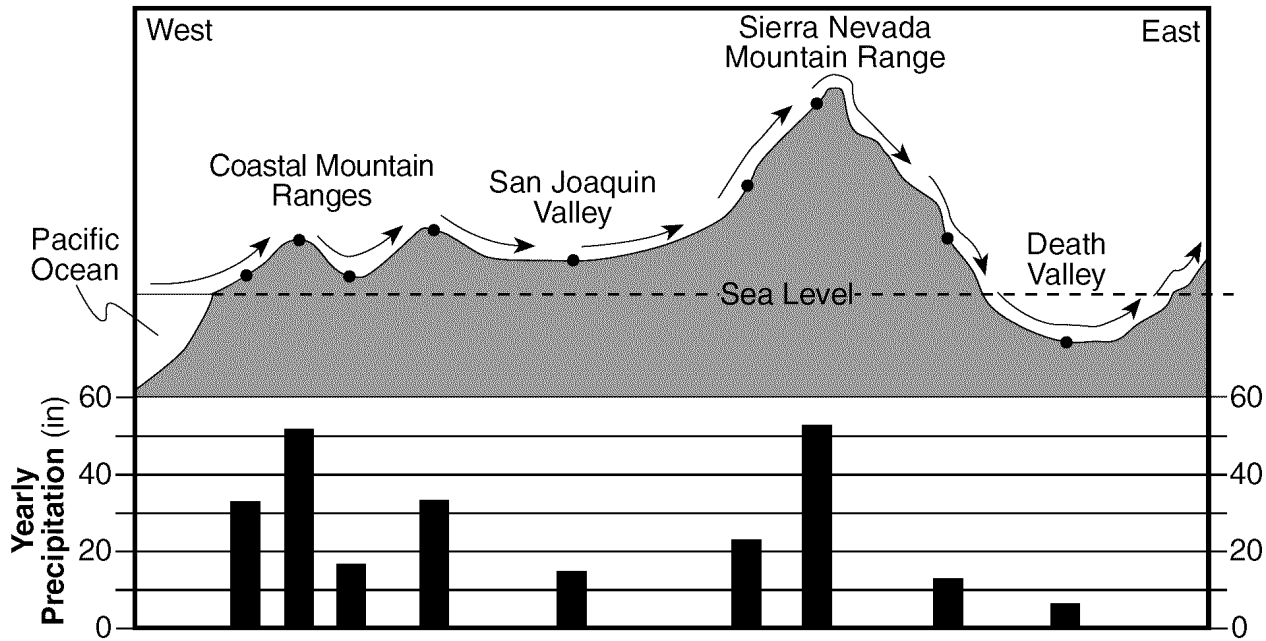
19. The diagram below shows wind flowing over a mountain range.



As the wind flows down the leeward side of the mountain range, the air becomes

- A) cooler and drier B) cooler and wetter
C) **warmer and drier** D) warmer and wetter

20. Base your answer to the following question on the cross section and bar graph below. The cross section shows a portion of Earth's crust along the western coast of the United States. The points show different locations on Earth's surface. The arrows show the prevailing wind direction. The bar below each point shows the yearly precipitation at that location.



What is the yearly precipitation total for the four points located in the Coastal Mountain Ranges?

21. Base your answer to the following question on the information below, which describes the past and present climate of Antarctica, and on your knowledge of Earth science.

Antarctica's ice sheet has an average thickness of 6600 feet and holds approximately 70% of Earth's freshwater. Ice layers in Antarctica preserve information about Earth's history. Fossil evidence found in the bedrock of this continent shows that Antarctica was once tropical and is a potential source of untapped natural resources. Antarctica is now a frozen desert with very little snowfall.

Explain why Antarctica's cold climate is responsible for its very low amount of yearly precipitation.

22. Which list correctly matches each instrument with the weather variable it measures?

- A) wind vane—wind speed
thermometer—temperature
precipitation gauge—relative humidity
- B) wind vane—wind direction
thermometer—dewpoint
psychrometer—air pressure
- C) barometer—relative humidity
anemometer—cloud cover
precipitation gauge—probability of precipitation
- D) barometer—air pressure
anemometer—wind speed
psychrometer—relative humidity**

23. Base your answer to the following question on the data table and map below and on your knowledge of Earth science. The data table shows the altitude of the top of a thunderstorm cloud and the probability of hail being formed for a location in New York State. The map shows the average number of days per year hail strikes the ground in different regions of the United States.

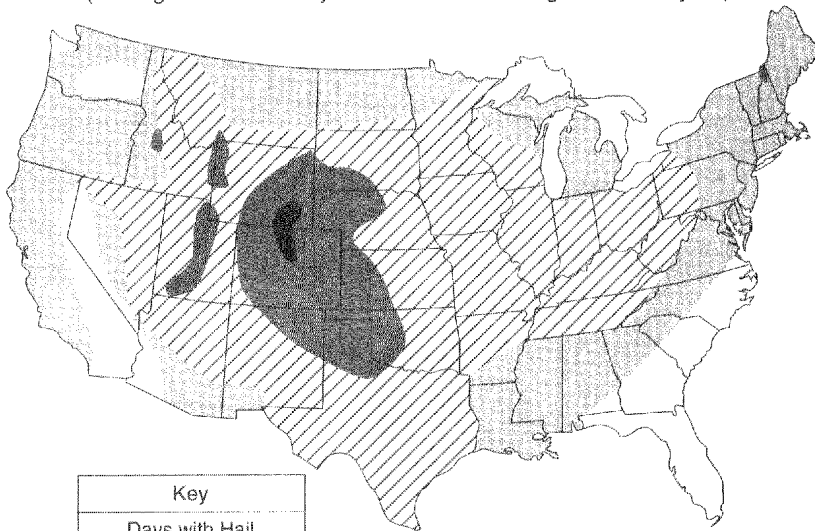
Data Table

Altitude of the Top of a Thunderstorm Cloud (km)	Probability of Hail Formation (%)
13	50
15	75
17	100

Wind direction	from the northwest
Wind speed	20 knots
Visibility	$\frac{1}{4}$ mile
Present weather	hail
Amount of cloud cover	100%
Barometric pressure	990.0 millibars

MAP

(Average number of days that hail strikes the ground each year)

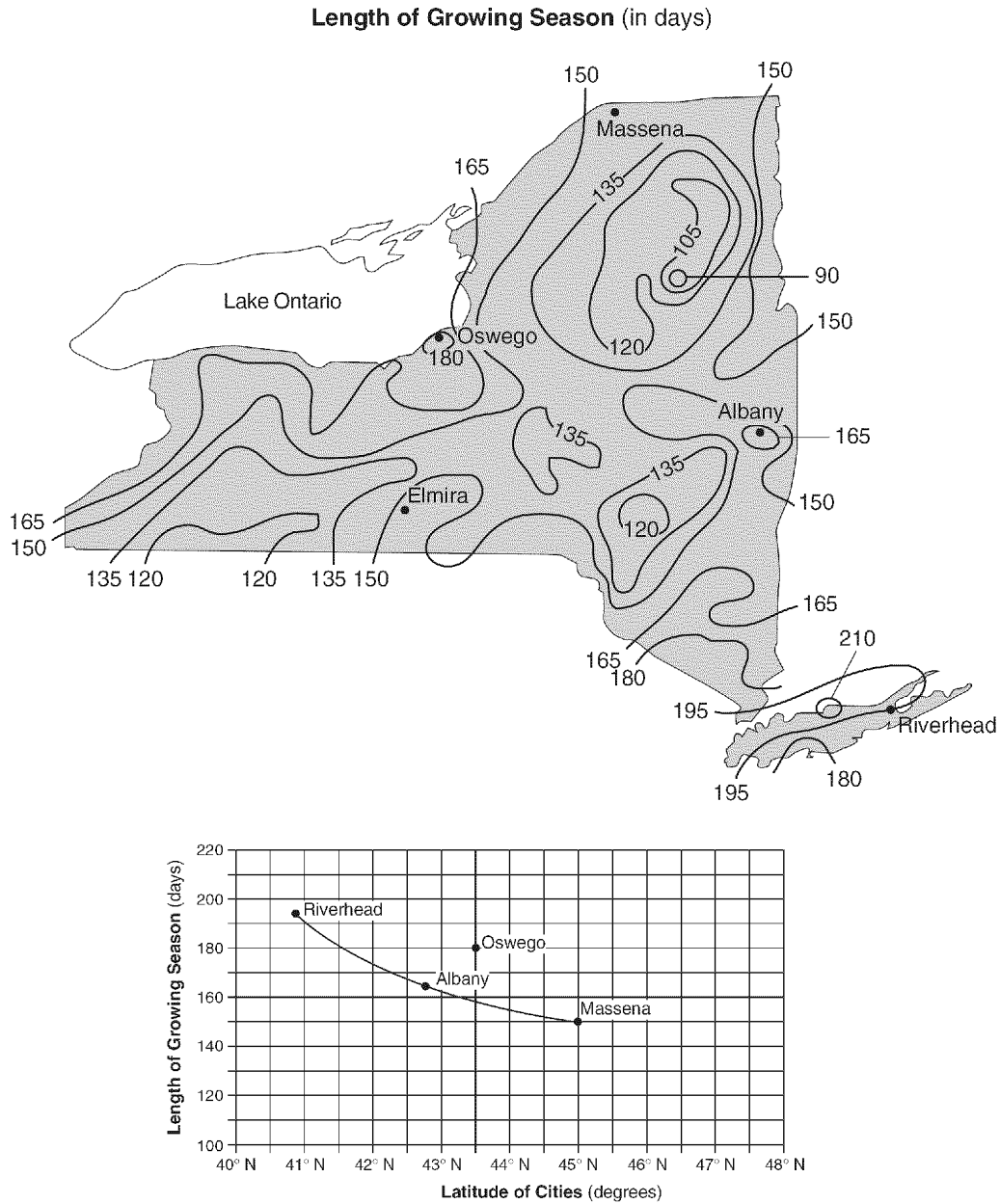


Station Model



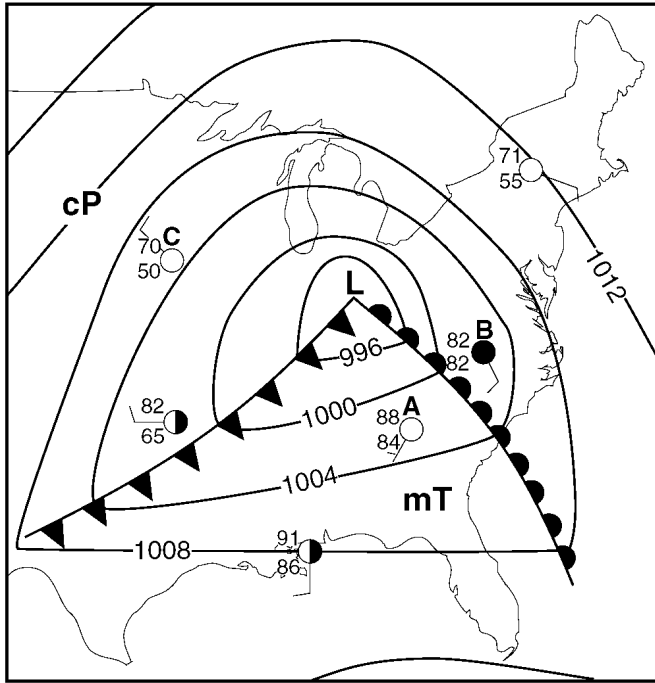
State the average number of days per year that Syracuse, New York, will experience hail.

24. Base your answer to the following question on the map and graph below and your knowledge of Earth science. The map shows the length of the growing season in New York State, expressed in days. The growing season is the average number of days between the last frost in spring and the first frost in fall. The graph line shows the relationship between the latitudes of Riverhead, New York; Albany, New York; and Massena, New York; and the length of the growing season at these three locations.

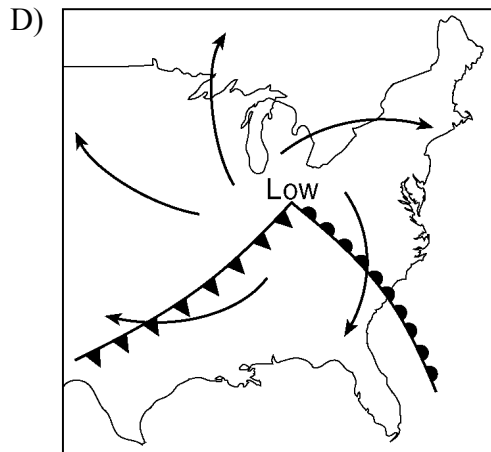
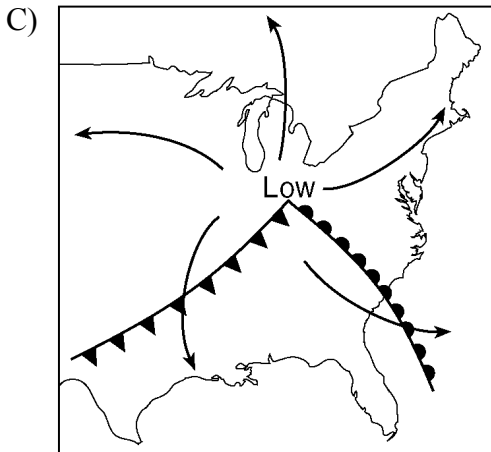
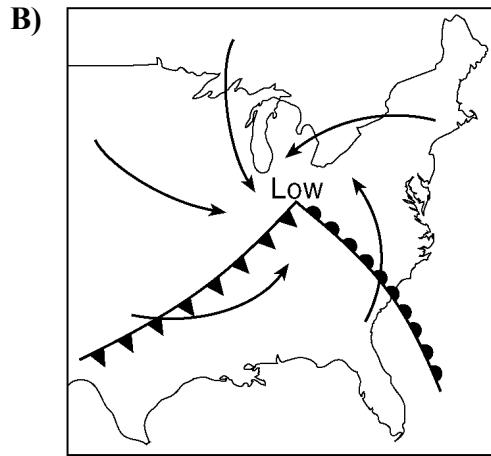
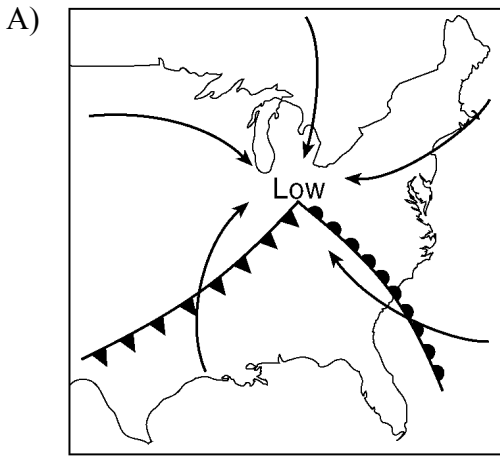


For Riverhead, Albany, and Massena, state the relationship between latitude and the length of the growing season shown by the graph.

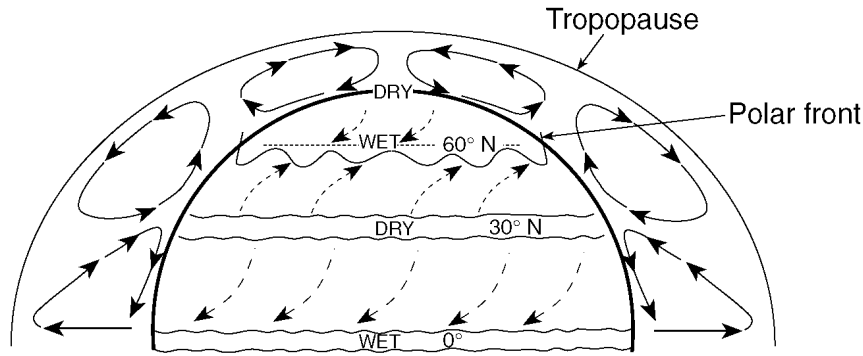
25. Base your answer to the following question on the weather map below. The map shows a low-pressure system and some atmospheric conditions at weather stations *A*, *B*, and *C*.



The arrows on which map best represent the direction of surface winds associated with this low-pressure system?



26. Base your answer to the following question on the diagram below, which represents the planetary wind and moisture belts in Earth's Northern Hemisphere.

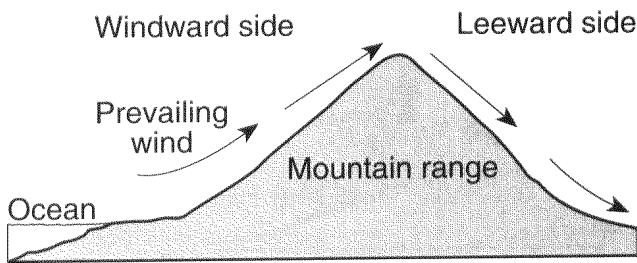


(Not drawn to scale)

The climate at 90° north latitude is dry because the air at that location is usually

- A) warm and rising B) warm and sinking
 C) cool and rising D) **cool and sinking**

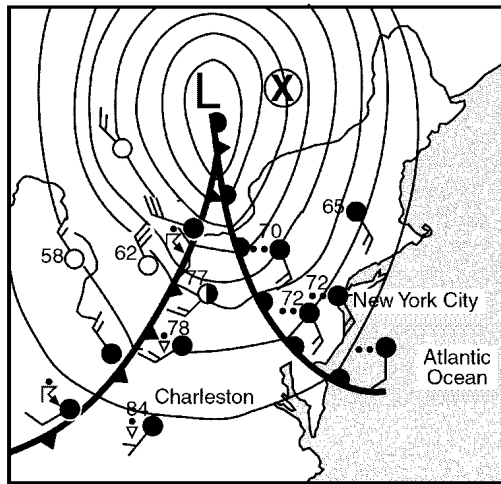
27. The cross section below shows the prevailing winds that cause different climates on the windward and leeward sides of this mountain range.



Compared to the climate conditions on the leeward side of this mountain range, the conditions on the windward side are usually

- A) **cooler and wetter** B) cooler and drier
 C) warmer and wetter D) warmer and drier

28. Base your answer to the following question on the weather map below, which shows a weather system over the northeastern United States and weather data for several locations. Isobars show a low-pressure (L) center. Point X is a location in Canada.



Weather Conditions	Description
(1) Air temperature	
(2) Present weather	
(3) Wind speed	
(4) Wind direction	From
(5) Cloud cover	

On the weather map above, draw a curved arrow through point X to show the general direction of surface winds on that side of the low-pressure center.

29. Base your answer to the following question on Read the passage below:

Greenhouse Effect

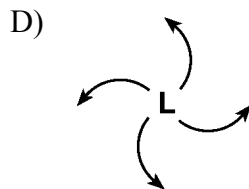
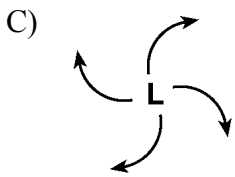
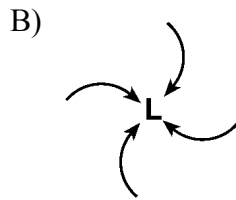
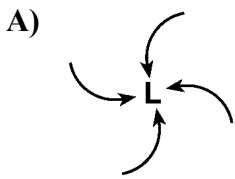
The warming of Earth's surface and lower atmosphere tends to intensify with an increase in atmospheric carbon dioxide. The atmosphere allows a large percentage of the visible light rays from the Sun to reach Earth's surface. Some of this energy is reradiated by Earth's surface in the form of long-wave infrared radiation. Much of this infrared radiation warms the atmosphere when it is absorbed by molecules of carbon dioxide and water vapor. A similar warming effect is produced by the glass of a greenhouse, which allows sunlight in the visible range to enter, but prevents infrared radiation from leaving the greenhouse.

The absorption of infrared radiation causes Earth's surface and the lowest layer of Earth's atmosphere to warm to a higher temperature than would otherwise be the case. Without this "greenhouse" warming, Earth's average surface temperature could be as low as -73°C . The oceans would freeze under such conditions.

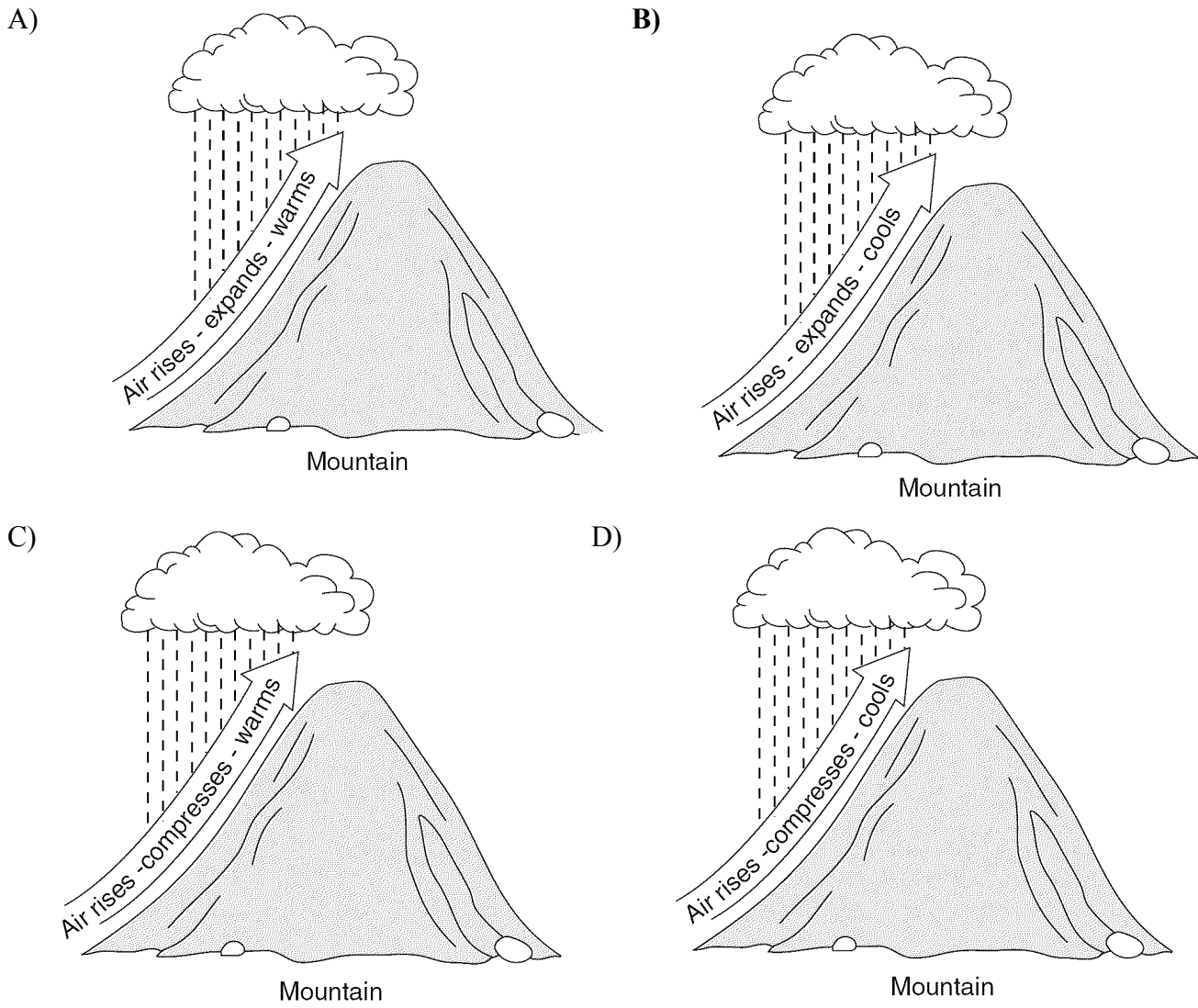
Many scientists believe that modern industrialization and the burning of fossil fuels (coal, oil, and natural gas) have increased the amount of atmospheric carbon dioxide. This increase may result in an intensified greenhouse effect on Earth causing significant alterations in climate patterns in the future. Scientists estimate that average global temperatures could increase by as much as 5°C by the middle of the 21st century.

State one possible change humans could make to significantly reduce the amount of greenhouse gases added to the atmosphere each year.

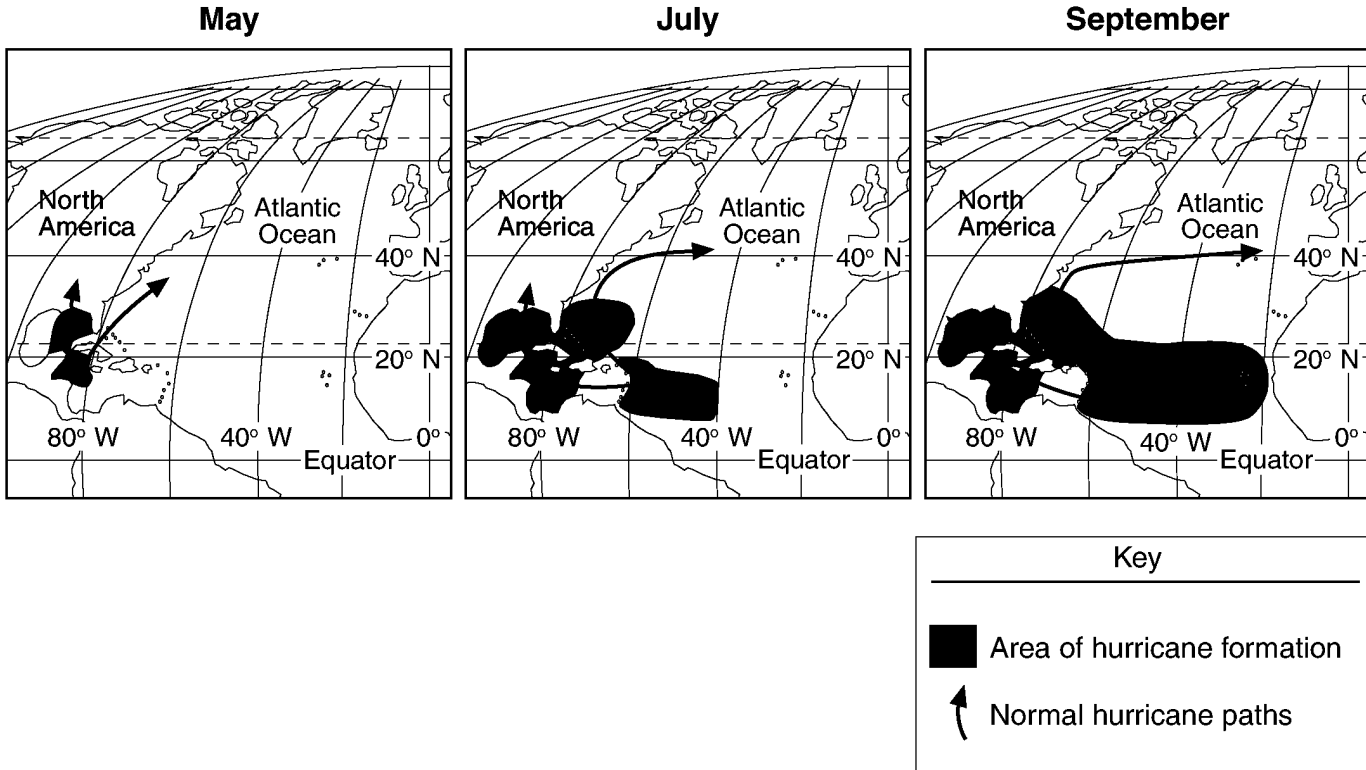
30. Which map view best shows the movement of surface air around a low-pressure system in the Northern Hemisphere?



31. Which diagram best illustrates how air rising over a mountain produces precipitation?

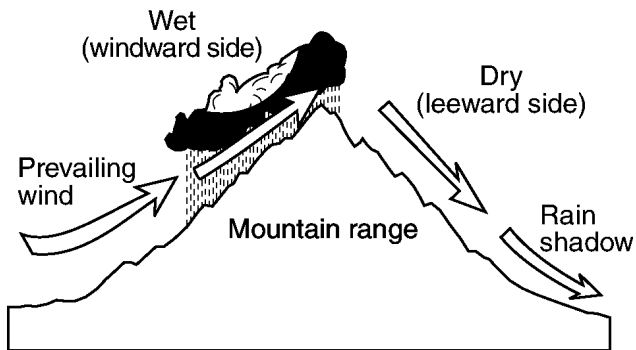


32. Base your answer to the following question on the maps below, which show areas of hurricane formation and normal hurricane paths in the Atlantic Ocean during May, July, and September. The areas of hurricane formation usually have surface ocean-water temperatures greater than 80°F.



How does the area of hurricane formation change from May to September?

33. The cross section below shows how prevailing winds have caused different climates on the windward and leeward sides of a mountain range.

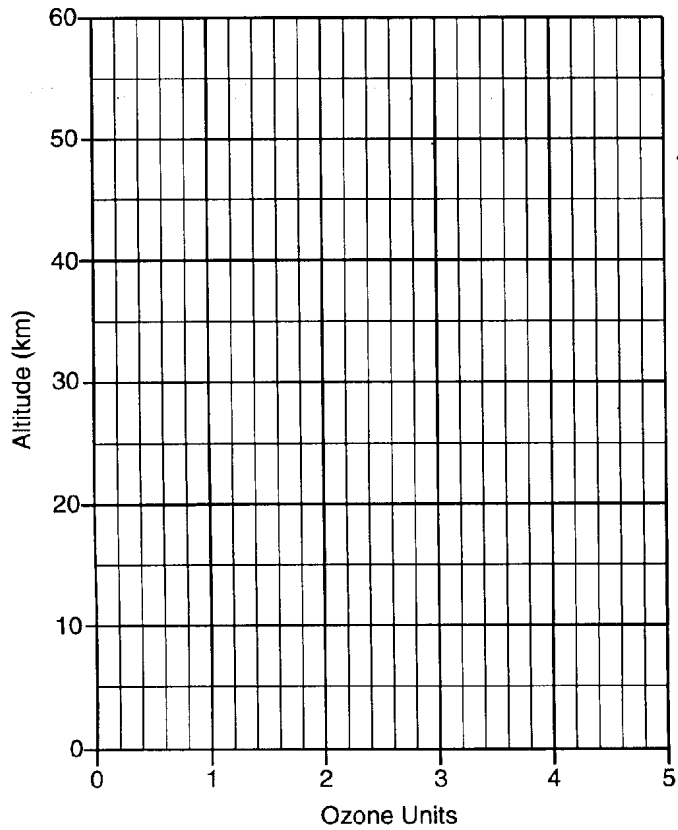


Why does the windward side of this mountain have a wet climate?

- A) Rising air compresses and cools, causing the water droplets to evaporate.
- B) Rising air compresses and warms, causing the water vapor to condense.
- C) **Rising air expands and cools, causing the water vapor to condense.**
- D) Rising air expands and warms, causing the water droplets to evaporate.

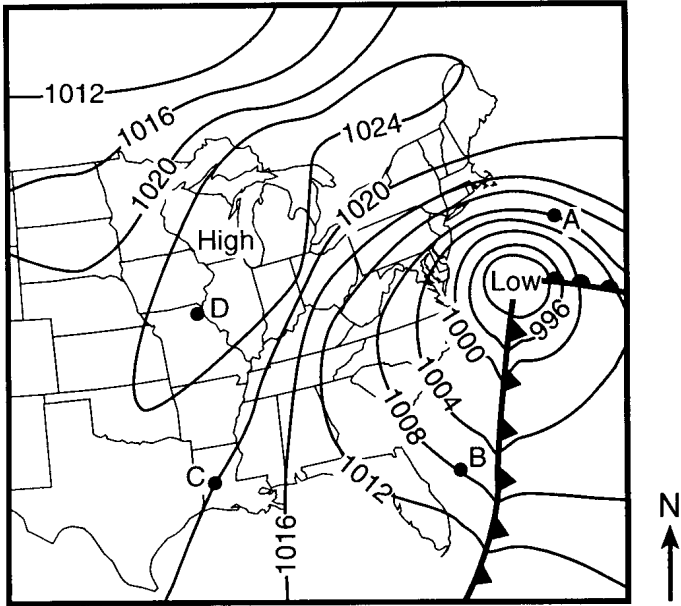
34. Base your answer to the following question on the table below, which shows the concentration of ozone, in ozone units, in Earth's atmosphere at different altitudes. [One ozone unit is equal to 10^{12} molecules per cubic centimeter.]

Concentration of Ozone	
Altitude (km)	Ozone Units
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9
25	4.4
30	2.6
35	1.4
40	0.6
45	0.2
50	0.1
55	0.0



On the grid provided, construct a line graph of the ozone concentration in the atmosphere recorded at the different altitudes shown on the table by plotting the data from the table and connecting the points.

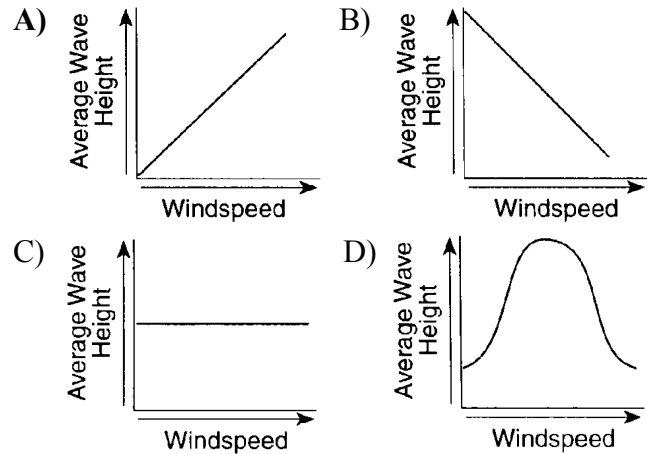
35. Base your answer to the following question on the weather map below. Points A, B, C, and D are locations on Earth's surface.



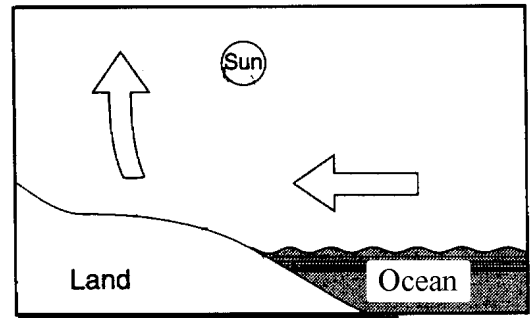
Which type of front extends southward from the center of the low?

- A) occluded B) warm
 C) stationary D) cold
36. Which atmospheric conditions are necessary for condensation?
- A) saturated air and dewpoint temperature much lower than air temperature
 B) unsaturated air and dewpoint temperature much higher than air temperature
 C) **saturated air and equal dewpoint and air temperatures**
 D) unsaturated air and equal dewpoint and air temperatures

37. Which graph best shows the relationship between windspeed and the average height of ocean waves formed by the wind?



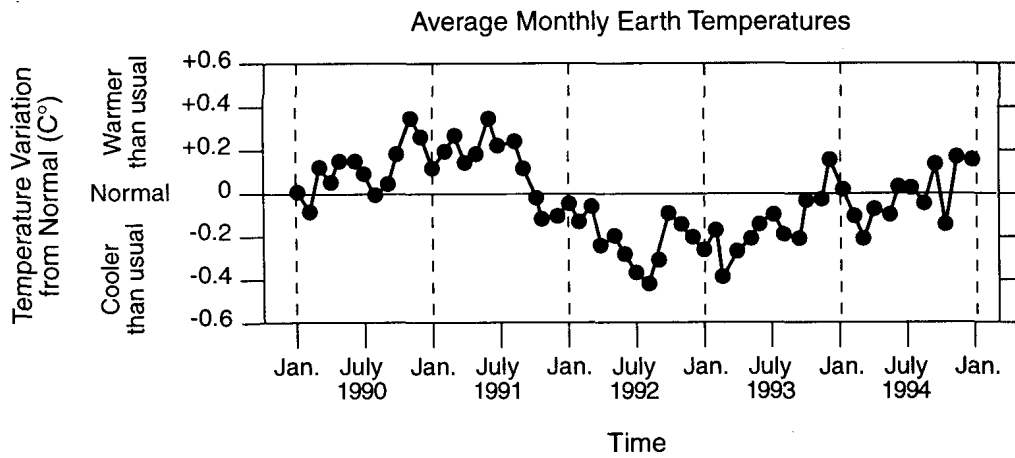
38. In the diagram below, arrows represent air movement near an ocean coastline on a summer afternoon.



Compared to the air over the ocean, the air over the land has a

- A) lower temperature and lower barometric pressure
 B) lower temperature and higher barometric pressure
 C) **higher temperature and lower barometric pressure**
 D) higher temperature and higher barometric pressure
39. Wind is caused mainly by air-pressure differences that result from
- A) **uneven heating of Earth's atmosphere**
 B) absorption of ultraviolet radiation by Earth's landmasses
 C) radiation of heat from Earth's landmasses to water bodies
 D) rotation of Earth on its axis

40. Base your answer to the following question on the graph below which shows variations in Earth's monthly temperatures from normal Earth temperatures between January 1990 and January 1995.



The greatest temperature variation from normal occurred during

- A) May 1991 **B) August 1992** C) July 1993 D) March 1994

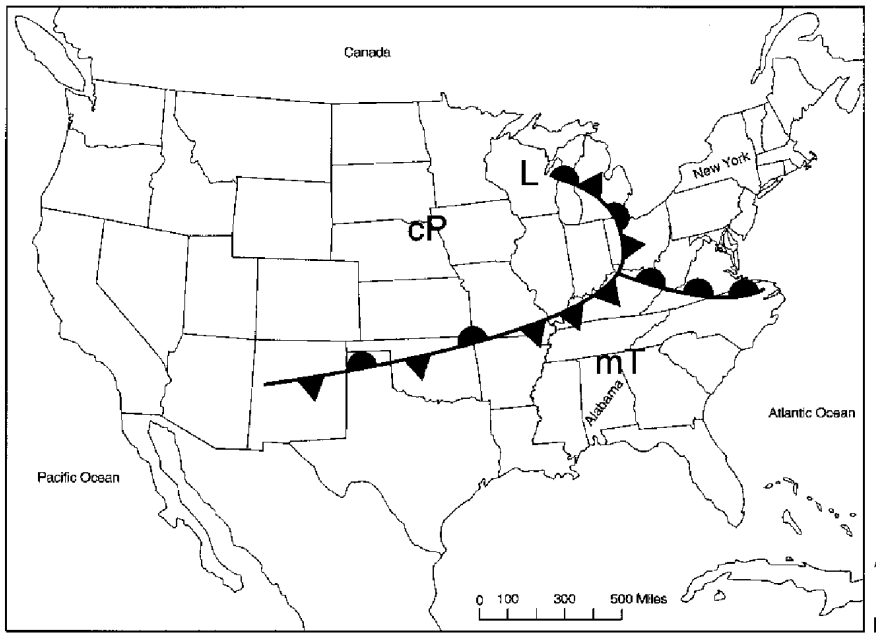
41. A city located near the center of a large continent has colder winters and warmer summers than a city at the same elevation and latitude located on the continent's coast. Which statement best explains the difference between the cities climates?

- A) Windspeeds are greater over land than over oceans.
 B) Air masses originate only over land.
C) Land has a lower specific heat than water.
 D) Water changes temperature more rapidly than land.

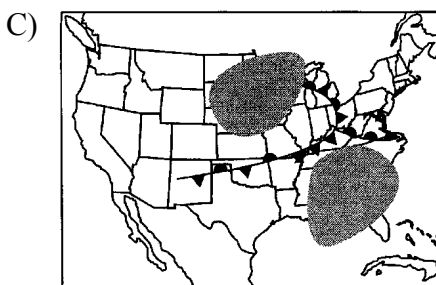
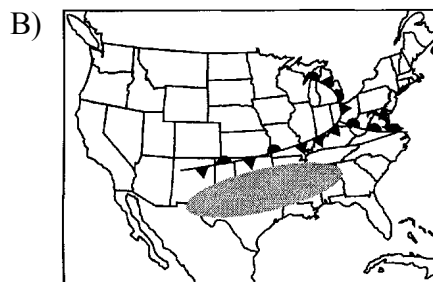
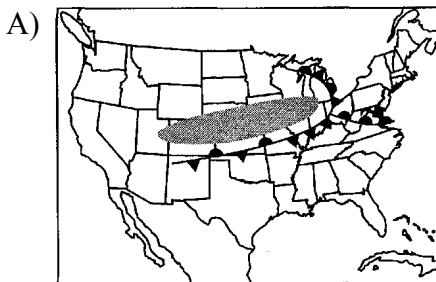
42. What is the dewpoint when the dry-bulb temperature is 16°C and the wet-bulb temperature is 12°C?

- A) -19°C B) -16°C
 C) 7°C D) 9°C

43. Base your answer to the following question on the weather map below, which shows a weather system that is affecting part of the United States.



Which map best shows the areas in which precipitation is most likely occurring? [Darkened areas represent precipitation.]



44. Under which set of atmospheric conditions does water usually evaporate at the fastest rate?

- A) warm temperatures, calm winds, and high humidity
- B) warm temperatures, high winds, and low humidity**
- C) cold temperatures, calm winds, and low humidity
- D) cold temperatures, high winds, and high humidity

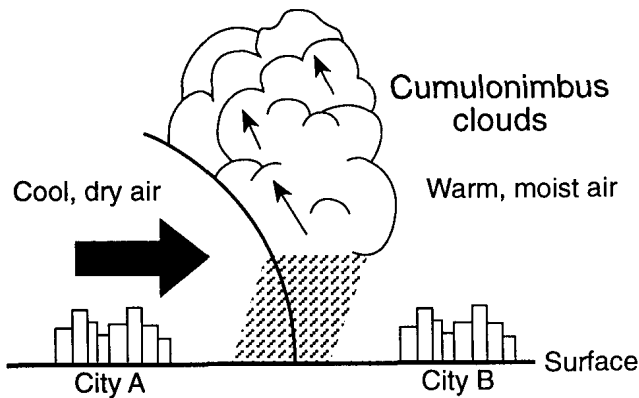
45. The satellite photograph below shows a Northern Hemisphere cloud pattern.



The center of this cloud pattern is most likely the center of a

- A) cold, dry air mass
- B) warm, dry air mass
- C) low-pressure system**
- D) high-pressure system

46. The cross section below shows a weather front. The large arrow shows the direction of the movement of the cool air mass.



Which type of weather front is shown?

- A) warm front
- B) cold front**
- C) occluded front
- D) stationery front

47. What is the wet-bulb temperature when the air temperature is 16°C and the relative humidity is 71%?
- A) 11°C
 - B) 13°C**
 - C) 3°C
 - D) 19°C

48. Which weather conditions are most probable when the moisture content of the air increases, resulting in a lower atmospheric pressure?
- A) sunny and fair
 - B) cold and windy
 - C) partly cloudy, with skies becoming clear
 - D) cloudy, with a chance of precipitation**

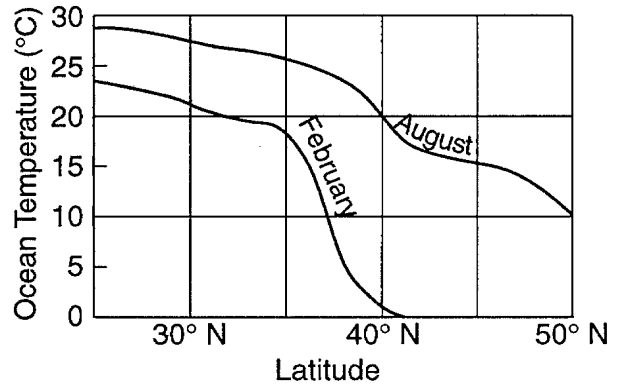
49. According to the *Earth Science Reference Tables*, the prevailing winds at 45° S latitude are from the

- A) southwest
- B) northwest**
- C) southeast
- D) northeast

50. What is the approximate dewpoint temperature when the dry-bulb temperature is 24°C and the wet-bulb temperature is 18°C?

- A) 6°C
- B) 12°C
- C) 14°C**
- D) 17°C

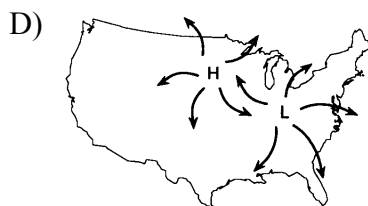
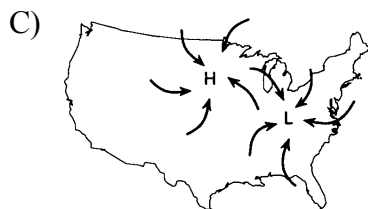
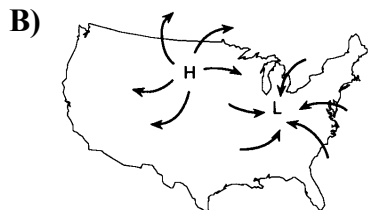
51. The graph below shows the ocean surface temperatures along part of the east coast of North America in February and in August.



Which inference about this region is supported by the data?

- A) Tides are higher in August.
- B) Insolation is greater in August.**
- C) The ocean is deeper in February.
- D) Ocean currents flow faster in February.

52. Which map correctly shows the wind directions of the high-pressure and low-pressure systems?



53. Which event is a direct result of transpiration and evaporation?

- A) The atmosphere warms.
- B) Cloud cover decreases.
- C) **Moisture enters the atmosphere.**
- D) Moisture leaves the atmosphere.

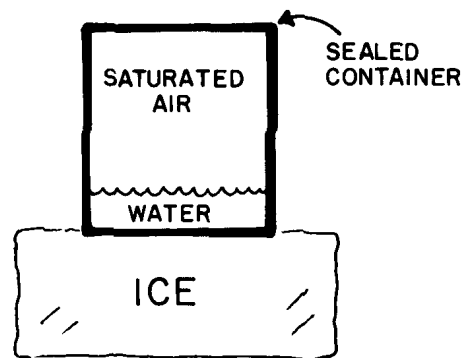
54. Wind velocity is most directly dependent on the

- A) **gradient of the air pressure field**
- B) value of the Coriolis effect
- C) moisture content of the air
- D) rotational velocity of the Earth

55. Two identical towels are hanging on a clothesline in a sunny location. One towel is wet, the other is dry. What is one reason that the wet towel feels cooler than the dry towel?

- A) **Water in the wet towel is evaporating.**
- B) Water in the wet towel prevents absorption of heat energy.
- C) The dry towel receives more heat energy from the Sun than the wet towel does.
- D) The dry towel has more room for heat storage than the wet towel does.

56. The diagram below shows a sealed container holding liquid water and clean air saturated with water vapor. (Relative humidity is 100%.) The container has been placed on a block of ice to cool.



Which statement best explains why a cloud has *not* formed in the sealed container?

- A) The air in the container is above the freezing point.
 - B) The ice is cooling the water in the container.
 - C) **The air in the container lacks condensation nuclei.**
 - D) The water in the container is still evaporating.
57. Wind moves from regions of
- A) high temperature toward regions of low temperature
 - B) **high pressure toward regions of low pressure**
 - C) high precipitation toward regions of low precipitation
 - D) high humidity toward regions of low humidity
58. Why do clouds usually form at the leading edge of a cold airmass?
- A) Cold air flows over warm air, causing the warm air to descend and cool.
 - B) **Cold air flows under warm air, causing the warm air to rise and cool.**
 - C) Cold air contains more dust than warm air does.
 - D) Cold air contains more water vapor than warm air does.
59. As wind velocity decreases, the distance between isobars on a weather map will
- A) decrease
 - B) **increase**
 - C) remain the same

60. As a sample of very moist air rises from sea level to a higher altitude, the probability of condensation occurring in that air sample will

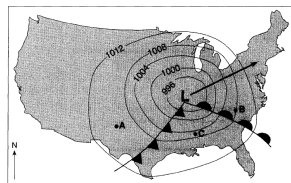
- A) decrease
- B) increase**
- C) remain the same

Answer Key

Chapter 7 Weather Practice

1. — The warm, moist air is less dense. — The warm, moist air is lighter. — Warm air is overriding the more dense cold air.

2. C
3. stratosphere



6. *Examples:* —B is being affected by a warm front. —Precipitation often occurs ahead of a warm front. —B is located close to a frontal boundary.

7. B
8. *Examples:* — Rising air expands, cools to the dewpoint, and condensation of water vapor occurs. — Condensation occurs when the dewpoint is reached. — Water vapor condenses when dewpoint is reached.

9. A
10. B
11. D
12. The centers of eight or nine Xs are within the circles shown on the graph and are correctly connected with a line that passes through the circles.

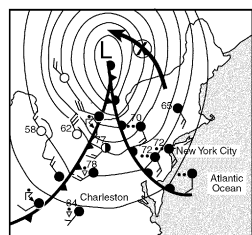
13. 2.8 to 3.2 millibars/hour

14. B
15. B
16. C
17. B
18. *Examples:* — Bundaberg is located east of Birdsville. — Birdsville is west of Bundaberg. — Earth rotates west to east.

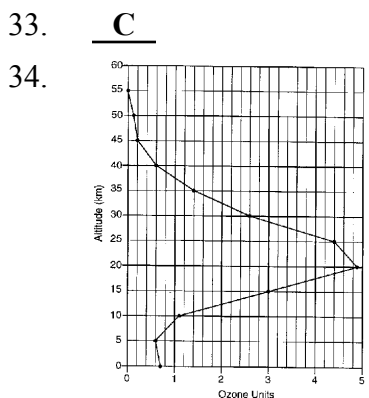
19. C
20. 134 ± 4 in.
21. *Examples:* — Cold air holds very little water vapor. — Very little evaporation takes place in Antarctica. — Antarctica is in a region where air is sinking, therefore, clouds seldom form. — Very little precipitation occurs in a high-pressure area.

22. D
23. one day per year
24. Acceptable responses include, but are not limited to, these examples: The lower latitudes have longer growing seasons; As latitude increases, the length of the growing season decreases.

25. B
26. D
27. A
28.



29. —Pass a law to limit greenhouse gas emissions. —Stop burning the rain forests. —Increase car pool/mass transit use.
30. A
31. B
32. The area of hurricane formation increases from May to September. The area spreads eastward.



35. D
36. C
37. A
38. C
39. A
40. B
41. C
42. D
43. D
44. B
45. C
46. B
47. B
48. D
49. B
50. C
51. B

52. B
53. C
54. A
55. A
56. C
57. B
58. B
59. B
60. B