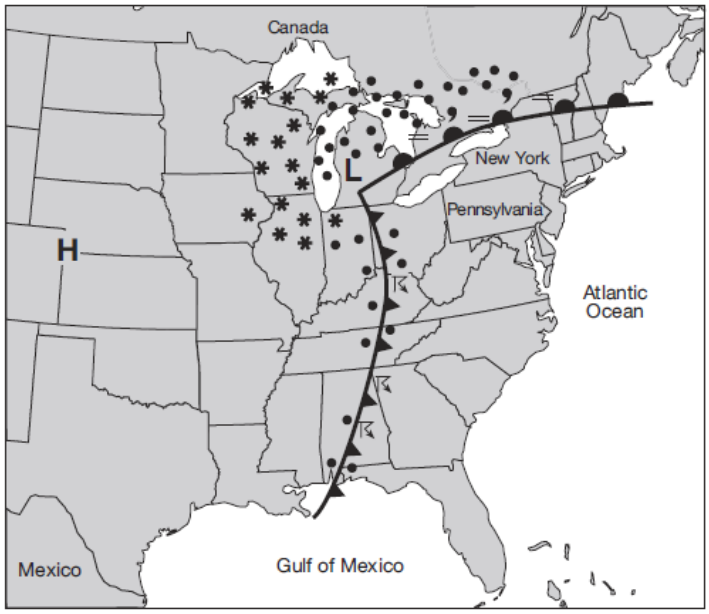
Base your answers to questions **1** through **3** on the weather map below and on your knowledge of Earth science. The map of a portion of eastern North America shows a high-pressure center (**H**) and a low-pressure center (**L**), frontal boundaries, and present weather conditions.



1. The general surface wind circulation associated with the high-pressure center (**H**) is most likely

A) clockwise and outward
B) clockwise and inward
C) counterclockwise and outward
D) counterclockwise and inward

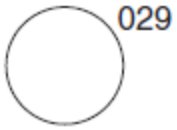
2. Which weather condition is shown along the cold front?

A) fog
B) snow
C) haze
D) thunderstorms

3. What was the most likely source region for the air mass over Pennsylvania?

A) New York State
B) Pacific Ocean
C) Gulf of Mexico
D) Canada

4. A weather station model is shown below.



What is the barometric pressure indicated by this station model?

A) 0.029 mb
B) 902.9 mb
C) 1002.9 mb
D) 1029.0 mb

5. Which gas in the atmosphere has the most influence on day-to-day weather changes?

A) ozone
B) oxygen
C) water vapor
D) carbon dioxide

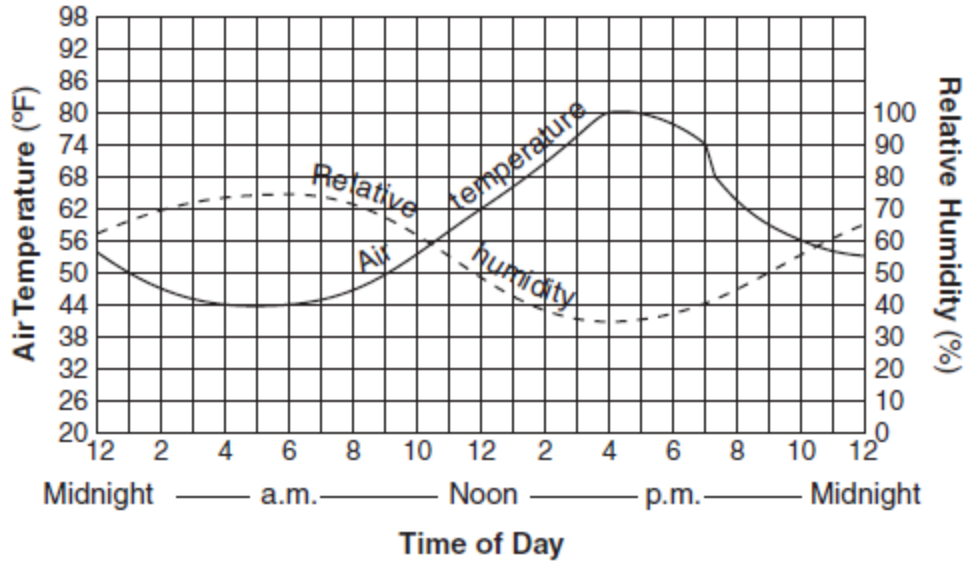
6. Students wish to study the effect of elevation above sea level on air temperature and air pressure. They plan to hike in the Adirondack Mountains from Heart Lake, elevation 2,179 feet, to the peak of Mt. Marcy, elevation 5,344 feet. Which instruments should they use to collect their data?

A) anemometer and psychrometer
B) anemometer and barometer
C) thermometer and psychrometer
D) thermometer and barometer

7. What is the dewpoint when the dry bulb temperature is 20°C and the relative humidity is 17%?

A) – 5°C
B) – 2°C
C) 11°C
D) 15°C

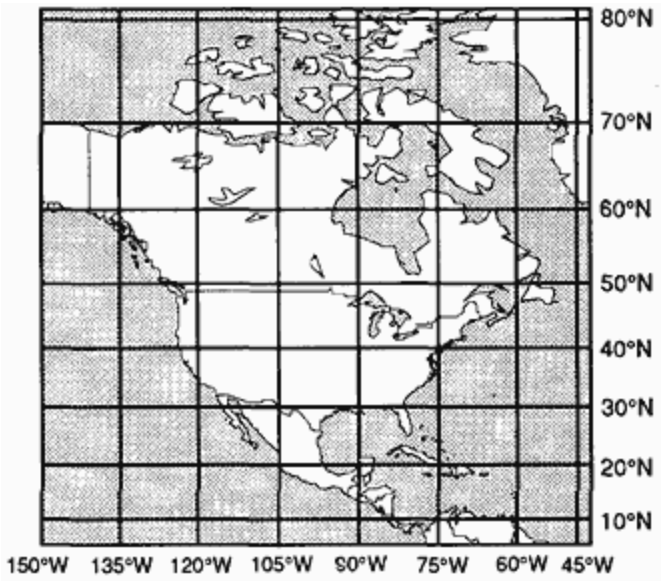
8. Base your answer to the following question on the graph below. The graph shows air temperature and relative humidity at a single location during a 24-hour period.



What was the approximate change in relative humidity from 12 noon to 4 p.m.?

A) 10% **B) 15%** C) 20% D) 30%

9. An airmass originates with its center located at 25° N and 90° W.



Based on the map, this air mass would be classified as

A) cP B) mP C) cT **D) mT**

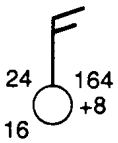
10. A temperature of 104°F is approximately equal to

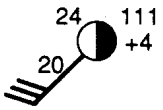
A) 220°C B) 214°C
C) 43°C **D) 40°C**

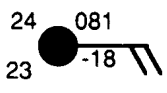
11. Which geographic region is the most common source region for the mT air masses that move into New York State?

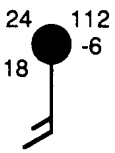
A) northern Canada
B) Gulf of Mexico
C) Arctic Ocean
D) southwestern United States

12. Which weather station model indicates the greatest probability of precipitation?

A)


B)


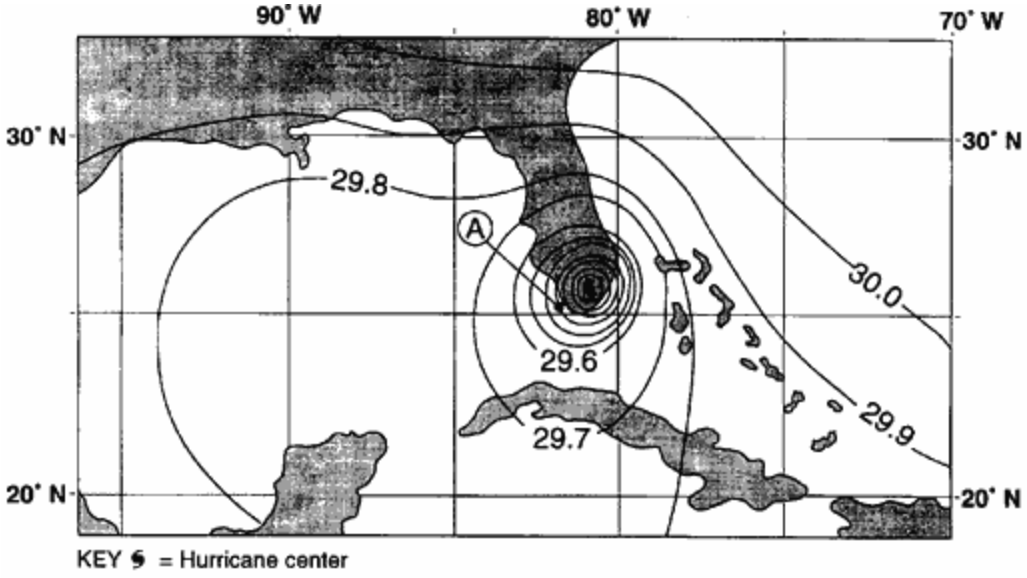
C)


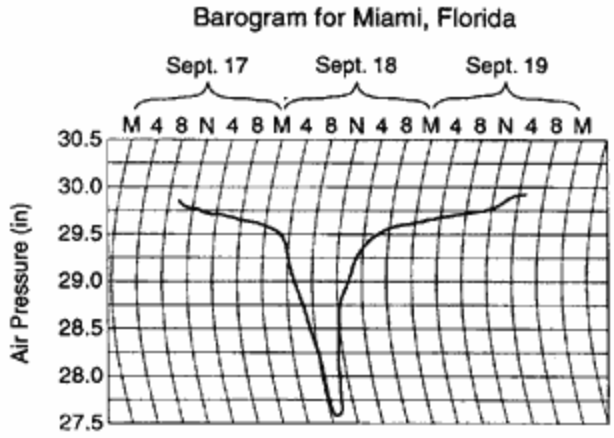
D)


13. 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

Base your answers to questions **14** through **18** on "the weather map and barogram below. The weather map shows a hurricane that was located over southern Florida. The isobars show air pressure in inches of mercury. Letter A represents a point near the west coast of Florida. The barogram shows the recorded air pressure in inches of mercury as the hurricane passed near Miami, Florida.

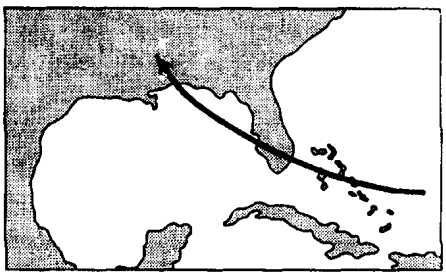




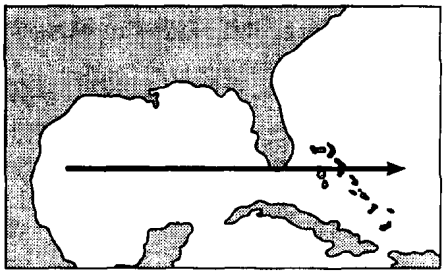
"

7. Which map shows the most likely track of this hurricane?

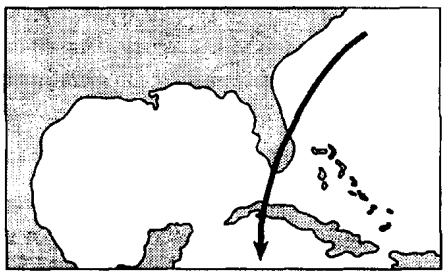
A)



B)



C)



D)

15. Which type of air mass would most likely be the source of the moisture that causes the strong winds and heavy rain associated with this hurricane ?

A) cP B) cT C) mP **D) mT**

16. What was the lowest air pressure recorded on the barogram as the hurricane passed near Miami?

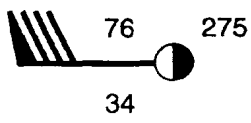
A) 27.30 in **B) 27.60 in** C) 27.75 in D) 28.60 in

17. What is the latitude and longitude at the center of the hurricane?

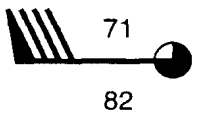
A) 26° N 81° W B) 26° N 89° W C) 34° N 81° W D) 34° N 89° W

18. Which station model best represents the weather conditions at point A?

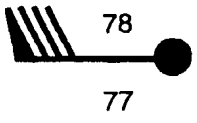
A)



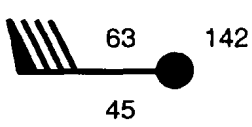
B)



C)



D)



19. Which weather variable can be determined by using a psychrometer?

A) barometric pressure
B) cloud cover
C) relative humidity
D) wind speed

20. Liquid water sometimes turns into ice when it comes in contact with Earth's surface. Which present weather symbol on a station model represents this type of precipitation?

A)

B)

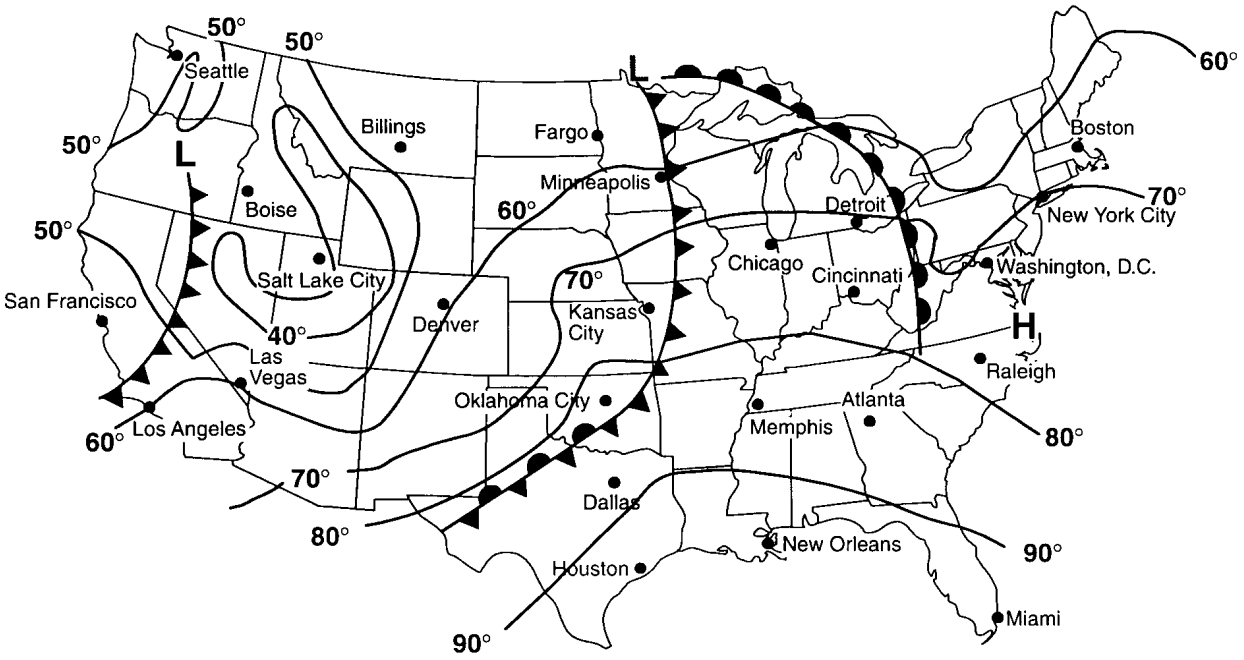
C)

D)

21. What is the relative humidity if the dry-bulb temperature is 16°C and the wet-bulb temperature is 10°C?

A) 45% B) 33% C) 14% D) 4%

22. Base your answer to the following question on the weather map below, which shows the location of fronts and the temperature field on a given day in the United States.



Which two cities most likely have an air temperature closest to 75°F?

A) Chicago and Detroit
B) Los Angeles and Denver
C) Oklahoma City and Memphis
D) Cincinnati and Kansas City

23. At which of these latitudes would average annual precipitation be greatest?

A) 0º
B) 30º N
C) 90º N
D) 90º S

24. An observer measured the air temperature and the dewpoint and found the difference between them to be 12°C. One hour later, the difference between the air temperature and the dewpoint was found to be 4°C. Which statement best describes the changes that were occurring?

A) The relative humidity was decreasing and the chance of precipitation was decreasing.
B) The relative humidity was decreasing and the chance of precipitation was increasing.
C) The relative humidity was increasing and the chance of precipitation was decreasing.
D) The relative humidity was increasing and the chance of precipitation was increasing.

25. What is the dewpoint when the dry-bulb temperature is 8°C and the wet-bulb temperature is 2°C?

A) 28°C B) 6°C C) 3°C **D) –9°C**

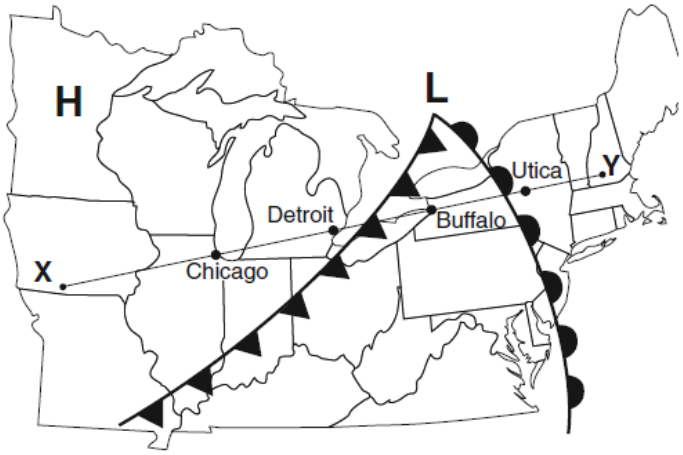
26. The chart below shows the air temperature and the dewpoint temperature near the ground at a given location for four consecutive days. All temperatures were recorded at noon.

Day	Air Temperature (°C)	Dewpoint Temperature (°C)
1	20	11
2	18	17
3	16	14
4	20	13

Which statement is best supported by the data?

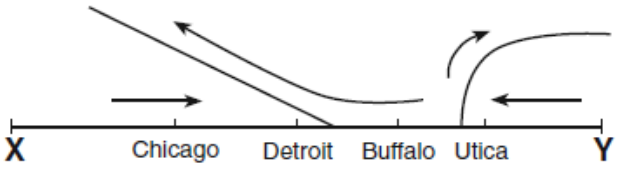
A) Relative humidity was highest on day 1.
B) The greatest amount of water vapor was in the atmosphere on day 2.
C) The base level for cloud formation was highest on day 3.
D) The chance of precipitation was greatest on day 4.

Base your answers to questions **27** and **28** on the weather map below, which shows a high-pressure center (**H**) and a low-pressure center (**L**), with two fronts extending from the low-pressure center. Points *X* and *Y* are locations on the map connected by a reference line.

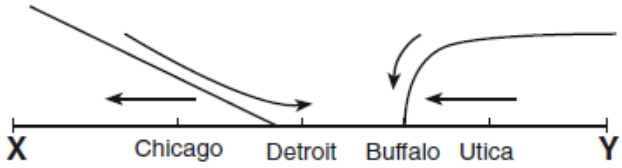


27. Which cross section best represents the fronts and air movements in the lower atmosphere along line *XY*?

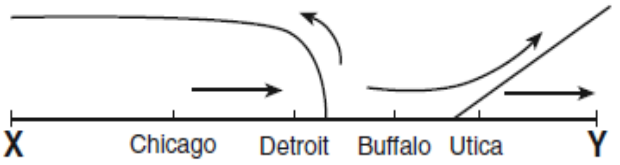
A)



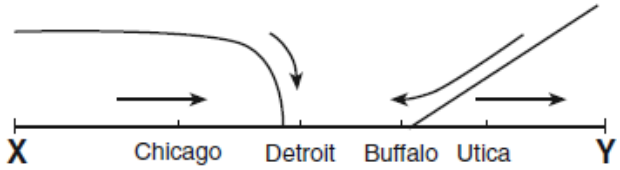
B)



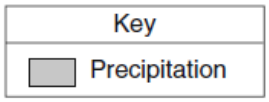
C)



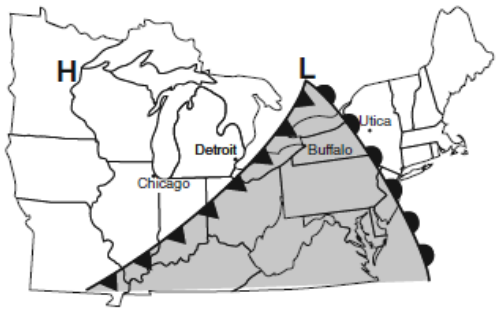
D)



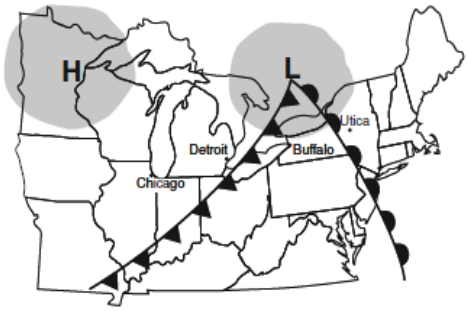
28. Which map best shows the most probable areas of precipitation associated with these weather systems?



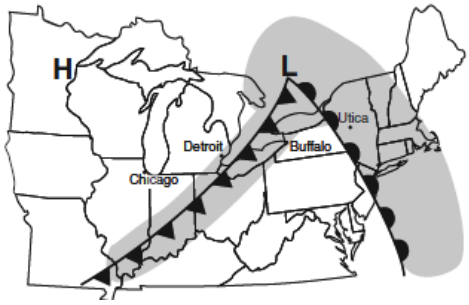
A)



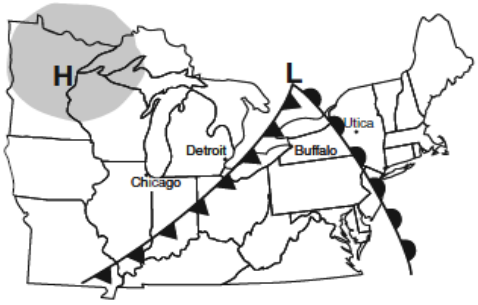
B)



C)



D)

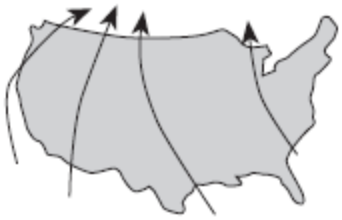


29. Which map shows normal paths followed by low-pressure storm centers as they pass across the United States?

A)

B)

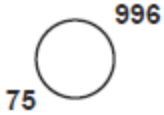
C)



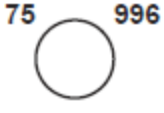
D)

30. Which station model shows an air temperature of 75°F and a barometric pressure of 996.3 mb?

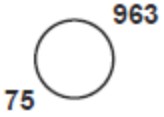
A)



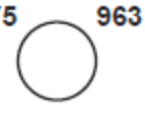
B)



C)



D)



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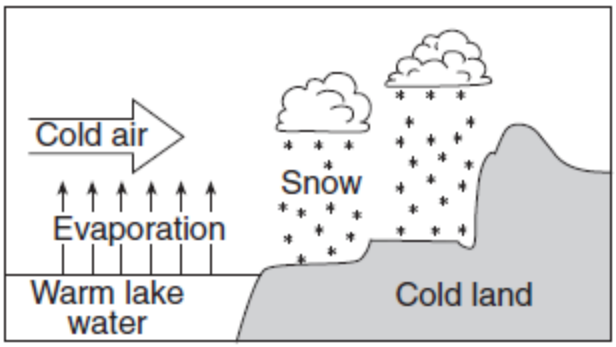
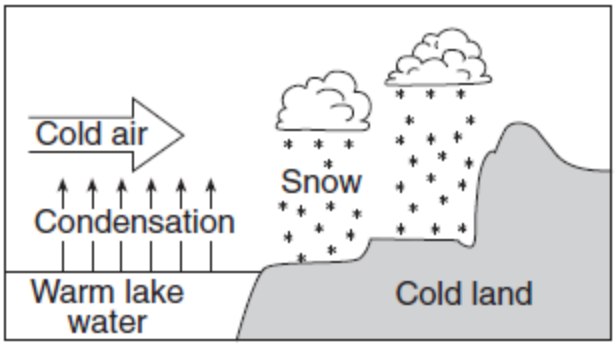
31. Which cross section below best represents the conditions that cause early winter lake-effect snowstorms in New York State?

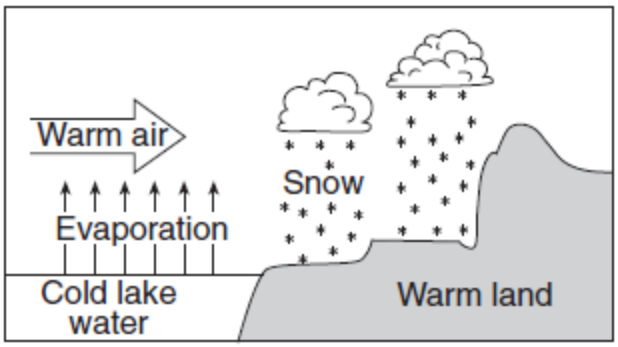
A)



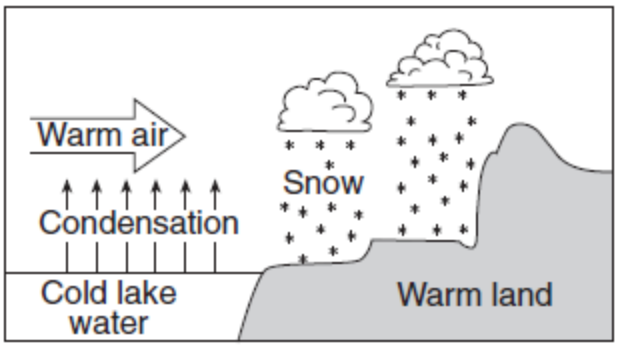
B)



C)



D)



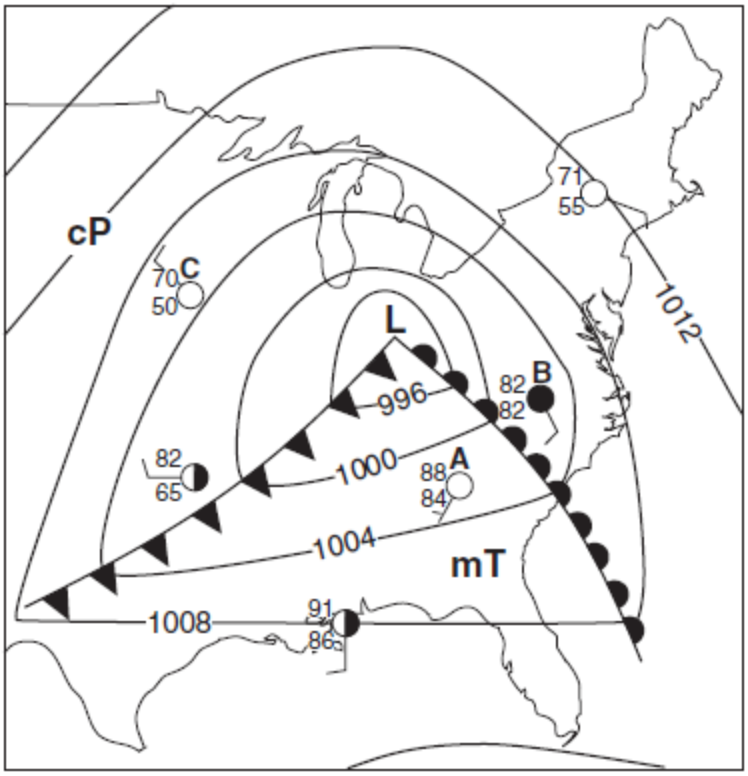
32. An air pressure of 29.47 inches of mercury is equal to

A) 996 mb **B) 998 mb**
C) 1,002 mb D) 1,014 mb

33. Which weather instrument is used to measure air temperatures recorded on a weather map?

A) anemometer B) wind vane
C) thermometer D) barometer

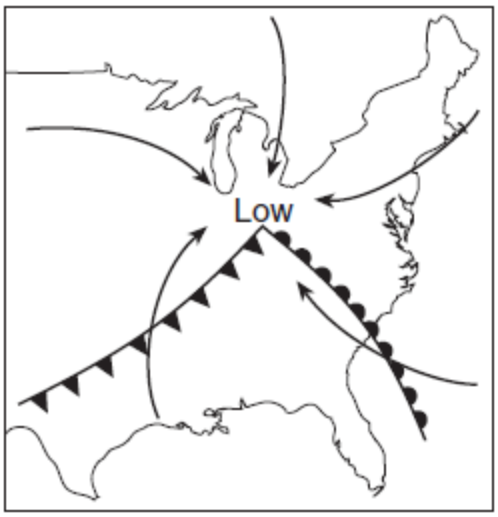
34. Base your answer to the following question on the weather map below. The map shows a low-pressure system and some atmospheric conditions at weather stations *A, B,* and *C*.



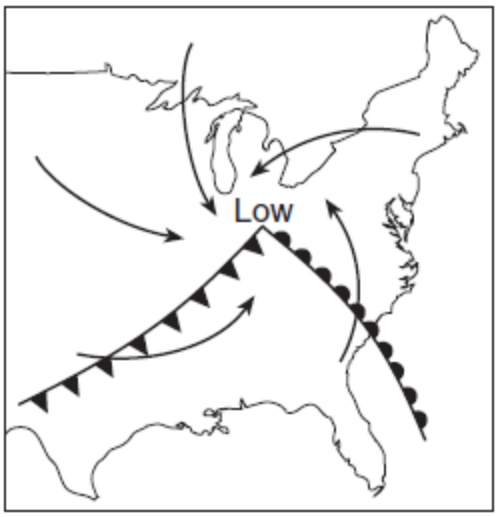
Page 9

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

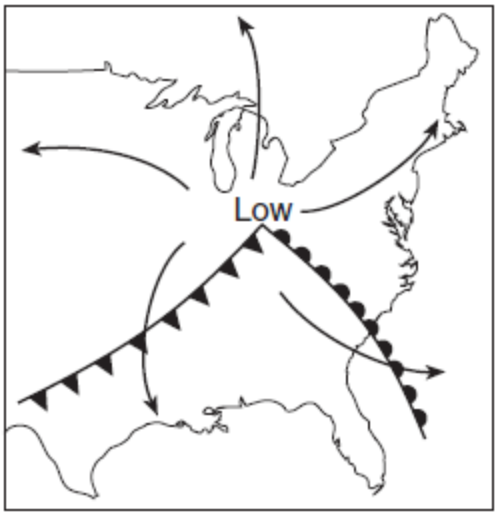
A)



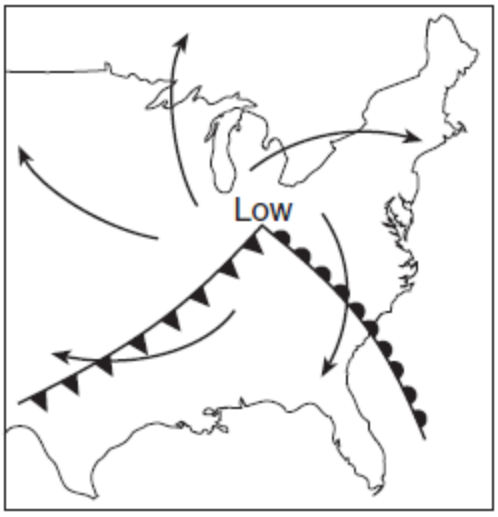
B)



C)



D)



35. The weather station model shown below indicated that winds are coming from the

A) southeast at 10 knots
B) northwest at 10 knots
C) southeast at 20 knots
D) northwest at 20 knots

36. A temperature of 73° Fahrenheit is approximately equal to a temperature of

A) 17° Celsius
B) 23° Celsius
C) 26° Celsius
D) 162° Celsius

37. 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

38. The properties of an airmass depend mainly on the

A) wind speed within the airmass
B) characteristics of the surface over which the airmass was formed
C) size of the airmass
D) rotation of the Earth

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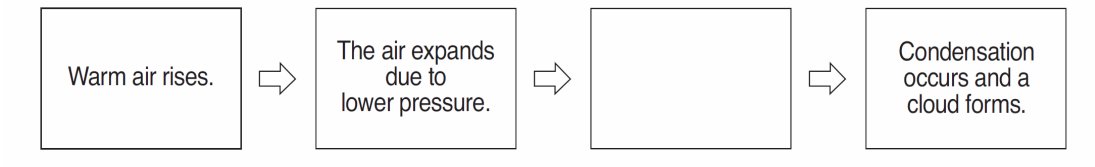
39. The incomplete flowchart below shows some of the changes that occur in warm air as it rises to form a cloud.

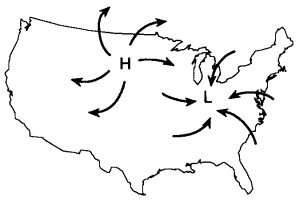


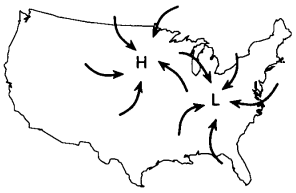
Which statement should be placed in the empty box to accurately complete the flowchart?

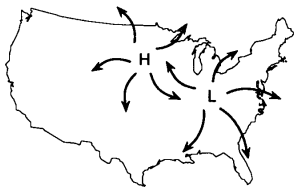
A) The air warms as it expands.
B) The air cools until it reaches the dewpoint.
C) The air's relative humidity decreases to zero.
D) The air enters the thermosphere.

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

A)


B)


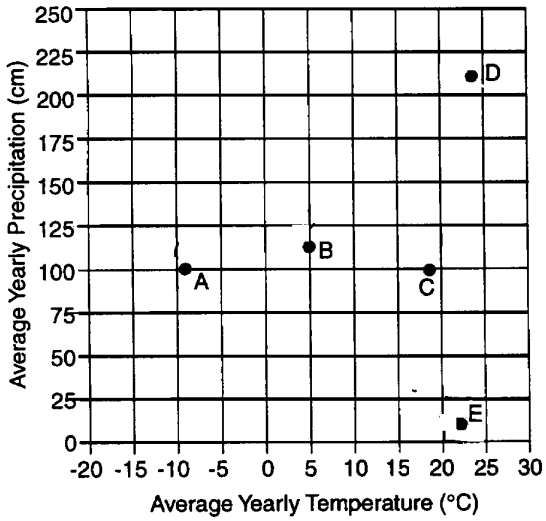
C)


D)


41. A psychrometer is used to determine which weather variables?

A) wind speed and wind direction
B) percentage of cloud cover and cloud height
C) air pressure and air temperature
D) relative humidity and dewpoint

42. Base your answer to the following question on the graph below, which shows the average yearly temperature and average yearly precipitation for Earth locations *A* through *E*.

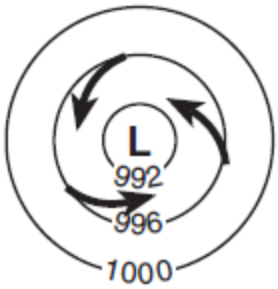


The climate indicated at location *E* on the graph would most likely be classified as

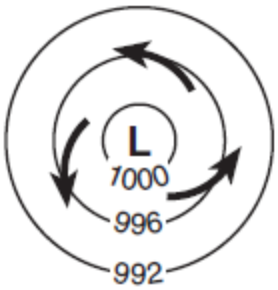
A) cold and dry
B) cold and humid
C) warm and dry
D) warm and humid

43. Which map view best represents the pattern of isobar values, in millibars, and the pattern of wind flow, shown by arrows, at Earth's surface surrounding a Northern Hemisphere low-pressure center?

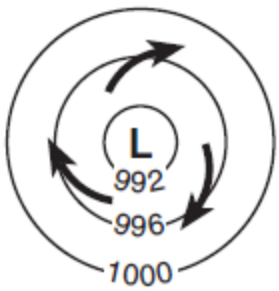
A)



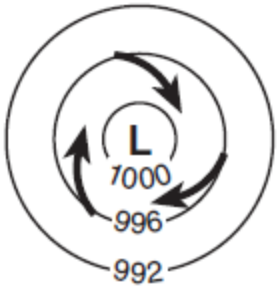
B)



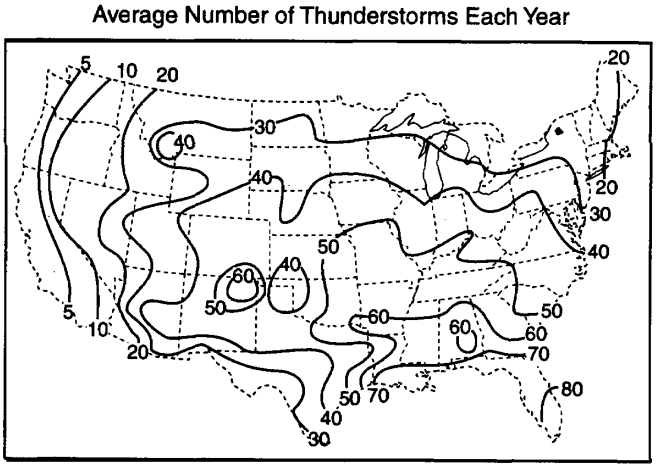
C)



D)



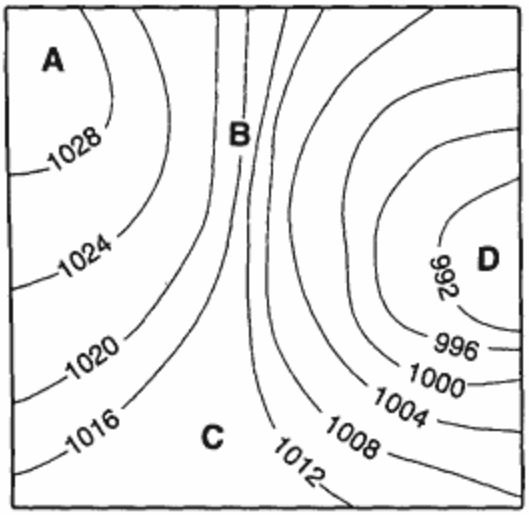
44. The map below shows the average number of thunderstorms each year in the continental United States.



The average number of thunderstorms that occur each year in Albany, New York is approximately

A) 15 **B) 25** C) 35 D) 45

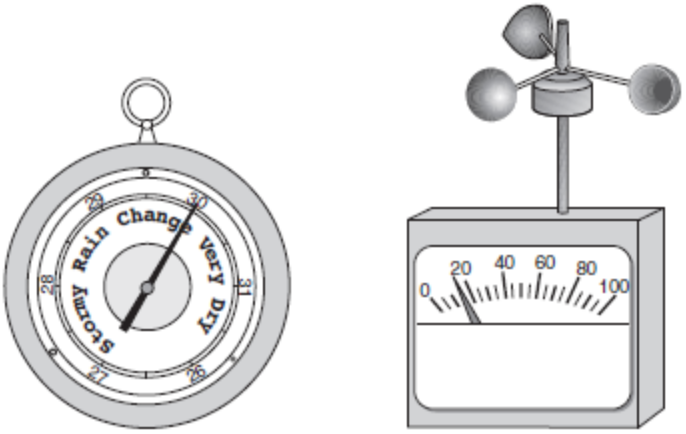
45. The weather map below shows a portion of an air-pressure field at Earth's surface. Isobars show air pressure in millibars.



At which location is windspeed greatest?

A) *A* **B) *B*** C) *C* D) *D*

46. 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

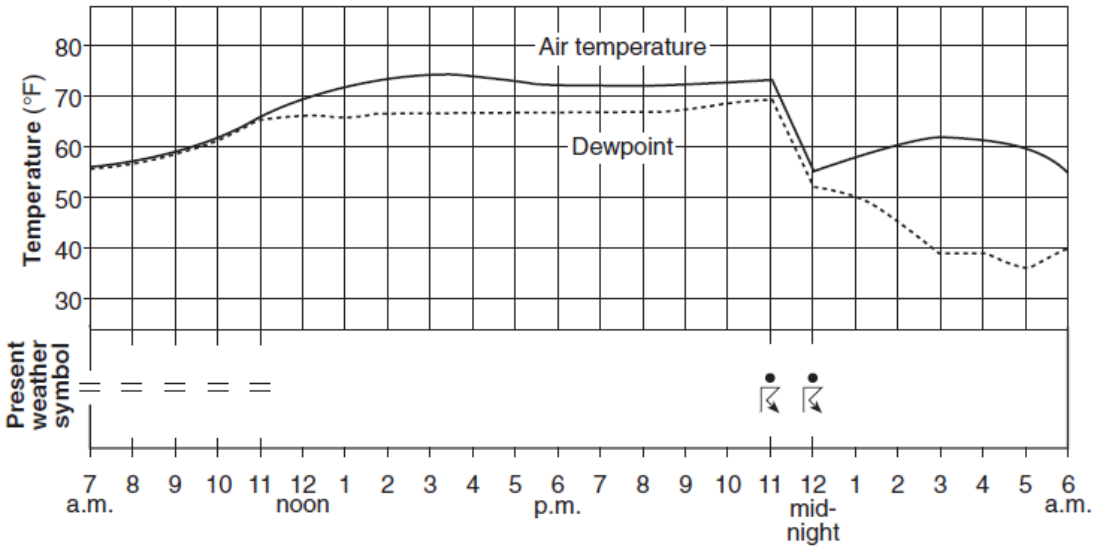
C)

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

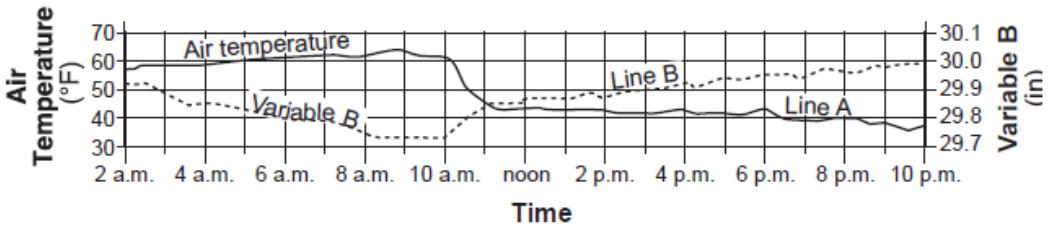
47. Base your answer to the following question on the graph below, which shows air temperature, dewpoint, and present weather conditions for a 23-hour period at Dallas, Texas.



The thunderstorm that occurred between 11 p.m. and 12 midnight was most likely the result of

A) the arrival of a warm front
B) the arrival of a cold front
C) an increase in the difference between air temperature and dewpoint
D) an increase in both air temperature and dewpoint

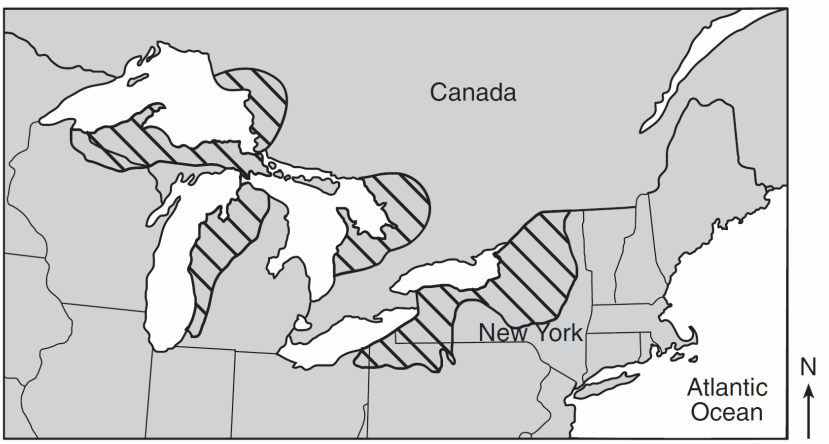
48. Data from two weather instruments have been recorded on the graph below. Line *A* on the graph represents air-temperature data. Line *B* was plotted using the scale for variable *B*.



Line *B* on the graph represents data from which weather instrument?

A) thermometer **B) barometer** C) psychrometer D) anemometer

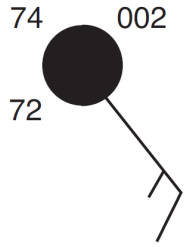
49. The striped areas on the map below show regions along the Great Lakes that often receive large amounts of snowfall due to lake-effect storms.



These storms generally develop when

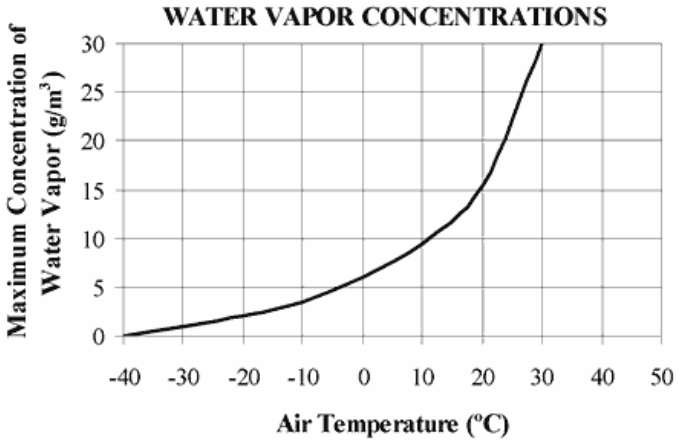
A) cold air moves to the east over warmer lake water
B) cold air moves to the west over warmer land regions
C) warm air moves to the east over colder lake water
D) warm air moves to the west over colder land regions

50. What are the dewpoint and wind direction shown on the station model below?



A) 72°F and wind from the northeast
B) 72°F and wind from the southeast
C) 74°F and wind from the northwest
D) 74°F and wind from the southwest

51. The graph below shows the maximum possible amounts of water vapor that air can hold at different temperatures.



What is the approximate maximum amount of water vapor that a cubic meter of air can hold at 20°C?

A) 15 g B) 20 g C) 25 g D) 30 g

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

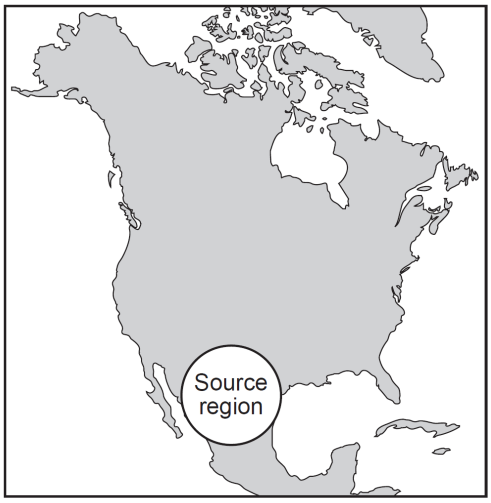
A) wind vane—wind speed
thermometer—temperature
precipitation gauge—relative humidity

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

53. The map of North America below shows the source region of an air mass forming mostly over Mexico.



This air mass originating over Mexico is classified as

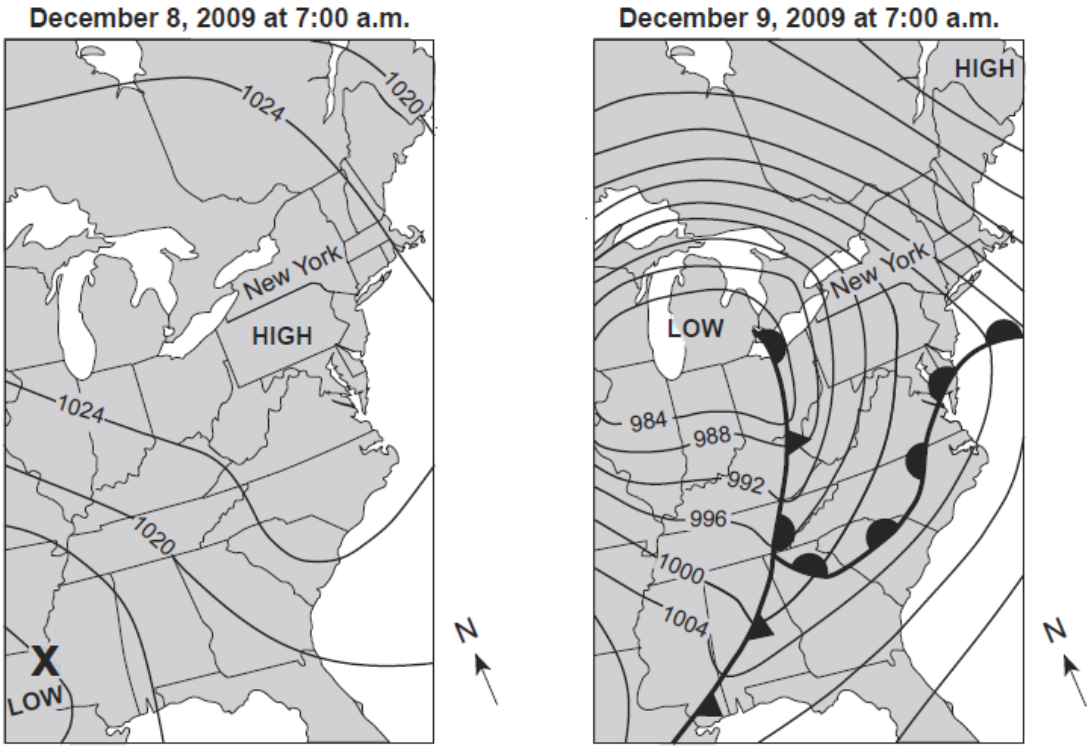
A) continental polar

B) continental tropical

C) maritime polar

D) maritime tropical

54. Base your answer to the following question on the weather maps below and on your knowledge of Earth science. The weather maps show the eastern United States on two consecutive days. Some isobars are labeled in millibars (mb). Letter *X* represents a location on Earth's surface on December 8, 2009.



Which information shown on the weather maps best indicates that wind speeds in New York State were greater on December 9 than on December 8?

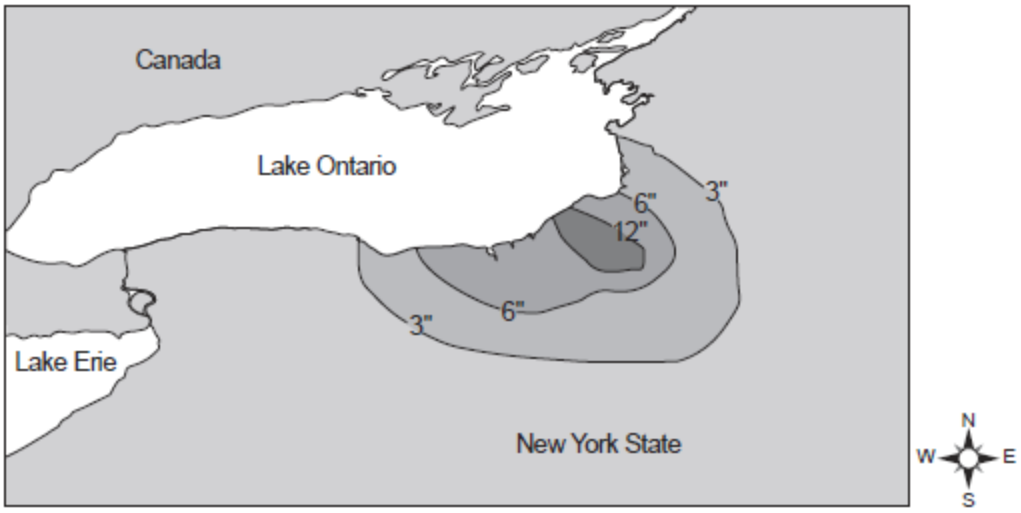
A) The isobars were closer together on December 9.

B) The fronts were closer together on December 9.

C) The air pressure over New York State was lower on December 9.

D) The air pressure over New York State was higher on December 9.

55. The map below shows the amount of snowfall, in inches, produced by a lake-effect snowstorm in central New York State.



The wind that produced this snowfall pattern most likely came from the

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

Answer Key
Topic 7 - Weather

1. **A**
2. **D**
3. **C**
4. **C**
5. **C**
6. **D**
7. **A**
8. **B**
9. **D**
10. **D**
11. **B**
12. **C**
13. **A**
14. **A**
15. **D**
16. **B**
17. **A**
18. **C**
19. **C**
20. **A**
21. **A**
22. **D**
23. **A**
24. **D**
25. **D**
26. **B**
27. **C**
28. **C**
29. **D**
30. **D**
31. **A**
32. **B**
33. **C**
34. **B**
35. **C**
36. **B**
37. **D**
38. **B**
39. **B**
40. **B**
41. **D**
42. **C**
43. **A**
44. **B**
45. **B**
46. **D**
47. **B**
48. **B**
49. **A**
50. **B**
51. **A**
52. **D**
53. **B**
54. **A**
55. **B**