Name: _____

Questions 1 and 2 refer to the following:

A partial station model and meteorological conditions table, as reported by the weather bureau in the city of Oswego, New York, are shown below.

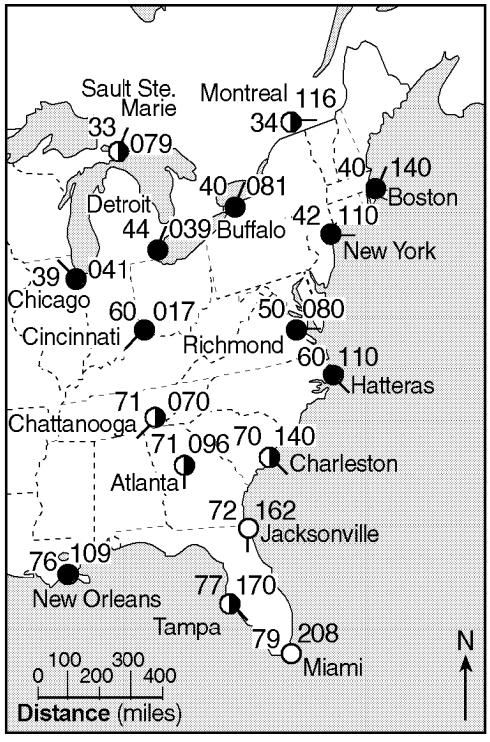
Air temperature: 65°F
Wind direction: from the southeast
Wind speed: 20 knots
Barometric pressure: 1017.5 mb
Dewpoint: 53°F

1) Using the meteorological conditions given, complete the station model by recording the air temperature, dewpoint, and barometric pressure in the proper format.

2) State the sky conditions or amount of cloud cover over Oswego as shown by the station model.

Questions 3 through 6 refer to the following:

The weather map below shows partial weather-station data for several cities in eastern North America.



3) On the weather given map, draw isotherms every 10° F, starting with 40° F and ending with 70° F. [*Isotherms must extend to the edges of the map.*]

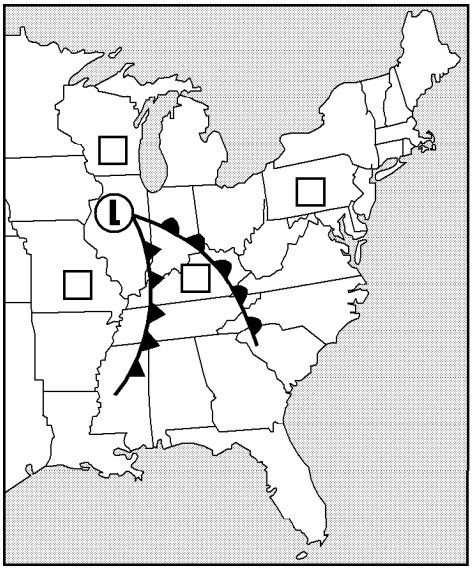
4) State the actual air pressure, in millibars, shown at Miami, Florida on the given weather map.

5) Based on the given weather map, calculate the temperature gradient between Richmond, Virginia, and Hatteras, North Carolina, by following the directions below.

   (a) Write the equation for gradient.
   (b) Substitute data from the given map into the equation.
   (c) Calculate the average gradient and label your answer with the correct units.

6) State the general relationship between air temperature and latitude for locations shown on the map.

7) The weather map below shows a typical midlatitude low-pressure system centered in Illinois.



   (a) On this weather map, indicate which boxed area has the *highest* surface air temperatures by marking an **X** in one of the four boxes on the map.
   (b) On the weather map above, draw an arrow to predict the normal storm track that this low-pressure center would be expected to follow.

8) State one way in which a hurricane differs from a tornado.

9) Name the weather instrument used to measure the air pressure at the center of a low pressure system.

Questions 10 and 11 refer to the following:

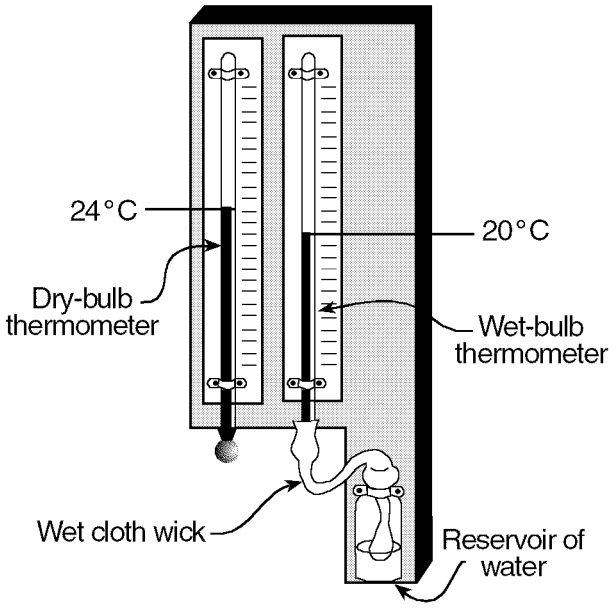
A student using a sling psychrometer obtained a dry-bulb reading of 20° C and a wet-bulb reading of 16° C for a parcel of air outside the classroom.

10) State the dewpoint.

11) State the change in relative humidity as the air temperature and the dewpoint get closer to the same value.

Questions 12 through 14 refer to the following:

The diagram below shows a hygrometer located on a wall in a classroom. The hygrometer's temperature readings are used by the students to determine the relative humidity of the air in the classroom.



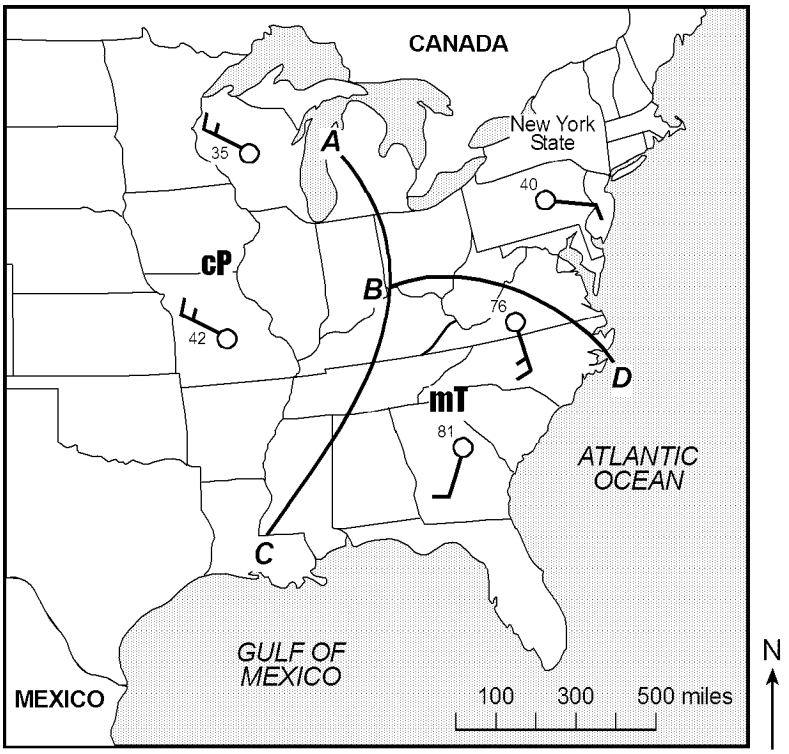
12) Besides relative humidity, identify another weather variable of the air in the classroom that may be determined by using *both* temperature readings on the hygrometer.

13) Based on the temperature readings shown in this diagram, determine the relative humidity of the air in the classroom.

14) Describe how water evaporating from the wick attached to the wet-bulb thermometer lowers the temperature reading of that thermometer.

Questions 15 through 17 refer to the following:

The weather map below shows a low-pressure system over part of North America. Five weather stations are shown on the map. Lines AB, BC, and BD represent surface frontal boundaries. Line AB represents an occluded front that marks the center of a low-pressure system. Symbols **cP** and **mT** represent different air masses.

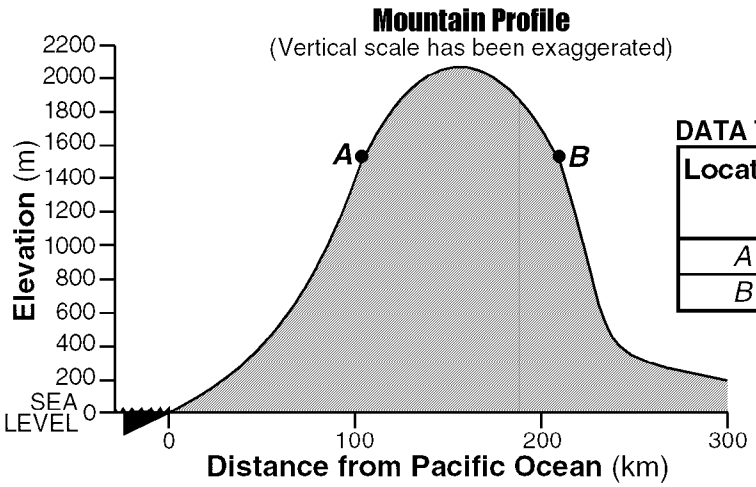


15) On the weather map, place the proper front symbols on lines AB, BC, and BD. Place the front symbols on the correct side of each line to show the direction of front movement.

16) Name the geographic region over which the **mT** air mass most likely formed.

17) Other than low pressure, state *two* weather conditions associated with a low-pressure center.

18) The data table below gives the average annual precipitation for locations *A* and *B*. The profile represents a mountain in the western United States. Points *A* and *B* are locations on different sides of the mountain.



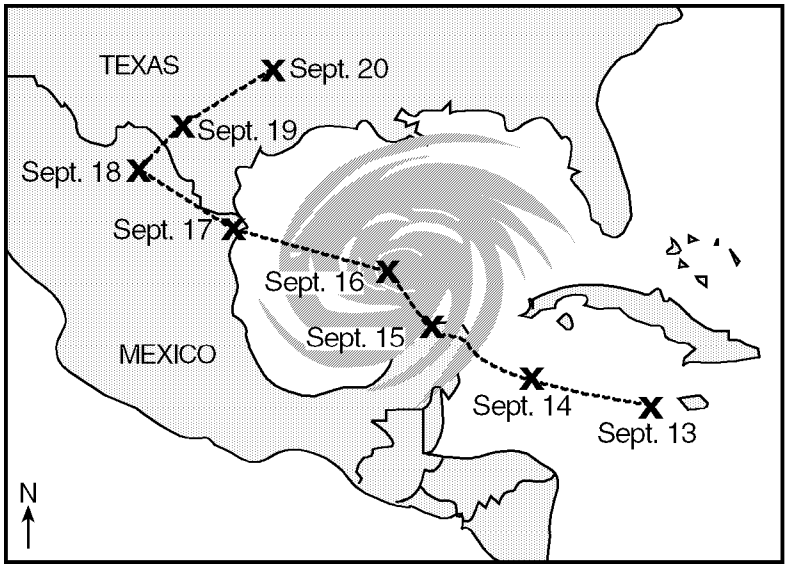
DATA TABLE:

Location	Average Annual Precipitation (cm)
A	120
B	35

State the elevation of location *A*.

Questions 19 and 20 refer to the following:

The map below represents a satellite image of Hurricane Gilbert in the Gulf of Mexico. Each *X* represents the position of the center of the storm on the date indicated.

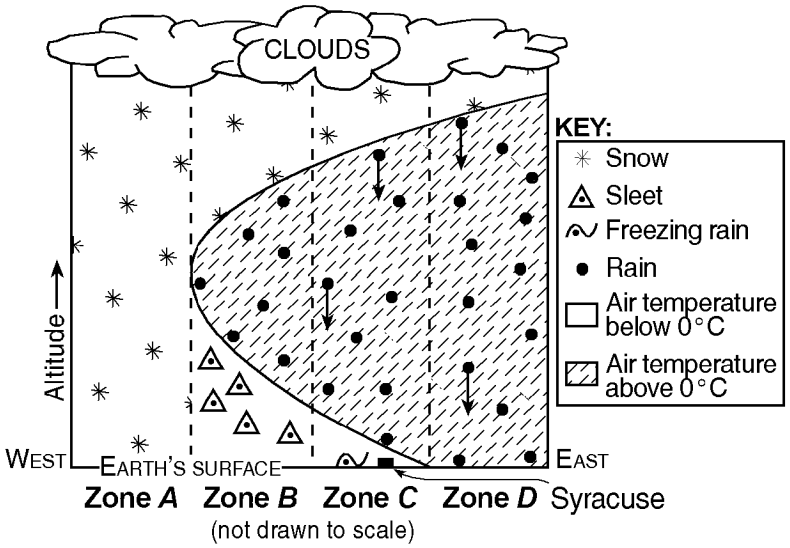


19) Describe *one* threat to human life and property that could have been caused by the arrival of Hurricane Gilbert along the coastline at the Texas-Mexico border in the given map.

20) State *one* reason Hurricane Gilbert weakened between September 16 and September 18 in the given map.

Questions 21 through 24 refer to the following:

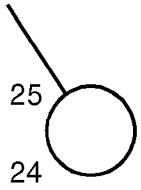
The atmospheric cross section below represents a winter storm system. Zones *A*, *B*, *C*, and *D* are located on a west to east line at approximately 43° N latitude across New York State. This cross section shows how solid and liquid forms of precipitation depend on the air temperature above Earth's surface. The storm is moving from west to east.



21) Explain why sleet is occurring in Zone *B* in the given diagram.

22) At the time of the events represented by the given cross section, Syracuse, New York, is experiencing the following weather conditions:

Cloud cover	100%
Wind speed	15 knots
Present weather	Freezing rain
Precipitation	1.23 inches past 6 hours
Visibility	1 mile



The temperature, dewpoint, and wind direction are shown on the weather station model above. Using proper format, add the information shown in the table to the model.

23) As the storm in the given diagram moves eastward, the type of precipitation received in Syracuse changes. State the type of precipitation that will immediately follow freezing rain.

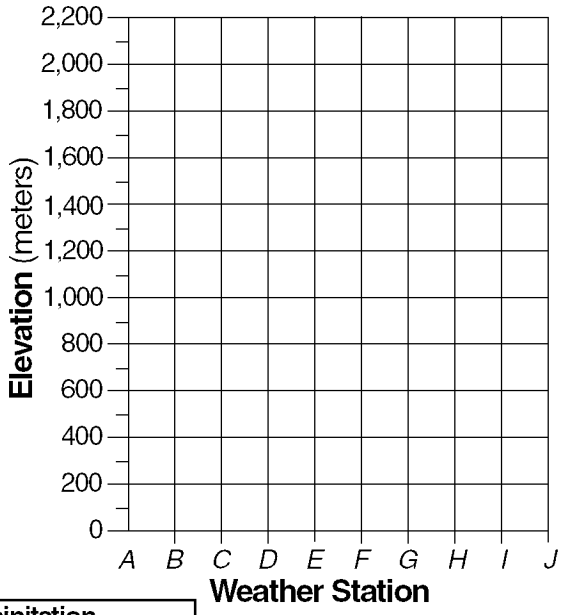
24) Describe the general air movement and temperature change that caused the clouds associated with the storm shown in the diagram to form.

Questions 25 through 27 refer to the following:

The data table below shows the elevation and average annual precipitation at ten weather stations, *A* through *J*, located along a highway that passes over a mountain.

DATA TABLE

Weather Station	Elevation (m)	Average Annual Precipitation (cm)
A	1,350	20
B	1,400	24
C	1,500	50
D	1,740	90
E	2,200	170
F	1,500	140
G	800	122
H	420	60
I	300	40
J	0	65



SYMBOL CHART

Key for Average Annual Precipitation			
△ 0–25 cm	⊡ 26–75 cm	⊙ 76–127 cm	✕ 128–170 cm

25) Although stations *C* and *F* are at the same elevation, they have very different amounts of average annual precipitation. Explain how the prevailing wind direction might cause this difference.

26) State the relationship between the elevation of weather stations *A* through *E* and the average annual precipitation at these weather stations.

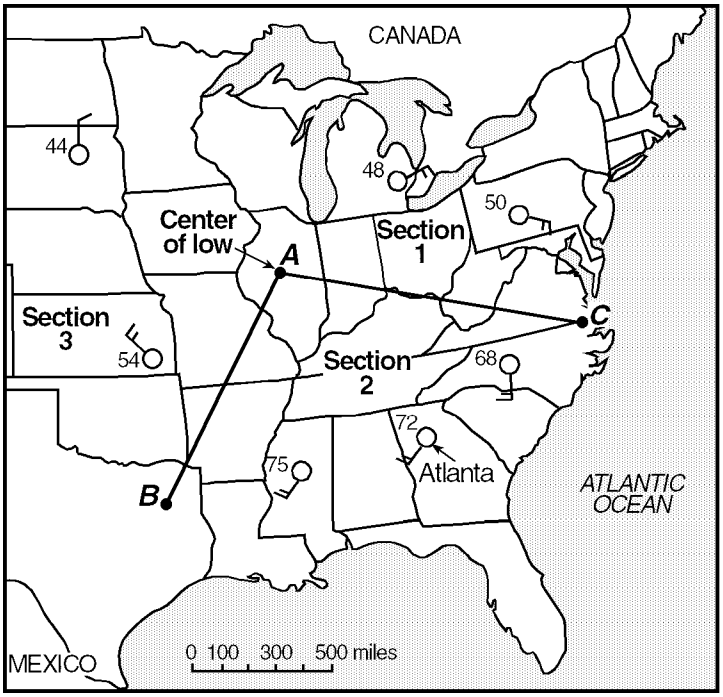
27) On the given grid, graph the data shown on the data table by following the directions below.

(a) Mark the grid with a point showing the elevation of each weather station.

(b) Surround each point with the proper symbol from the symbol chart to show the amount of average annual precipitation for the weather station.

Questions 28 through 30 refer to the following:

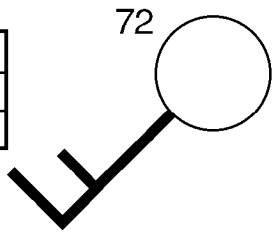
The weather map below shows partial weather data for several weather stations. Point *A* is the center of a low-pressure system. Lines *AB* and *AC* represent the frontal boundaries between different air masses.



28) In each of the *three* map sections shown (Section 1, Section 2, and Section 3), draw curved arrows to represent the general direction that surface winds will move in association with the center of the low-pressure system at location *A*.

29) Atlanta, Georgia, has the following additional weather variable measurements.

Visibility	6 miles
Amount of cloud cover	1/2 or 50%
Air pressure	1001.1millibars

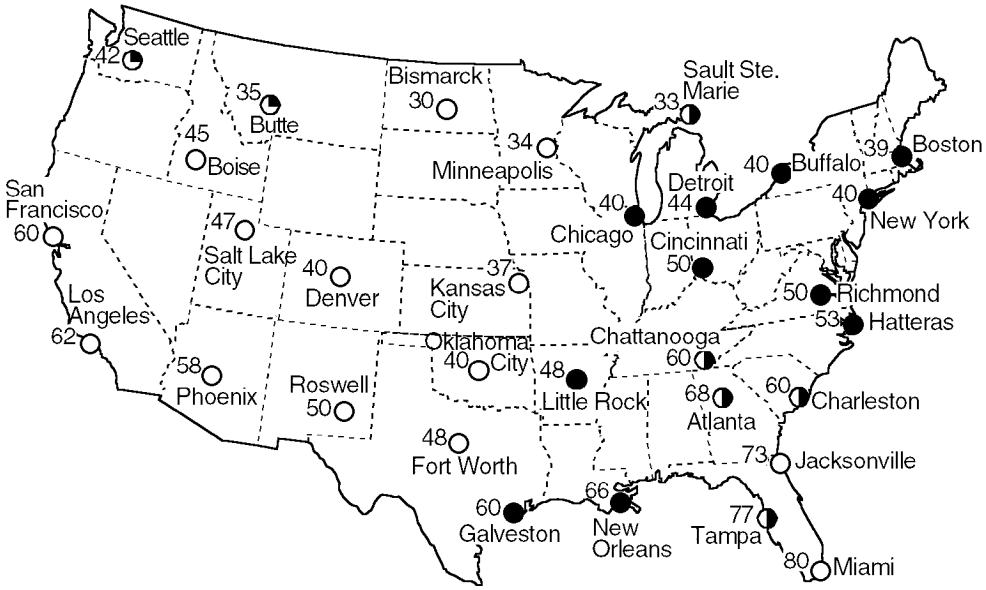


On the station model above, place these *three* weather measurements in their correct location using the proper format.

30) On the given map, draw the correct weather map symbols for the *two* different fronts located on lines *AB* and *AC*. The symbols must show the direction the fronts are moving.

Questions 31 through 33 refer to the following:

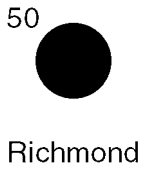
The weather map below shows temperature readings at weather stations in the continental United States.



31) On the weather map above, draw three isotherms: the 40° F isotherm, the 50° F isotherm, and the 60° F isotherm.

32) In addition to temperature, one other weather variable for each weather station is shown on the map. State the other weather variable.

33) In Richmond, Virginia, the wind direction is from the east at a speed of 20 knots. On the station model below, draw the correct symbols for wind direction and windspeed.



Questions 34 and 35 refer to the following:

In August 1992, Hurricane Andrew, the most costly natural disaster in United States history, hit southern Florida. The data table below shows the location and classification of Hurricane Andrew on 7 days in August 1992.

Day	Latitude	Longitude	Storm Classification
August 18	13° N	46° W	Tropical storm
August 20	19° N	59° W	Tropical storm
August 22	25° N	66° W	Hurricane
August 24	25° N	78° W	Hurricane
August 26	28° N	90° W	Hurricane
August 27	32° N	91° W	Tropical storm
August 28	34° N	86° W	Tropical storm

34) As Hurricane Andrew approached Miami, Florida, cloudiness and precipitation increased dramatically. State how the air pressure at Miami was changing at this time.

35) By August 27, Hurricane Andrew was downgraded from a hurricane to a tropical storm because its windspeed decreased. State *one* reason why Hurricane Andrew's windspeed decreased at this time.

Questions 36 through 39 refer to the following:

The passage below represents a magazine article.

LAKE-EFFECT SNOW

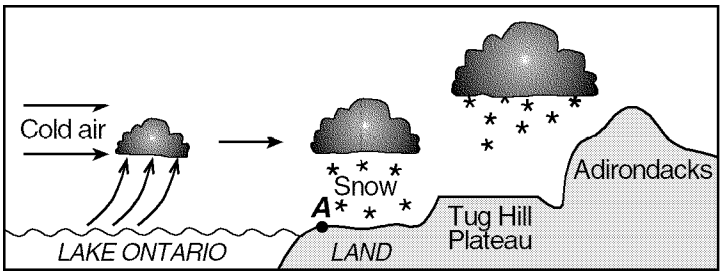
During the cold months of the year, the words "lake effect" are very much a part of the weather picture in many locations in New York State. Snow created by the lake effect may represent more than half the season's snowfall in some areas.

In order for heavy lake-effect snow to develop, the temperature of the water at the surface of the lake must be higher than the temperature of the air flowing over the water. The higher the water temperature and the lower the air temperature, the greater the potential for lake-effect snow.

A lake-effect storm begins when air flowing across the lake is warmed as it comes in close contact with the water. The warmed air rises and takes moisture along with it. This moisture, which is water vapor from the lake, is turned into clouds as it encounters much colder air above. When the clouds reach the shore of the lake, they deposit their snow on nearby land. A typical lake-effect storm is illustrated in the diagram below.

The area most likely to receive snow from a lake is called a "snowbelt." Lake Ontario's snowbelt includes the counties along the eastern and southeastern ends of' the lake. Because the lake runs lengthwise from west to east, the prevailing westerly winds are able to gather the maximum amount of moisture as they flow across the entire length of the lake. There can be lake-effect snowfall anywhere around the lake, but the heaviest and most frequent snowfalls occur near the eastern shore.

In parts of the snowbelt, the lake effect combines with a phenomenon known as orographic lifting to produce some very heavy snowfalls. After cold air has streamed over the length of Lake Ontario, it moves inland and is forced to climb the slopes of the Tug Hill Plateau and the Adirondack Mountains, resulting in very heavy snowfall.



36) State why very heavy snowfall occurs in the Tug Hill Plateau region.

37) State the relationship that must exist between water temperature and air temperature for lake-effect snow to develop.

38) State why locations east and southeast of Lake Ontario are more likely to receive lake-effect snow than are locations west of the lake.

39) State the name of the New York State landscape region that includes location *A* shown in the given diagram.