

Topic VI

Part 2

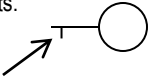
Weather

(Meteorology)

Topic: Weather
Aim:

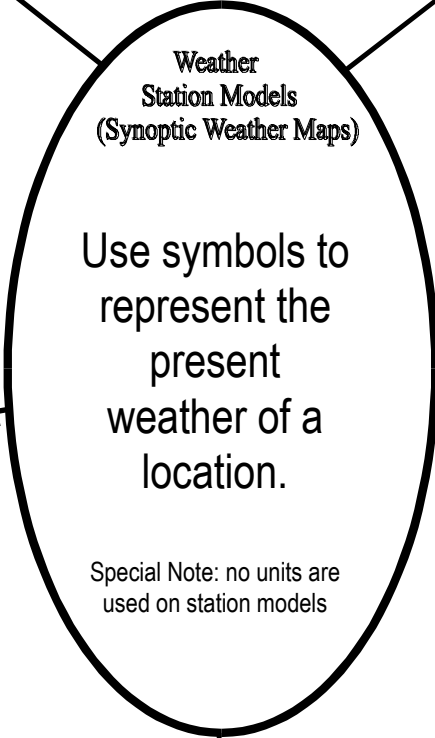
1. Temperature / Dewpoint
 Temperatures must be in degrees Fahrenheit.
 (**never** show units on the station mode – not even the degrees symbol)

3. Wind Direction and Speed
 The staff shows the direction wind comes from.
 Feathers (flags) indicate speed. Remember to indent half-feather if speed is less than 10 knots.



half-feather does not start on end of staff

2. Determining Humidity
BEST WAY:
 Compare air temperature to dew point. (If close together, humidity is high)
 or
 Observe cloud cover. (**full = overcast**)
 or
 Observe present weather. (**precipitation**)



4. Barometric Trend
RISING
 "+ number" or "/"
FALLING
 "- number" or "\"
STEADY
 no change indicated


5. Converting 3-digit Pressure Readings to Millibar Readings

To get the 3 digit number to put in the upper right corner of a station model, just take the last 3 digits of the millibar reading.

1. IF < 500 PUT A 10 IN FRONT AND A DECIMAL BETWEEN LAST TWO DIGITS. Example: **196 = 1019.6 mb**

2. IF ≥ 500 PUT A 9 IN FRONT AND A DECIMAL BETWEEN LAST TWO DIGITS. Example: **752 = 975.2 mb**

When putting the millibars reading onto the station model:
 JUST USE LAST 3 DIGITS OF MILLIBAR READING.
 Example: 1011.2mb



Key to Weather Map Symbols

Station Model	Station Model Explanation
	<p>Present weather</p> <p>Amount of cloud cover (approximately 75% covered)</p> <p>Temperature (°F) 28</p> <p>Barometric pressure (1019.6 mb) 196</p> <p>Visibility (mi) $\frac{1}{2}$*</p> <p>Barometric trend (a steady 1.9-mb rise in past 3 hours) +19/</p> <p>Dewpoint (°F) 27</p> <p>Precipitation (0.25 inches in past 6 hours) .25</p> <p>Wind speed</p> <p>Wind direction (from the southwest)</p> <p>(1 knot = 1.15 mi/h)</p> <p>whole feather = 10 knots half feather = 5 knots total = 15 knots</p>

Present Weather	Air Masses	Fronts	Hurricane
Drizzle Rain Smog Hail Thunderstorms Rain showers	cA continental arctic cP continental polar cT continental tropical mT maritime tropical mP maritime polar	Cold Warm Stationary Occluded 	 Tornado
Snow Sleet Freezing rain Fog Haze Snow showers			

Station Model Practice:

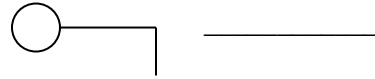
	<u>Station 1</u>	<u>Station 2</u>
air temperature(°F):	36	55
dew point temperature(°F):	34	46
present weather:	fog	none
cloud cover:	100%	25%
wind direction:	SE	N
wind speed(knots):	25	5
barometric pressure(mb):	956.0	1012.0
barometric trend:	0.9 mb rise	1.2 mb drop

Station 1	Station 2

Weather Station Models

Directions: Using your *Earth Science References Tables* Weather Information Chart, and your knowledge of Station Models, answer the following questions.

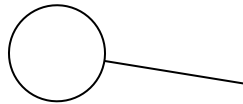
1. What wind direction is represented by this symbol?



2. What wind speed is represented by this symbol?



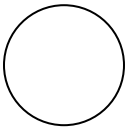
3. How would a barometric pressure of 1010.5mb be represented on the station model below?



4. Indicate 50% cloud cover on the station model above.

5. Plot the weather information provided for each of the weather stations.

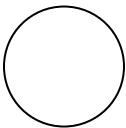
a.



Temperature: 75°F
Air Pressure: 1011.8 mb
Dew Point: 67°F
Cloud Cover: 50%

Wind Direction: south
Wind Speed: 25 knots
Barometric Trend: 1.4 mb rise
Present Weather: none

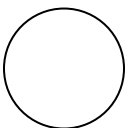
b.



Temperature: 22°F
Air Pressure: 1005.5 mb
Dew Point: 21°F
Cloud Cover: 100%

Wind Direction: northwest
Wind Speed: 10 knots
Barometric Trend: 0.2 mb drop
Present Weather: snow

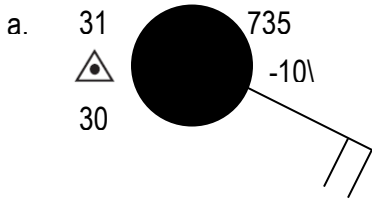
c.



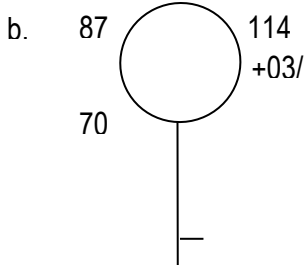
Temperature: 61°F
Air Pressure: 997.1 mb
Dew Point: 60°F
Cloud Cover: 85%

Wind Direction: west
Wind Speed: 30 knots
Barometric Trend: 0.5 mb drop
Present Weather: fog

6. Give the weather report for the station models below.



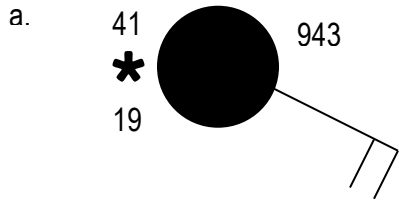
Temperature - _____	Wind Direction - _____
Air Pressure - _____	Wind Speed - _____
Dew Point - _____	Barometric Trend - _____
Cloud Cover - _____	Present Weather - _____



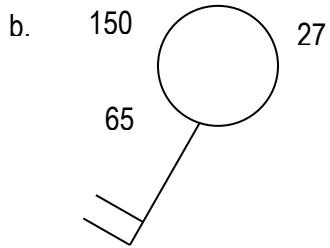
Temperature - _____	Wind Direction - _____
Air Pressure - _____	Wind Speed - _____
Dew Point - _____	Barometric Trend - _____
Cloud Cover - _____	Present Weather - _____

7. *****Impossible weather reports*****

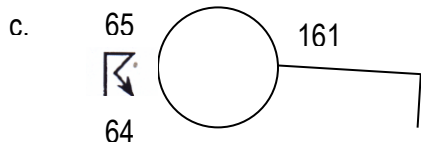
Find the problem with each report that makes the conditions impossible to occur.



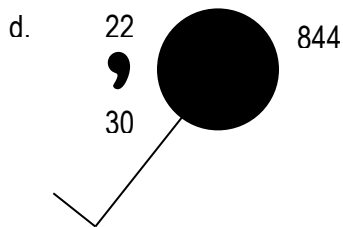
Problem: _____



Problem: _____



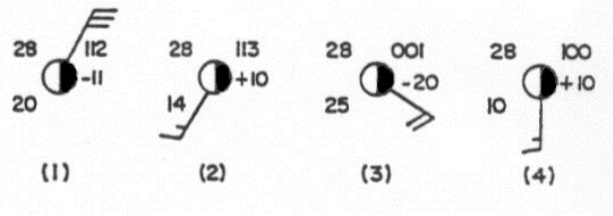
Problem: _____



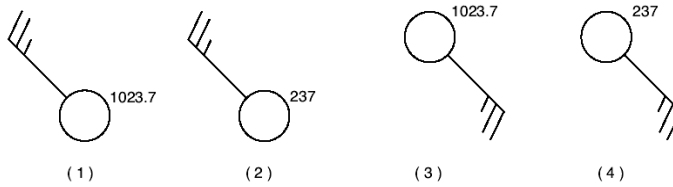
Problem: _____

Station Models Review

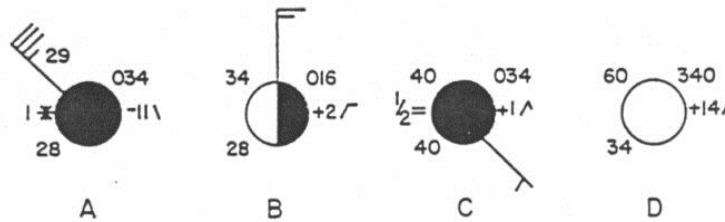
1. Which weather station model indicates the greatest probability of precipitation?



2. Which station model shows the correct form for indicating a northwest wind at 25 knots and an air pressure of 1023.7 mb?



Base your answers to **questions 3-7** on the diagrams below of four weather station models. Weather data were recorded at four different locations at the same time.



3. Which station has an air temperature of 34°F?

- 1 A
- 2 B
- 3 C
- 4 D

4. The wind direction at station C is from the

- 1 northeast
- 2 northwest
- 3 southwest
- 4 southeast

5. What is the air pressure at station D?

- 1 340.0 mb
- 2 934.0 mb
- 3 1003.4 mb
- 4 1034.0 mb

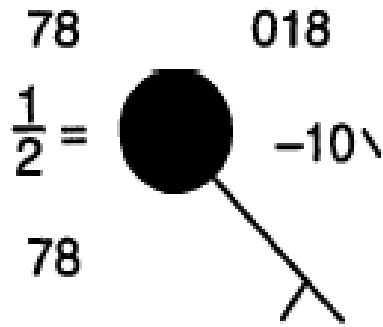
6. Which station shows that the present air pressure reading is lower than it was 3 hours ago?

- 1 A
- 2 B
- 3 C
- 4 D

7. At which station are there winds of 35 knots?

- 1 A
- 2 B
- 3 C
- 4 D

Base your answers to **questions 8-9** on the station model shown below.

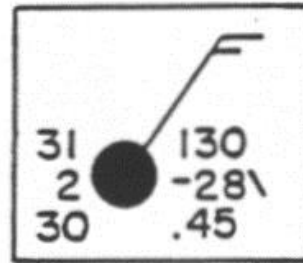


8. State the condition represented by the symbol for "present weather."

9. State the relative humidity.

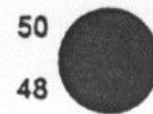
Base your answers to **questions 10-12** on the weather station model below.

10. The weather forecast for the next 6 hours at this station most likely would be
- 1 overcast, hot, unlimited visibility
 - 2 overcast, hot, poor visibility
 - 3 overcast, cold, probable snow
 - 4 sunny, cold, probable rain



11. The barometric pressure is
- | | |
|-------------|------------|
| 1 1013.0 mb | 3 130.0 mb |
| 2 913.0 mb | 4 10.28 mb |

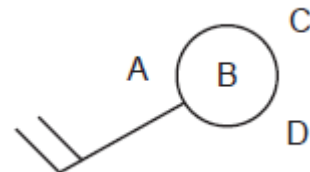
12. Indicate on the station model that the pressure tendency is falling and that rain showers are occurring. Also indicate that there are northeast winds with a speed of 10 knots.



13. Weather data is normally recorded at positions A, B, C, and D on the weather station model shown.

At which position should the measurements from a rain gauge be recorded?

- | | |
|-------|-------|
| (1) A | (3) C |
| (2) B | (4) D |



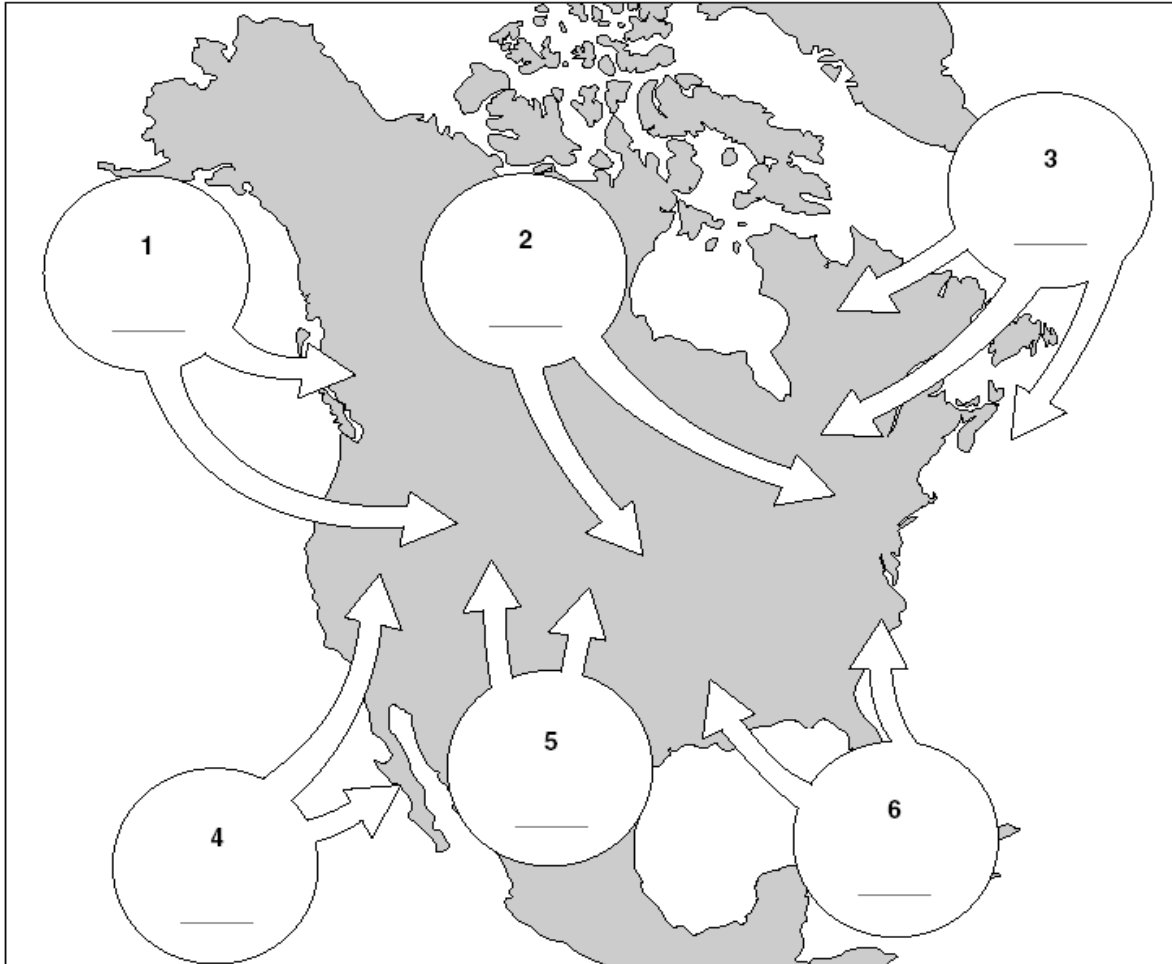
Topic: Weather
Aim:

air mass - a large body of air that has the same temperature and humidity of its source region (location where the air mass originated)

Air Mass	Symbol	Characteristics	Source Region
1. maritime tropical			
2. continental tropical			
3. maritime polar			
4. continental polar			
5. continental arctic			

Air Masses

1. Label the map below using the correct symbols for the air mass originating at each numbered circle.



2. An air mass is described based on its

- 1 temperature and moisture
- 2 moisture and wind velocity

3 temperature and wind velocity

4 barometric pressure and direction of movement

3. The weather characteristics of an air mass are caused primarily by its

- 1 rate of movement
- 2 direction of movement

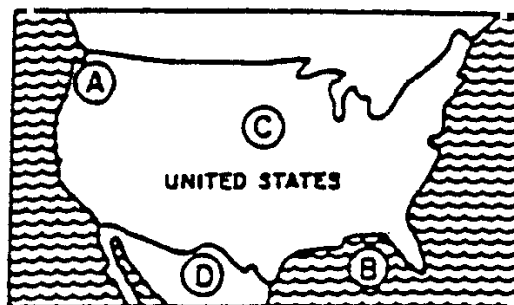
3 size and shape

4 geographic origin

4. An mP air mass is located over the northwestern part of the United States. The source region of this air mass is most likely
- 1 central Mexico
 - 2 the Gulf of Mexico
 - 3 northern Canada
 - 4 the North Pacific Ocean

5. Which letter on the map below represents the area closest to the source region of a mT air mass?

- 1 A
- 2 B
- 3 C
- 4 D



6. The properties of an air mass depend mainly on the
- 1 wind speed within the air mass
 - 2 characteristics of the surface over which the air mass formed
 - 3 size of the air mass
 - 4 rotation of the Earth
7. Which type of air mass would probably contain the most moisture?
- | | |
|------|------|
| 1 mP | 3 cT |
| 2 mT | 4 cP |
8. An air mass originating over north central Canada would most likely be
- | | |
|----------------|------------------|
| 1 warm and dry | 3 warm and moist |
| 2 cold and dry | 4 cold and moist |
9. Which surface features would give an air mass cT characteristics?
- | | |
|------------------------|------------------------|
| 1 warm, moist surfaces | 3 cold, moist surfaces |
| 2 warm, dry surfaces | 4 cold, dry surfaces |
10. Compared to a maritime tropical air mass, a maritime polar air mass has
- 1 lower temperature and less water vapor
 - 2 lower temperature and more water vapor
 - 3 higher temperature and less water vapor
 - 4 higher temperature and more water vapor

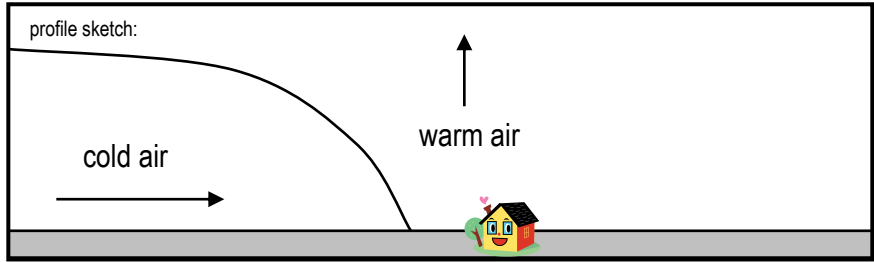
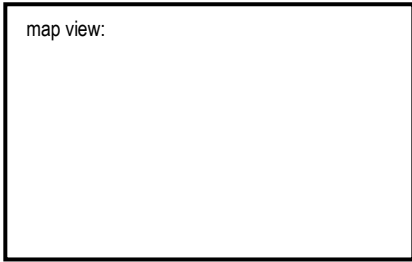
Topic:

Weather

Aim:

front – the leading edge of an oncoming air mass (the boundary between two different air masses)

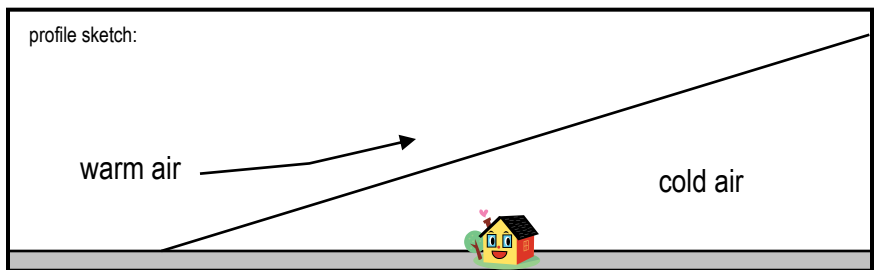
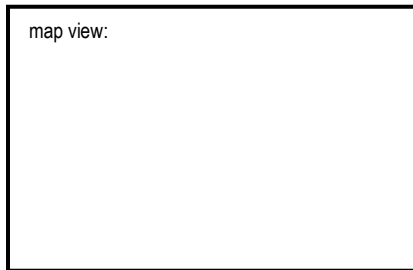
cold front



How it Forms:

Weather Associated:

warm front

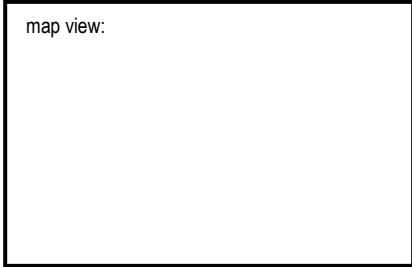


How it Forms:

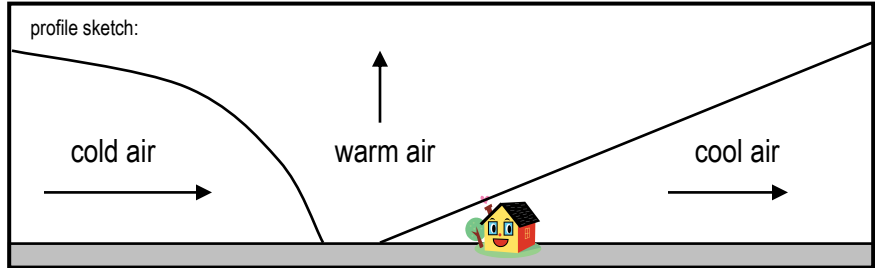
Weather Associated:

occluded front

map view:



profile sketch:

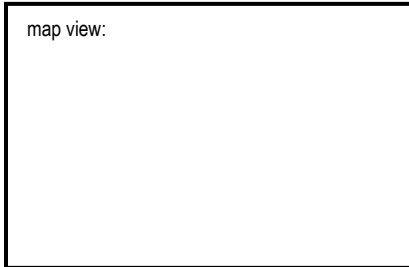


How it Forms:

Weather Associated: heavy rains

stationary front

map view:



Weather Associated: prolonged periods of precipitation

Summary on Fronts:

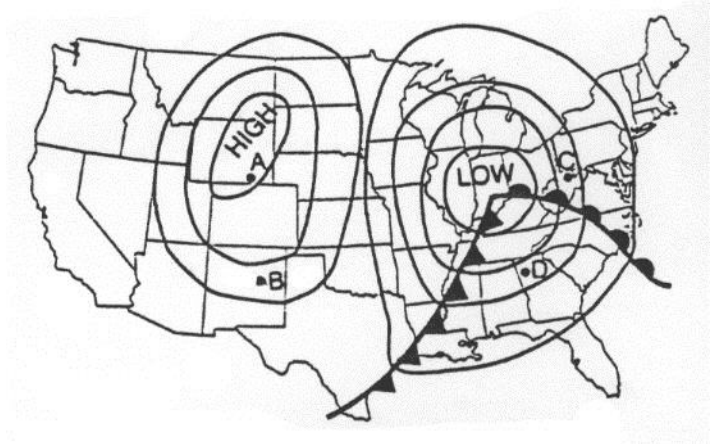
As a front APPROACHES:

When a front PASSES (moves on):

Fronts

The weather map below shows two air pressure systems covering a large geographic area. Points A through D represent four locations on the map.

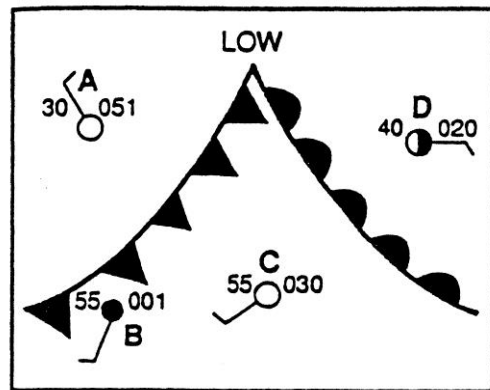
- At which location is precipitation most likely occurring?
 - A
 - B
 - C
 - D



The map below shows a section of a weather map for locations in the eastern U.S. The map shows a low pressure system, fronts, and weather stations A, B, C, and D.

- At which weather station are weather conditions probably most unstable?

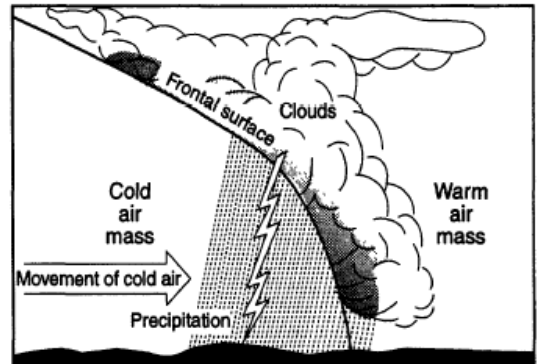
(1) A	(3) C
(2) B	(4) D



Use the diagram below to answer **questions 3 and 4**.

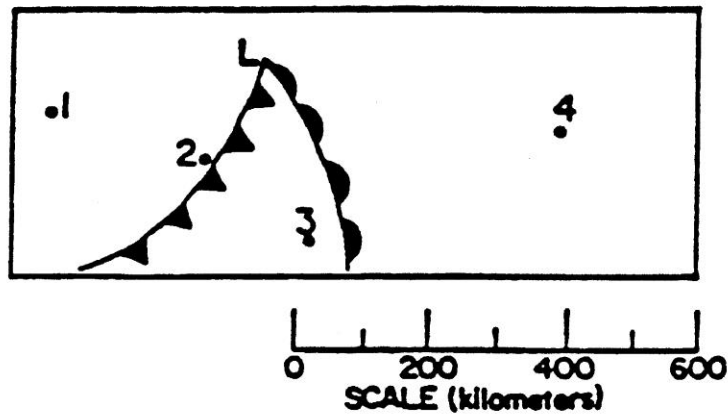
- What type of front is illustrated by the diagram?

(1) cold	(3) occluded
(2) warm	(4) stationary
- The cloud formation and precipitation shown in the cross section are caused by the
 - rising of cold, moist air
 - sinking of cold, moist air
 - rising of warm, moist air
 - sinking of warm, moist air



5. Why do clouds usually form at the leading edge of a cold air mass?
- (1) Cold air contains more water vapor than warm air does.
 - (2) Cold air contains more dust particles than warm air does.
 - (3) Cold air flows over warm air, causing the warm air to descend and cool.
 - (4) Cold air flows under warm air, causing the warm air to rise and cool.
6. As a front is approaching a city, the barometric pressure readings would indicate
- (1) decreasing pressure
 - (2) increasing pressure
 - (3) no change in pressure

Use the diagram below to answer questions 7-10.



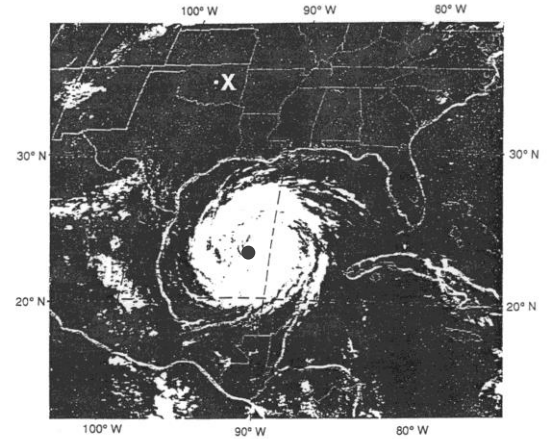
7. Lightly shade in the area that would probably be experiencing clouds and precipitation.
8. Which location would probably be experiencing heavy rains and note a decrease in temperature
- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |
9. Based on the information given on the map, which location has the least chance of precipitation over the next 24-48 hours?
- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |
10. Explain your answer from the previous question.

Topic: Weather

Aim:

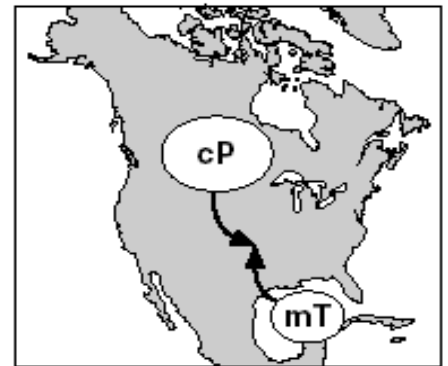
hurricanes

1. tropical cyclones (low pressure) – mT air masses
2. storm track is guided by planetary winds
3. fueled by evaporating seawater
4. die out when they move over land
5. calm eye near center of storm
– eye wall has most severe winds/precipitation
6. storm surge – winds cause rising of the sea level and coastal flooding
7. hurricane season is late summer (July – November)



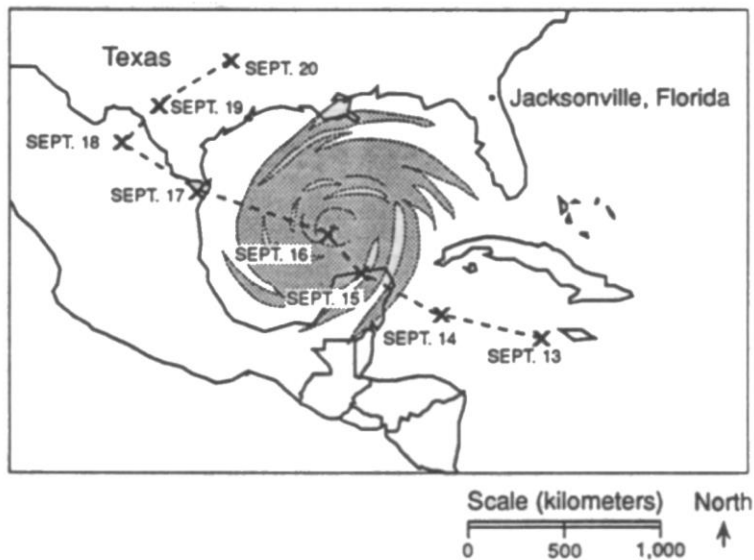
tornadoes

1. form when a cP collides with an mT (central U.S. – “tornado alley”)
2. starts with a very low-pressure thunderstorm that creates twisting winds
3. highest windspeeds on Earth (200-300 mph)
4. tornado season spring to early summer (April – June)



Hurricanes

Base your answers to the following questions on the map shown below. The diagram represents a satellite image of Hurricane Gilbert in the Gulf of Mexico. Each **x** represents the position of the eye of the storm on the date indicated.



- The general direction of Hurricane Gilbert's track from September 13 through September 18 was toward the
 - southwest
 - southeast
 - northwest
 - northeast
- The surface wind pattern associated with Hurricane Gilbert was
 - clockwise and outward from the center
 - counterclockwise and outward from the center
 - clockwise and toward the center
 - counterclockwise and toward the center
- What was the probable source of moisture for this hurricane?
 - carbon dioxide from the atmosphere
 - winds from the coastal deserts
 - transpiration from tropical jungles
 - evaporation from the ocean
- On September 18, Hurricane Gilbert changed direction. Which statement provides the most probable reason for this change?
 - The air mass was cooled by the land surface.
 - The storm entered the prevailing westerlies wind belt.
 - The amount of precipitation released by the storm changed suddenly.
 - The amount of insolation received by the air mass decreased.
- The air mass that gave rise to Hurricane Gilbert would be identified as
 - cP
 - cT
 - mT
 - mP

What should you do in preparation for / during severe weather?

Part 1: For each of the following statements, put a small check mark if the action is something that you think should be done in preparation for or during a severe weather condition. Then check the type(s) of severe weather you think the action would apply to.

Part 2: We will review this together in class and then circle the correct answers.

	Action	When To Do It (check one)	During which type of severe weather? (check all that apply)
1	Remove weak and dead trees or tree limbs on your property. Secure or put away garbage pails and patio furniture.	In Preparation For During	Hurricane Tornado Thunderstorm
2	Know whether your home is in a zone that could be flooded by storm surge, meaning you'd have to evacuate to higher ground.	In Preparation For During	Hurricane Tornado Thunderstorm
3	Create a family emergency plan. Know where you will go if you evacuate, when you will leave (maybe early to avoid traffic jams), and how family members will contact each other.	In Preparation For During	Hurricane Tornado Thunderstorm
4	Stay away from windows.	In Preparation For During	Hurricane Tornado Thunderstorm
5	Ride out the storm in a "safe room" inside the house.	In Preparation For During	Hurricane Tornado Thunderstorm
6	Move to a basement and get under something sturdy. If you have no basement, move to the lowest level and get in an interior room, like a bathroom or closet.	In Preparation For During	Hurricane Tornado Thunderstorm
7	Buy a battery-powered radio, maybe a battery-powered television set for keeping up with the latest advisories.	In Preparation For During	Hurricane Tornado Thunderstorm
8	Install storm shutters or board up windows.	In Preparation For During	Hurricane Tornado Thunderstorm
9	Make a "grab and run" bag ready with important documents and prescription drugs.	In Preparation For During	Hurricane Tornado Thunderstorm
10	Make an evacuation or survival kit with nonperishable food, water, a first aid kit and other things you'll need.	In Preparation For During	Hurricane Tornado Thunderstorm
11	Stay indoors. (if not ordered to evacuate)	In Preparation For During	Hurricane Tornado Thunderstorm