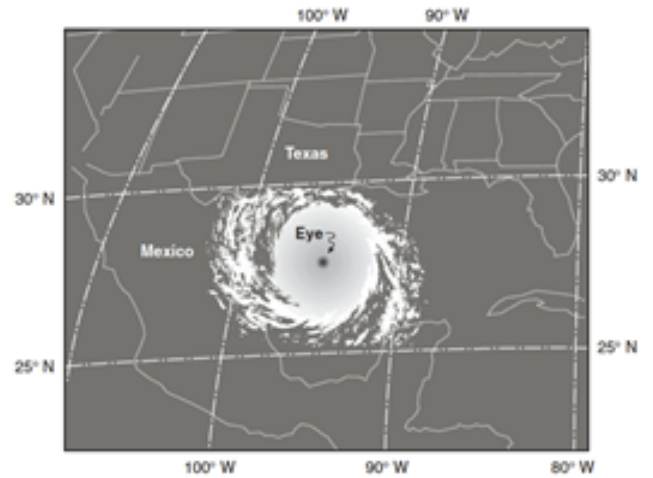
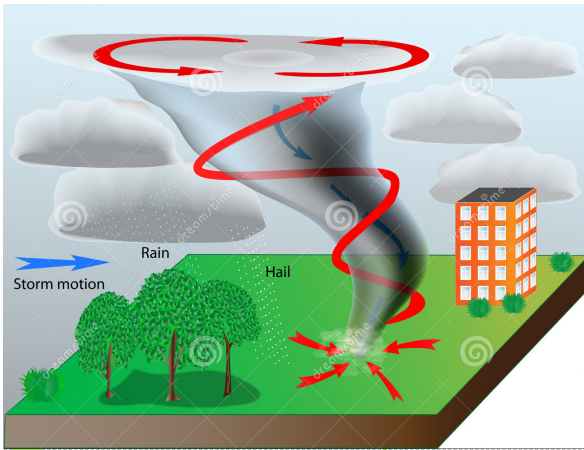


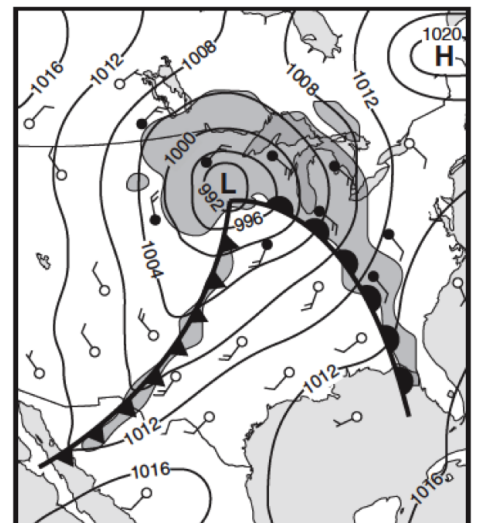
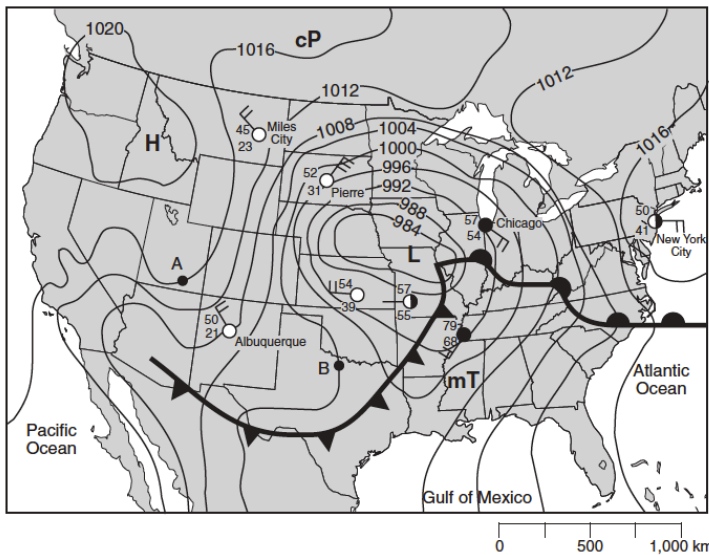
Name:  
Earth Science

Date:  
Period:



# Weather Unit

## Part 2: Meteorology



# Geography Review

The map below shows North America and its surrounding bodies of water. Country borders are shown.

- On the map, label the following locations:

Canada	United States	Mexico	North Atlantic Ocean
Arctic Ocean	Gulf of Mexico	North Pacific Ocean	South Pacific Ocean



1. What are the characteristics of air masses?

• **Air mass:** \_\_\_\_\_  
\_\_\_\_\_

○ Air masses are named based upon these two characteristics: (see ESRT page 13)

1) Moisture content:

▪ **Continental (c):** \_\_\_\_\_

▪ **Maritime (m):** \_\_\_\_\_

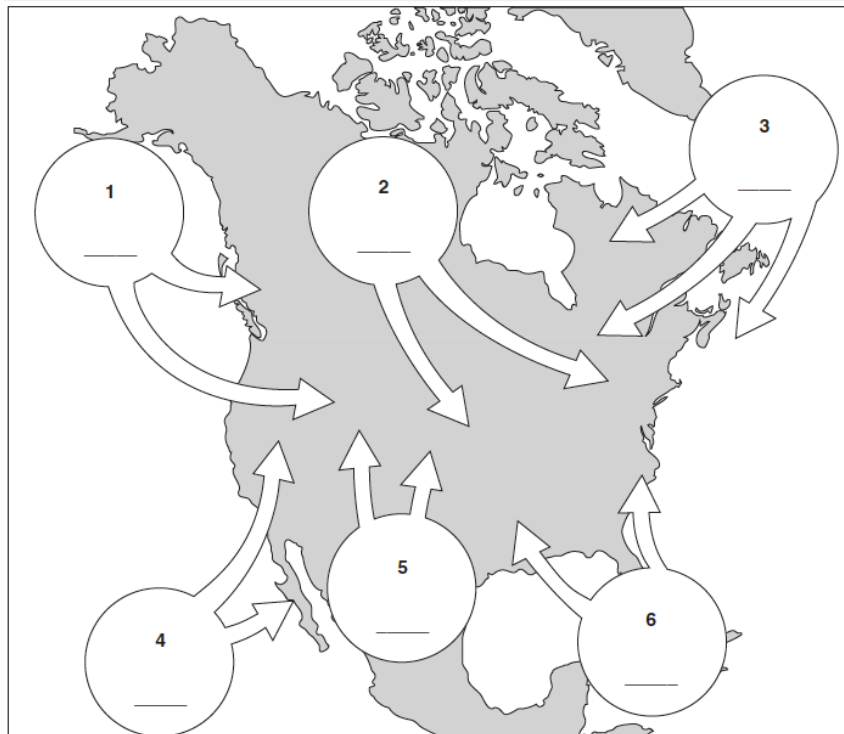
2) Temperature:

▪ **Tropical (T):** \_\_\_\_\_

▪ **Polar (P):** \_\_\_\_\_

▪ **Arctic (A):** \_\_\_\_\_

✓ **Checkpoint – Air Masses:** The map provided below shows six source regions for different air masses that affect the weather of North America. The directions of movement of the air masses are shown. Label the air masses by writing the correct moisture symbol and temperature symbol in each circle on the map.



2. Where do air masses originate?

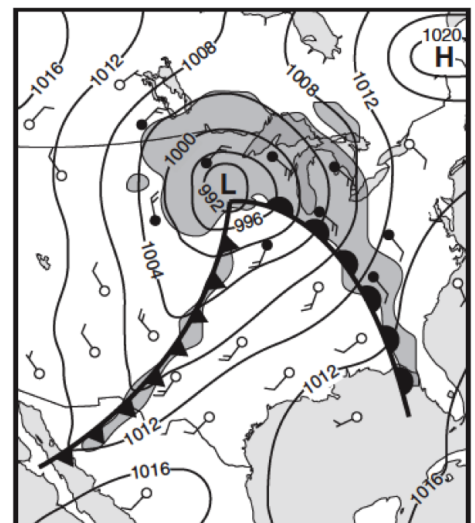
Air Mass	Description	Region of Origin
*cP (continental polar)		
*mT (maritime tropical)		
cT (continental tropical)		
mP (maritime polar)		

3. Which air masses are most important to us in New York?

- The weather in New York is most influenced by two air masses:
  - \_\_\_\_\_
  - \_\_\_\_\_
- In the United States, weather systems move towards the \_\_\_\_\_ because we are in the \_\_\_\_\_ wind belt.

4. What happens when two air masses meet?

- Front: \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_
- When a front passes a location, there will be changes in:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_



5. What are the different types of fronts that can exist?

1) **Cold front:** \_\_\_\_\_

\_\_\_\_\_

• \_\_\_\_\_

\_\_\_\_\_

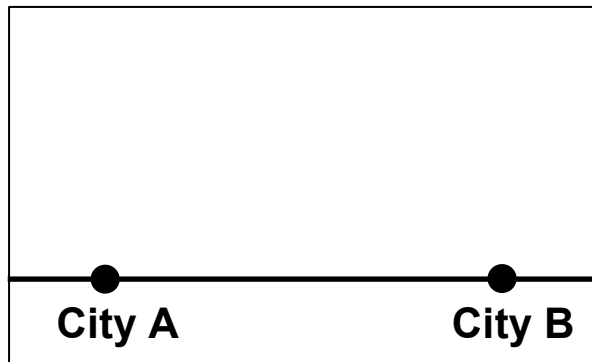
• **Effect:**

○ \_\_\_\_\_

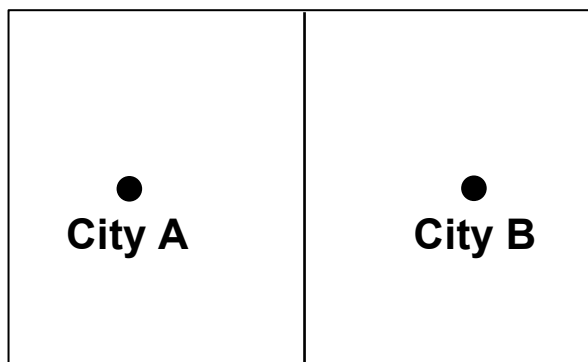
\_\_\_\_\_

○ After a cold front passes an area, that area will become \_\_\_\_\_.

• **Cross section:**



• **Cold front on a map:**



2) **Warm front:** \_\_\_\_\_

\_\_\_\_\_

• \_\_\_\_\_

\_\_\_\_\_

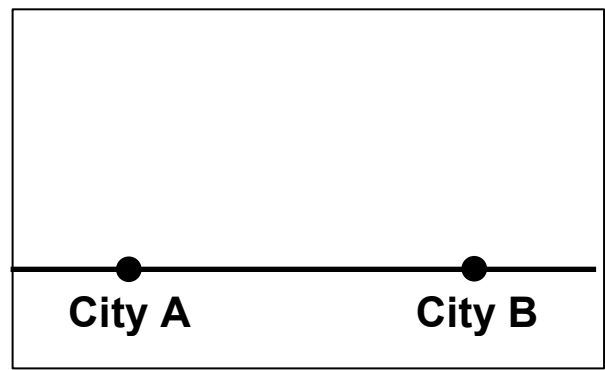
• **Effect:**

○ \_\_\_\_\_

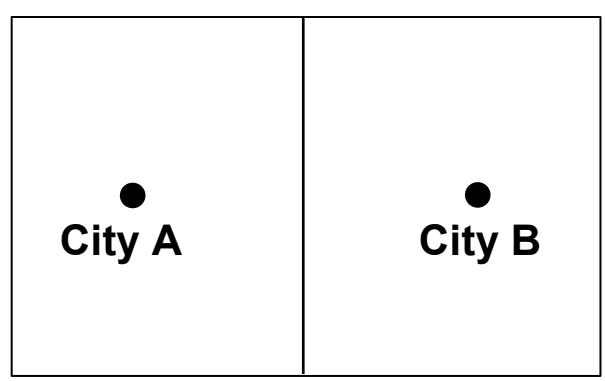
\_\_\_\_\_

○ **After a warm front passes an area, that area will become** \_\_\_\_\_.

• **Cross section:**



• **Warm front on a map:**



3) **Occluded front:** \_\_\_\_\_

---

- The warm air is held up by two cooler air masses that merge beneath it. This produces cloudy weather. It may or may not bring precipitation. A temperature change is usually not noticed at ground level.

• Occluded front on a map: \_\_\_\_\_

4) **Stationary front:** \_\_\_\_\_

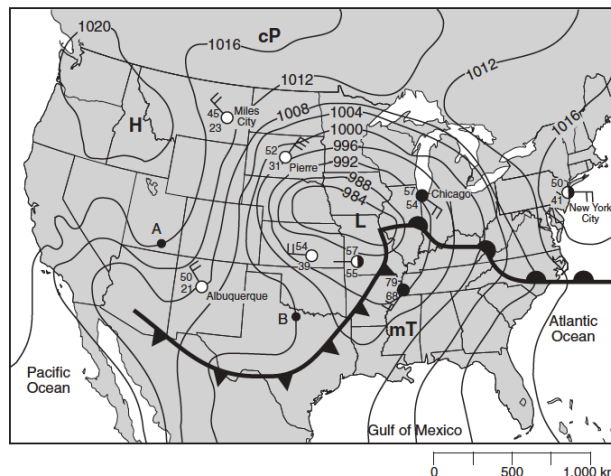
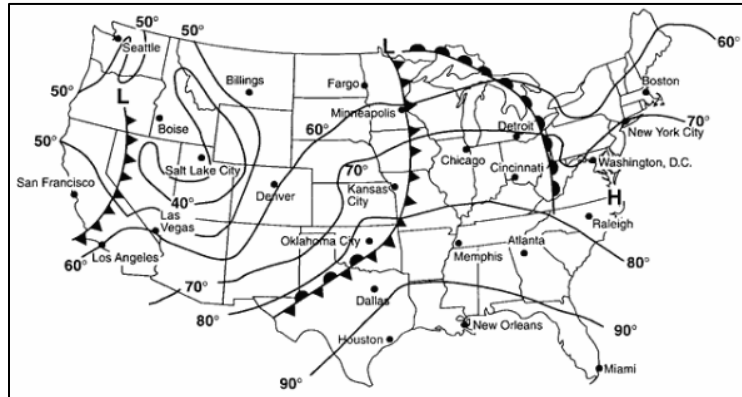
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• Stationary front on a map: \_\_\_\_\_

**6. How are maps used to determine current weather conditions and to predict future weather conditions?**

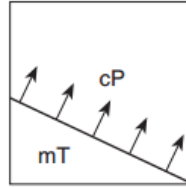
• **Weather maps may show:**

- Station models
- Temperature (isotherms)
- Air pressure (isobars)
- High and low-pressure centers
- Fronts
- Wind speed (spacing of isobars)
- Air masses
- Precipitation locations (around the low-pressure center, at the cold front, and ahead of the warm front)
- Satellite maps can show areas of precipitation and clouds.

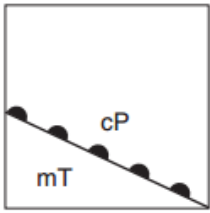


✓ **Checkpoint – Weather Maps:**

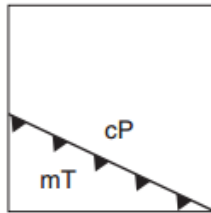
Base your answers to questions 1 and 2 on the map below which shows the boundary between two air masses. The arrows show the direction in which the boundary is moving.



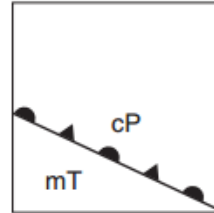
1) Which weather map uses the correct weather front symbol to illustrate this information?



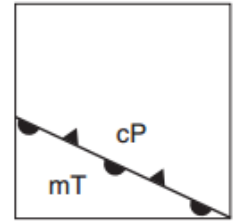
(1)



(2)



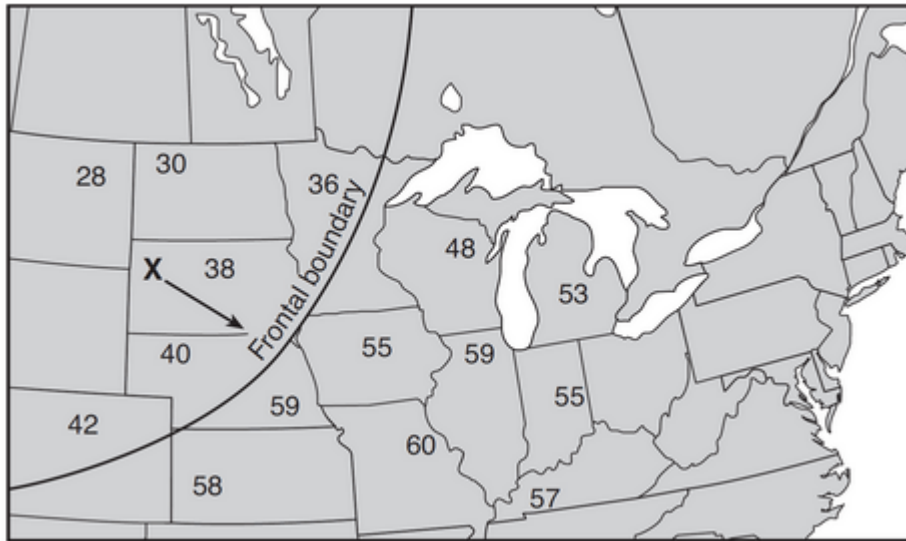
(3)



(4)

2) Where did the mT air mass likely originate from? \_\_\_\_\_

Base your answers to questions 3 through 5 on the map below which shows surface air temperatures, in degrees Fahrenheit, reported by weather stations in the north-central United States. Letter X represents an air mass moving in the direction shown by the arrow. A line marks a frontal boundary advancing in a southeasterly direction.



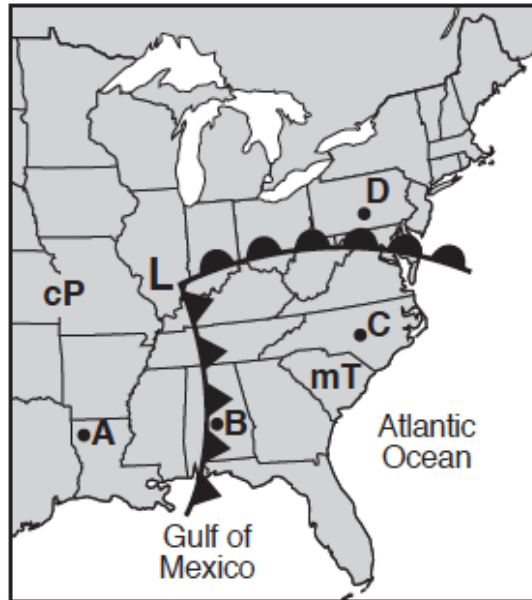
3) On the weather map above, write the air-mass symbols to indicate the most likely locations of the continental polar air mass and maritime tropical air mass that have formed this low-pressure system.

4) On the weather map above, draw the weather-map symbols that best represent air-mass X and the frontal boundary shown.

5) Where did air mass X likely originate from? \_\_\_\_\_

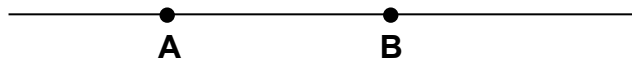


Base your answers to questions 6 through 10 on the weather map below which shows a low-pressure system with two fronts extending from its center (L). Points A, B, C, and D represent locations on Earth's surface. Two different air masses are labeled.

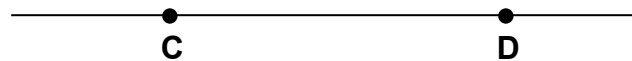


6) Draw the cross section of the frontal boundary between the two cities indicated. Draw arrows to show the general direction of air movement:

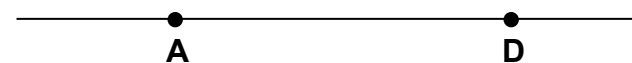
a. Cities A and B:



b. Cities C and D:



c. Cities A and D:



7) Which cities are currently experiencing precipitation? \_\_\_\_\_

8) In which direction are the low-pressure center winds spinning? \_\_\_\_\_

9) In which direction will the low-pressure center move towards? \_\_\_\_\_

10) Describe characteristics and region of origin for the air masses shown on the map:

a. cP air mass: \_\_\_\_\_

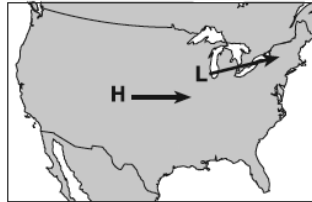
b. mT air mass: \_\_\_\_\_

7. How are maps used to predict future weather conditions?

- Weather forecasting: \_\_\_\_\_

- Storm Track: \_\_\_\_\_

- This is why we typically look at weather conditions in \_\_\_\_\_ to predict our future weather conditions.



8. How does radar help scientists determine changes in weather?

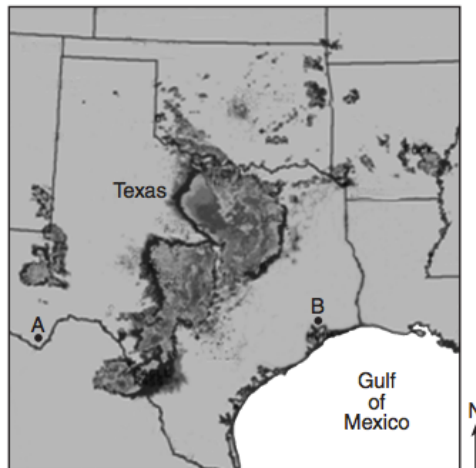
- Doppler radar: \_\_\_\_\_

- The diagrams below represent electromagnetic waves being transmitted (T) by a Doppler radar weather instrument and waves being reflected (R) by rain showers. This instrument produces computer images that show the movement of rainstorms.

<p><b>A Stationary Rain Shower</b></p>	
<p><b>A Rain Shower Moving Toward the Instrument</b></p>	
<p><b>A Rain Shower Moving Away from the Instrument</b></p>	

✓ **Checkpoint – Weather Forecasting**

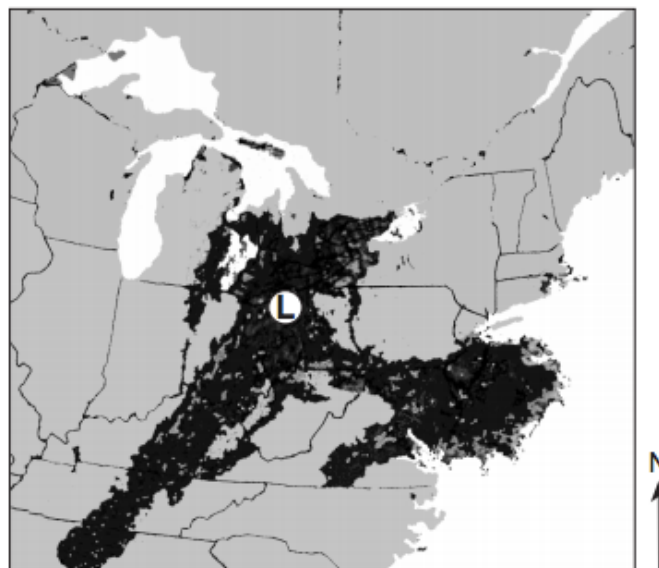
- 1) The computer image below shows a rainstorm over Texas. Letters A and B represent locations on Earth's surface.



If Doppler radar is used at locations A and B, as this rainstorm moves eastward, reflected wavelengths from this storm will be

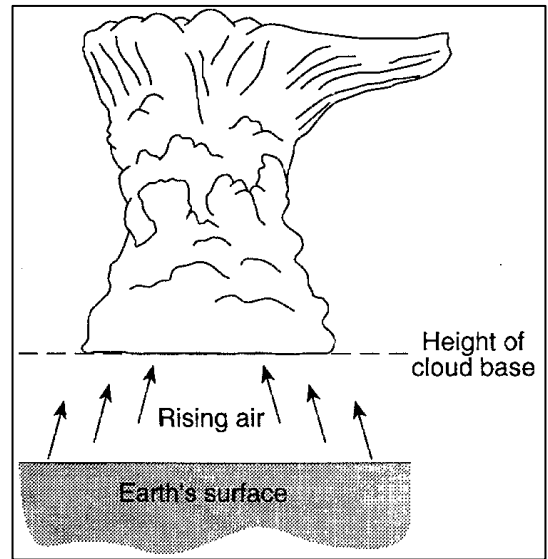
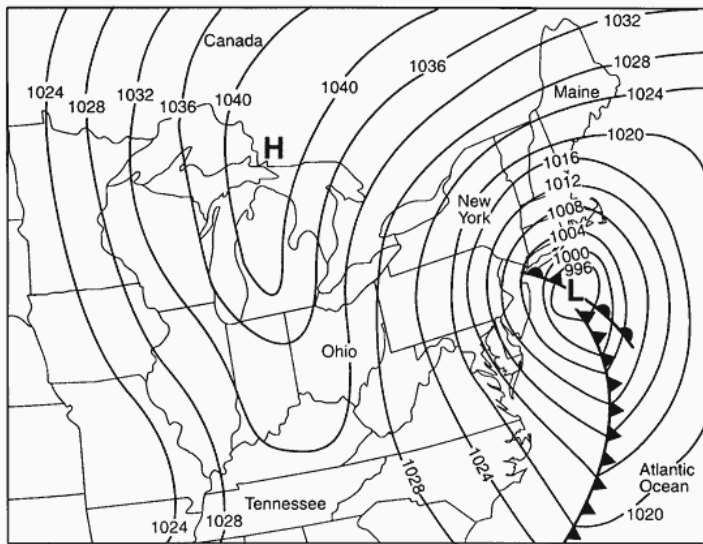
- (1) shorter at both locations A and B
  - (2) longer at both locations A and B
  - (3) shorter at location A and longer at location B
  - (4) longer at location A and shorter at location B
- 2) A radar image of this storm is shown below. The darkest regions on the radar image show areas of precipitation. Letter L marks the location of the center of the low-pressure system. Draw an arrow on the radar image to show the most probable path this winter storm followed. Begin the arrow at letter L.

**Radar Image**



9. What causes severe storms?

- **Storms:** \_\_\_\_\_  
\_\_\_\_\_
- Storms are associated with \_\_\_\_\_-pressure centers and \_\_\_\_\_.
- \_\_\_\_\_  
\_\_\_\_\_



10. How should we prepare for storms?

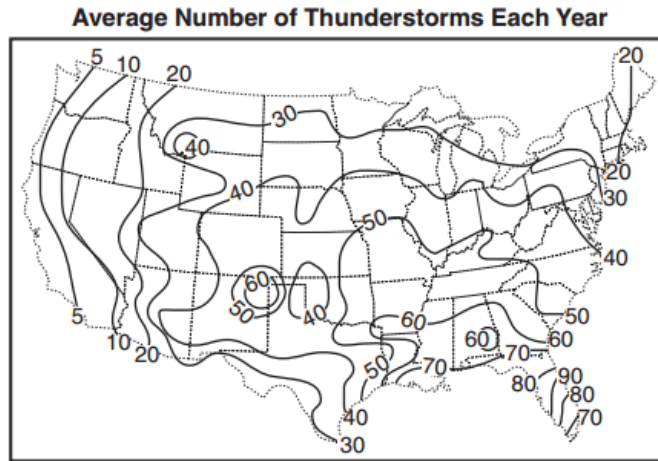
**General Storm Preparation:**

- \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_  
\_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## SEVERE STORM #1: THUNDERSTORMS

### 11. What is a thunderstorm?

- Thunderstorm: \_\_\_\_\_  
\_\_\_\_\_  
  
○ \_\_\_\_\_



### 12. What are the dangerous conditions associated with thunderstorms?

- Thunderstorm dangers: \_\_\_\_\_  
\_\_\_\_\_

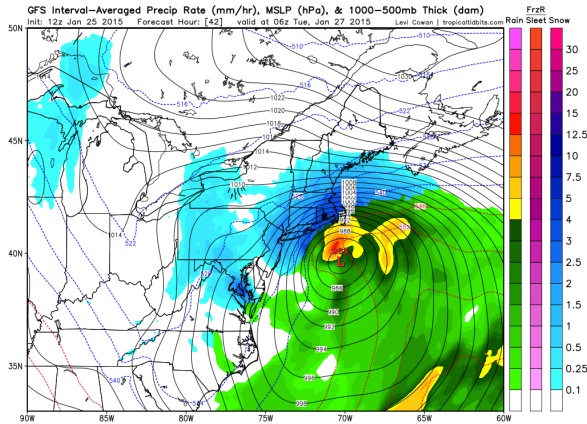
### 13. How can I stay safe in a thunderstorm?

- Thunderstorm safety:  
  
○ \_\_\_\_\_  
\_\_\_\_\_  
  
○ \_\_\_\_\_  
\_\_\_\_\_  
  
○ \_\_\_\_\_  
\_\_\_\_\_  
  
○ \_\_\_\_\_  
\_\_\_\_\_

## SEVERE STORM #2: BLIZZARDS

### 14. What is a blizzard?

- **Blizzard:** \_\_\_\_\_  
\_\_\_\_\_



### 15. What are the dangerous conditions associated with blizzards?

- **Blizzard dangers:** \_\_\_\_\_  
\_\_\_\_\_

### 16. How can I stay safe in a blizzard?

- **Blizzard safety:**
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

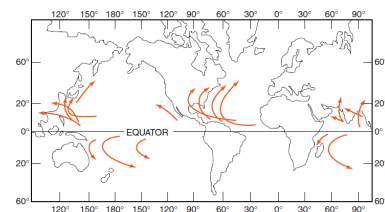
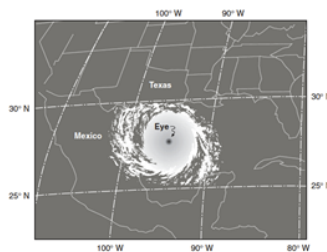
# SEVERE STORM #3: HURRICANES

## 17. What is a hurricane?

- Hurricane: \_\_\_\_\_  
\_\_\_\_\_
- Power: \_\_\_\_\_  
\_\_\_\_\_
- Hurricane tracking: \_\_\_\_\_  
\_\_\_\_\_
- Duration: \_\_\_\_\_  
\_\_\_\_\_

**Safir-Simpson Hurricane Scale**

Hurricane Category	Central Air Pressure (mb)	Windspeed (km/hr)	Expected Storm Surge Height (m)	Expected Damage
1	over 979	119–153	1.2–1.5	Minimal
2	965–979	154–177	1.6–2.4	Moderate
3	945–964	178–209	2.5–3.6	Extensive
4	920–944	210–250	3.7–5.4	Extreme
5	below 920	over 250	over 5.4	Catastrophic



## 18. What are the dangerous conditions associated with hurricanes?

- Hurricane dangers:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

## 19. How can I stay safe in a hurricane?

- Hurricane safety:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

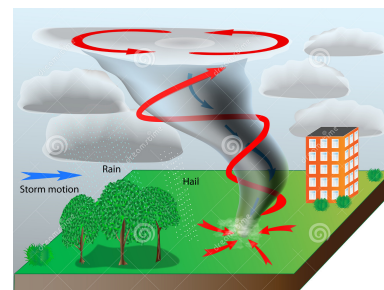
## SEVERE STORM #4: TORNADOES

### 20. What is a tornado?

- **Tornado:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Formation:** \_\_\_\_\_  
\_\_\_\_\_
- **Size:** \_\_\_\_\_
- **Duration:** \_\_\_\_\_



F-Scale Number	Wind Speed (mph)	Type of Damage Done
F-0	40-72	some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards
F-1	73-112	peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed
F-2	113-157	considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated
F-3	158-206	roof and some walls torn off well-constructed homes; trains overturned; most trees in forest uprooted
F-4	207-260	well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated
F-5	261-318	strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; steel-reinforced concrete structures badly damaged



### 21. What are the dangerous conditions associated with tornadoes?

- **Tornado dangers:**
  - \_\_\_\_\_
  - \_\_\_\_\_

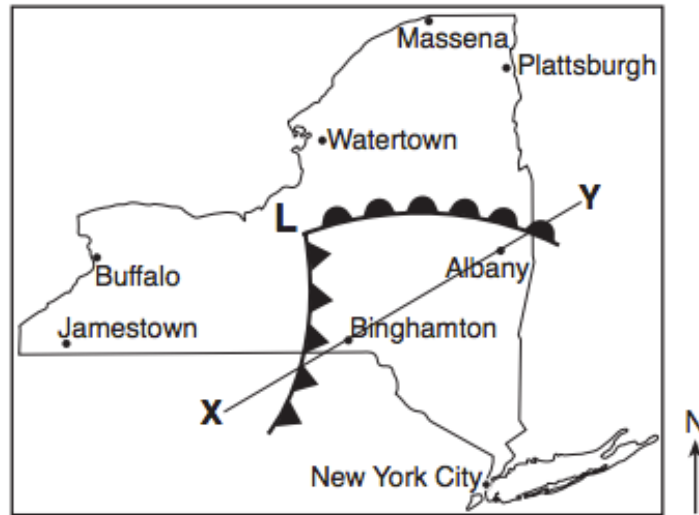
### 22. How can I stay safe in a tornado?

- **Tornado safety:**
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_



✓ **Checkpoint – Severe Storms**

- 1) The weather map shows a low-pressure system in New York State during July. The L represents the center of the low-pressure system. Two fronts extend from the center of the low. Line XY on the map is a reference line.



The forecast for one city located on the map is given below:

“In the next hour, skies will become cloud covered. Heavy rains are expected with possible lightning and thunder. Temperatures will become much cooler.”

State the name of the city for which this forecast was given. \_\_\_\_\_

- 2) Identify one action that people should take to protect themselves from lightning.
- 3) Identify two hazards to human life or property that can result from a large snowstorm.
- 4) Describe two actions that could be taken to prepare for a forecasted severe snow event.

- 5) 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
- 6) The air mass that gave rise to a hurricane would be identified as
- cP
  - cT
  - mT
  - mP
- 7) Clouds form in the hurricane because the air is
- sinking, expanding, and cooling
  - sinking, compressing, and warming
  - rising, expanding, and cooling
  - rising, compressing, and warming
- 8) What was the direction of movement of surface winds associated with a hurricane?
- counterclockwise and away from the center
  - counterclockwise and toward the center
  - clockwise and away from the center
  - clockwise and toward the center
- 9) Tornadoes occur when a very cold, dry air mass meets a very warm, wet air mass. Which two air masses would most likely form a tornado when they meet?
- cP and cA
  - cT and mP
  - cP and mT
  - mP and mT
- 10) Describe one safety precaution that should be taken if a tornado has been sighted approaching your home.
- 11) State one way in which a hurricane differs from a tornado.