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FOCUS: Air Masses & Fronts

ESSENTIAL QUESTION: Can you explain what a front is? Can you explain how fronts form and how they affect weather?

What do you already know?

- Air masses are classified according to their temperature and humidity.
- Warm air is less dense than cold air and always rises in the troposphere.
- Cold air is more (denser) dense than warm air and always sinks in the troposphere.

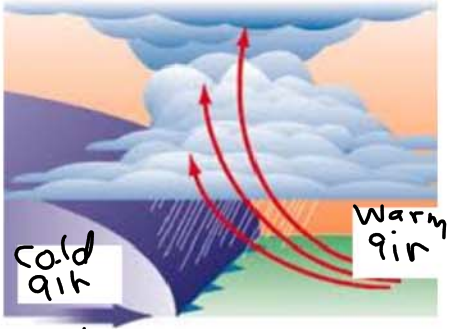
Fronts

- When air masses collide, the boundary between the different types of air is called a front.
- The symbols on the front map tell you the temperature of the air behind the front and the direction the front is traveling.

Blue Triangle = Cold air moving in the direction of the triangle

Red semicircle = Warm air moving in the direction of the semicircle

- There are 4 different types of fronts:
  1) ***Cold Front:*** Forms when fast-moving cold air moves underneath slow-moving warm air, forcing the warm air to rise.
     - Rising warm air condenses into Cumulus or Cumulonimbus clouds.



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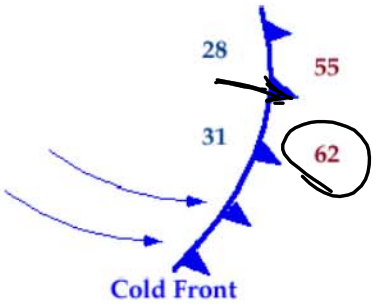
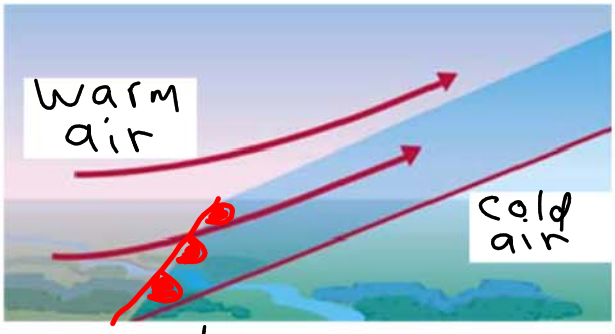
- If the warm air mass was also humid, it will produce heavy rain or snow.
- Often causes abrupt and severe weather changes (thunderstorms, strong winds, downpours, blizzards).
- Once the front has passed, it is followed by a mass of cold air.
- Symbol:



2) ***Warm Front:*** Forms when warm air moving in rises over the cold air that is in front of it.



- If the warm air is dry, it will produce scattered clouds.
- If the warm air is humid, it will produce showers and light rain.
- Since warm fronts are slow moving, it can produce a very wide rain or fog for a few days.

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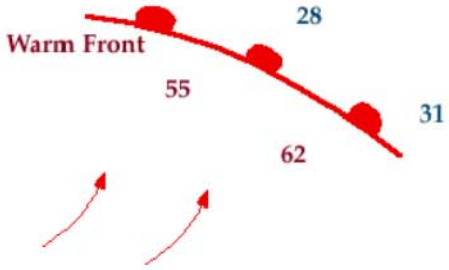
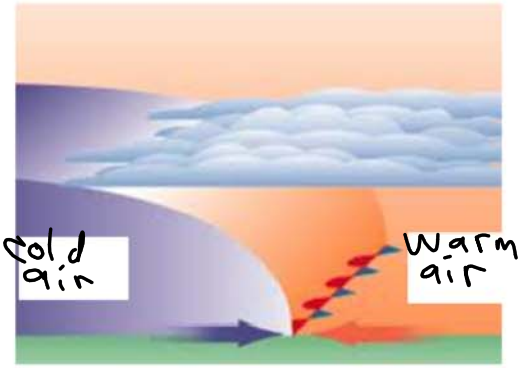
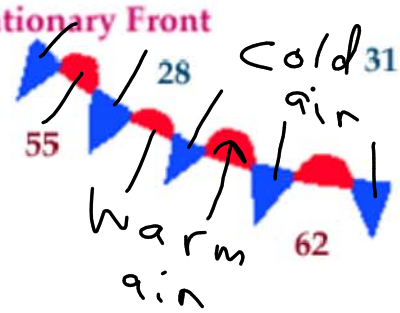
- Once the front has passed, it is followed by a mass of warm air.
- Symbol:



3) ***Stationary Front:*** Forms when cold and warm air masses meet, but neither one has enough force to move the other.



- At the boundary of the two air masses, water vapor from the warm air mass rises to produce clouds, rain, fog, or snow over the warmer area.
- Can remain stalled over an area for several days.
- The front that gains the most force will determine the resulting weather.
  - Ex: If another air mass pushes the cold air mass eastward, the stationary front will become a cold front.
- Symbol:



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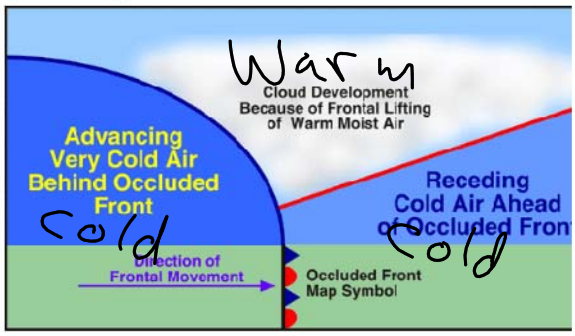
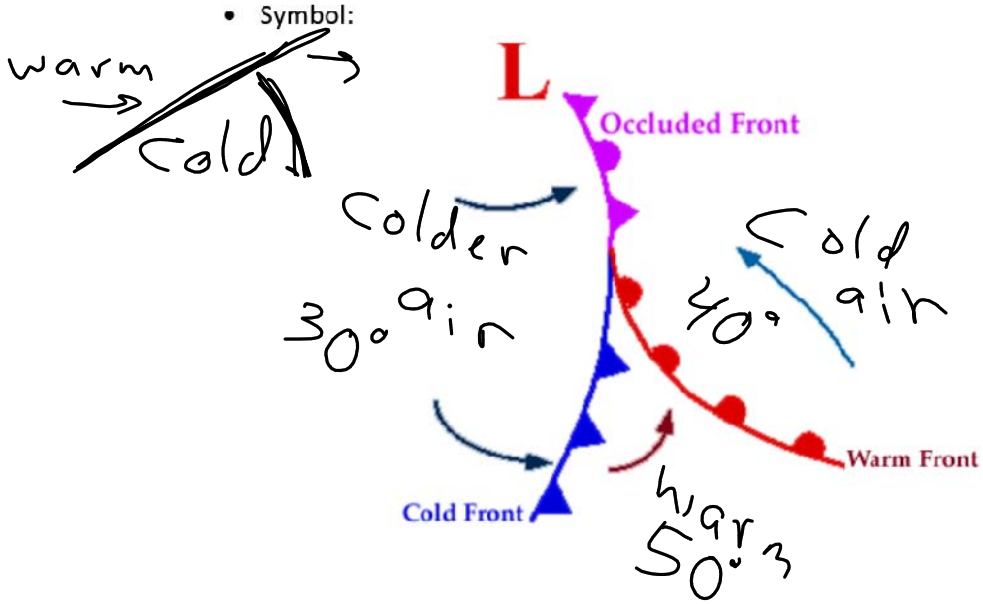
4) ***Occluded Front:*** Forms when a warm air mass is caught between two cooler air masses.

- The warm air mass is pushed upward and cut off (or occluded) from the ground by the two masses of cooler air.
- Rising warm air will produce clouds.
- It will also produce rain or snow if the warm air mass was humid.
- Once the front has passed, cold air on the ground is replaced by the even colder air behind the front.
- Symbol:





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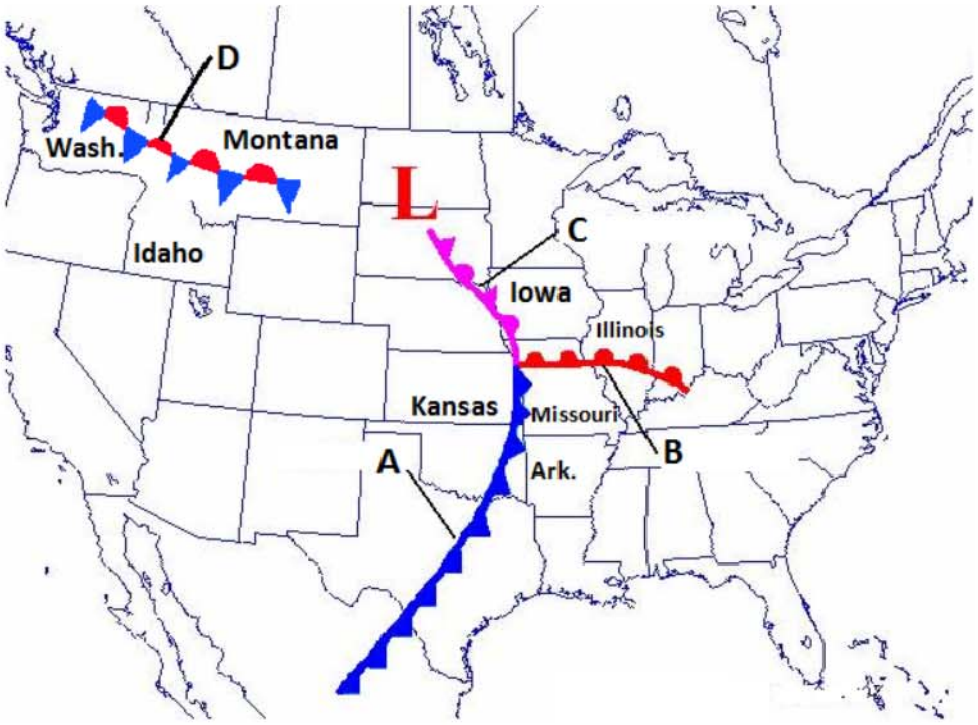
Weather Maps and Fronts



1. Name the labeled fronts with their appropriate names:

   Front A = _____

   Front B = _____

   Front C = _____

   Front D = _____

2. How would you describe the weather in Kansas at the moment?
   a. Warmer than average.
   b. Colder than average.
   c. Foggy
   d. Drizzling rain.

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3. How would you describe the weather that will occur in Missouri and Arkansas as Front A passes through?
    a. The front would stop moving and the temperature would drop.
    b. The warm air would move back overtop of the cold air, producing light rain showers.
    c. The cold front would force the warm air mass upward producing sudden thunderstorms.
    d. The cold air would push the warm air further to the south.

4. What type of weather will northern Illinois experience as Front B pushes north?
    a. Sudden, severe thunderstorms followed by cold temperatures.
    b. A few days of light rain and fog, followed by a few days of warm temperatures.
    c. Several days of heavy rain and cloud coverage.
    d. Sunny skies and cool temperatures.

5. What type of weather will Iowa experience as Front C pushes east?
    a. A few days of cloudy skies followed by cooler temperatures.
    b. Blizzard conditions.
    c. Sudden heavy rain showers and thunderstorms.
    d. Sunny skies and warm temperatures.

6. What type of weather would people see in northern Washington, Idaho, and Montana as Front D pushes through?
    a. A fast-moving snow storm followed by sunny skies.
    b. Sunny skies and warm temperatures.
    c. A few days of light rain and scattered clouds.
    d. Several days of heavy clouds, rain showers, and dense fog.