**Chapter 2 Mapping**

1. **Latitude:**
   1. What direction do the lines run?
   2. Are the lines labeled N/S or E/W?
   3. What is 0 degrees latitude?
   4. What is the latitude of the North Pole?
   5. What is the latitude of the South Pole?
2. **Longitude:**
3. What direction do the lines run?
4. Are the lines labeled N/S or E/W?
5. What is 0 degrees longitude?
6. **International Date Line**:
7. Is it latitude or longitude?
8. How many degrees?
9. What is important about this line?

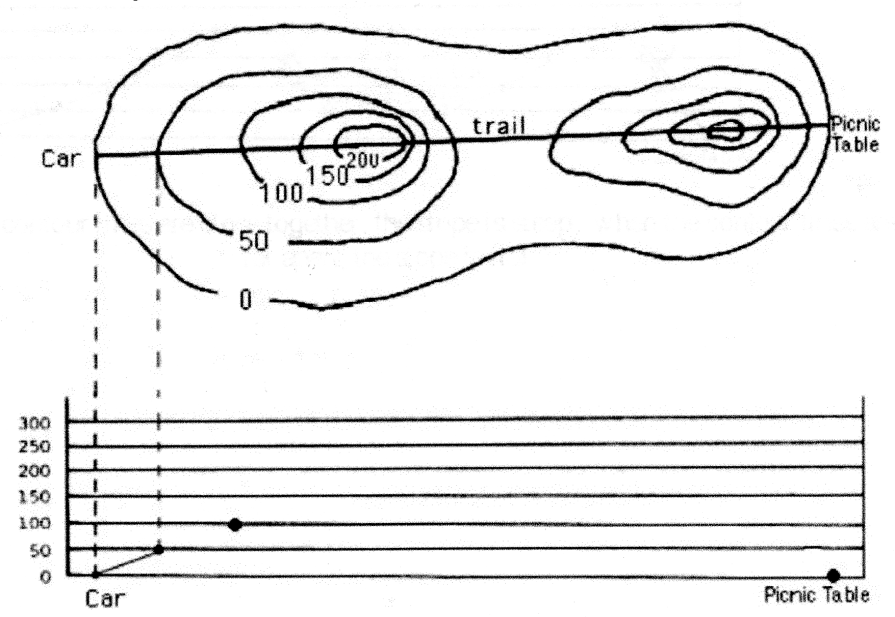
|  |  |  |
| --- | --- | --- |
| **City** | **Latitude** | **Longitude** |
| Minneapolis, Minnesota | 45N | 93W |
| Cairo, Egypt | 30N | 31E |
| Madrid, Spain | 40N | 4W |
| Rio de Janeiro, Brazil | 23S | 43W |

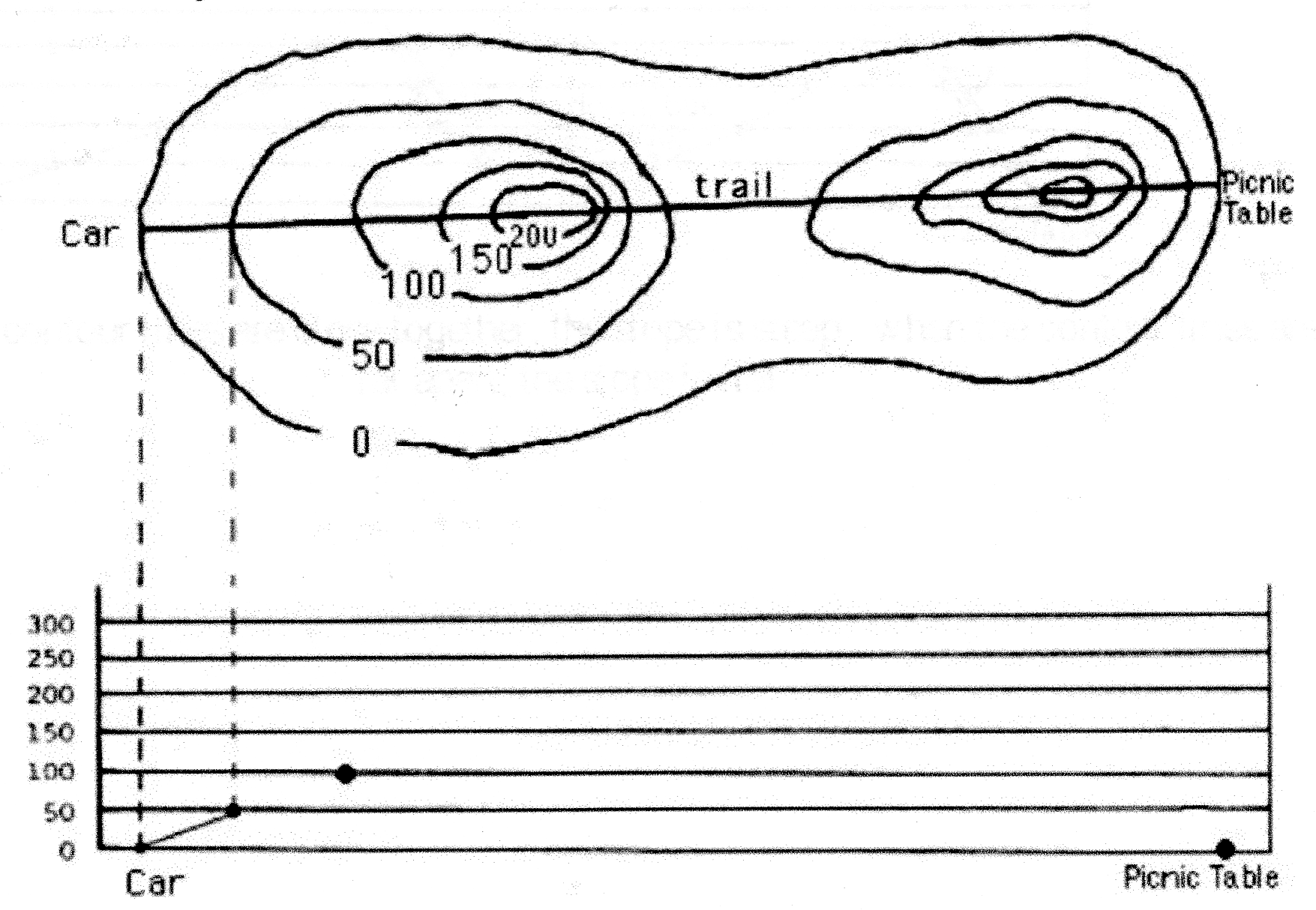
**Using the table above, answer the following:**

1. Which city is closest **in degrees** to the International Date Line? How do you know?
2. Which city is closest  **in degrees** to the Prime Meridian? Explain.
3. Which city is closest to the equator? Explain.
4. Which city is farthest from the equator? Explain.
5. Which city is closest to the North Pole? Explain.

**Section 2.2 Topographic Maps:**

1. How are the following terms related to topographic maps? Explain their use on the maps.
2. Contour line
3. Index contour
4. Contour interval
5. Hachure
6. Why can’t contour lines come together or cross?



**A**

**B**

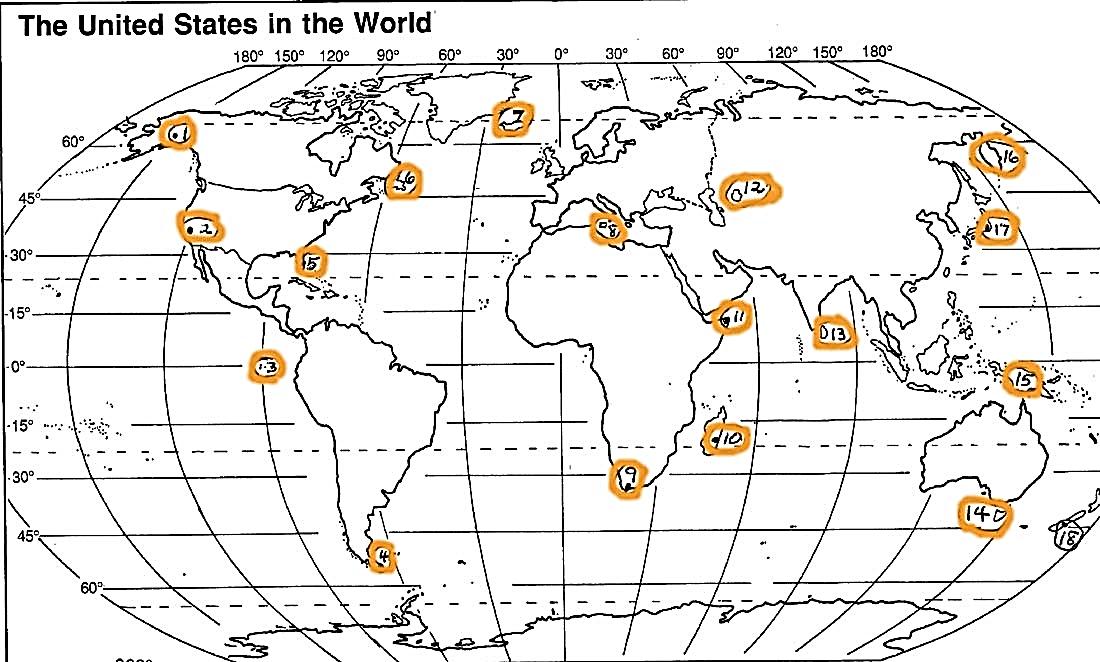
**E**

**C**

**D**

**Use the topographic map above to answer the next questions**

1. At which point is it the steepest in the map above? A, B, C, D, E? How do you know?
2. At which point is it the flattest in the map above? A, B, C, D, E? How do you know?
3. What is the gradient of an area that is totally flat?
4. What is the contour interval in the map above?



**Using the map above, answer the following questions about latitude & Longitude**

1. Which city is located at 52oS?
2. Which 2 cities are located closest to a 60o longitude line?

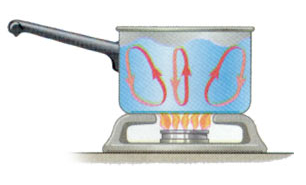
**Chapter 11 – Atmosphere & Cloud Formation**

**Layers of the Atmosphere**

1. Name the 4 layers of the atmosphere in order from the farthest to closest to Earth’s surface.
2. What are the 3 imaginary separation lines between layers of the atmosphere called?
3. Which layer has the largest concentration of ozone?
4. Which layer absorbs most of the Sun’s ultraviolet light?
5. Why does the temperature decreases with a higher altitude in the Troposphere?
6. Why does temperature increase with altitude in the Stratosphere?
7. What is a temperature inversion? How do they occur?

**Heat transfer**

1. What are the 3 Main Methods of Heat Transfer and explain how they work.
2. What is the Earth’s primary source of energy? Through what type of heat transfer mechanism does the Earth receive this energy?
3. Describe 2 heat transfer mechanisms by which a cup of hot coffee loses its energy.
4. How does the Earth pass on heat to the Troposphere?
5. Circle the 2 methods of heat transfer occurring in the picture below. Explain how these energy transfers work and relate them to the heating of Earth and/or the atmosphere.



1. In the pan above, also label an area that is less dense, more dense, colder water, and warmer water.

**Temperature/Volume/Density/Pressure Relationships**

1. Explain the relationship between Temperature, Volume, and Density.
2. Explain the relationship between Temperature, Volume, and Pressure.



1. \*\*The stars in the balloon to the right represent air molecules. The balloon

pictured is at room temperature.

* 1. Based on your knowledge about temperature and volume, draw what would happen if the balloon is put into an ice bath.
  2. How would this affect the density of the air in the balloon? **Explain why**.
  3. Based on your knowledge about density, do you think the balloon you drew would float higher or sink lower than the 1st balloon? Explain.

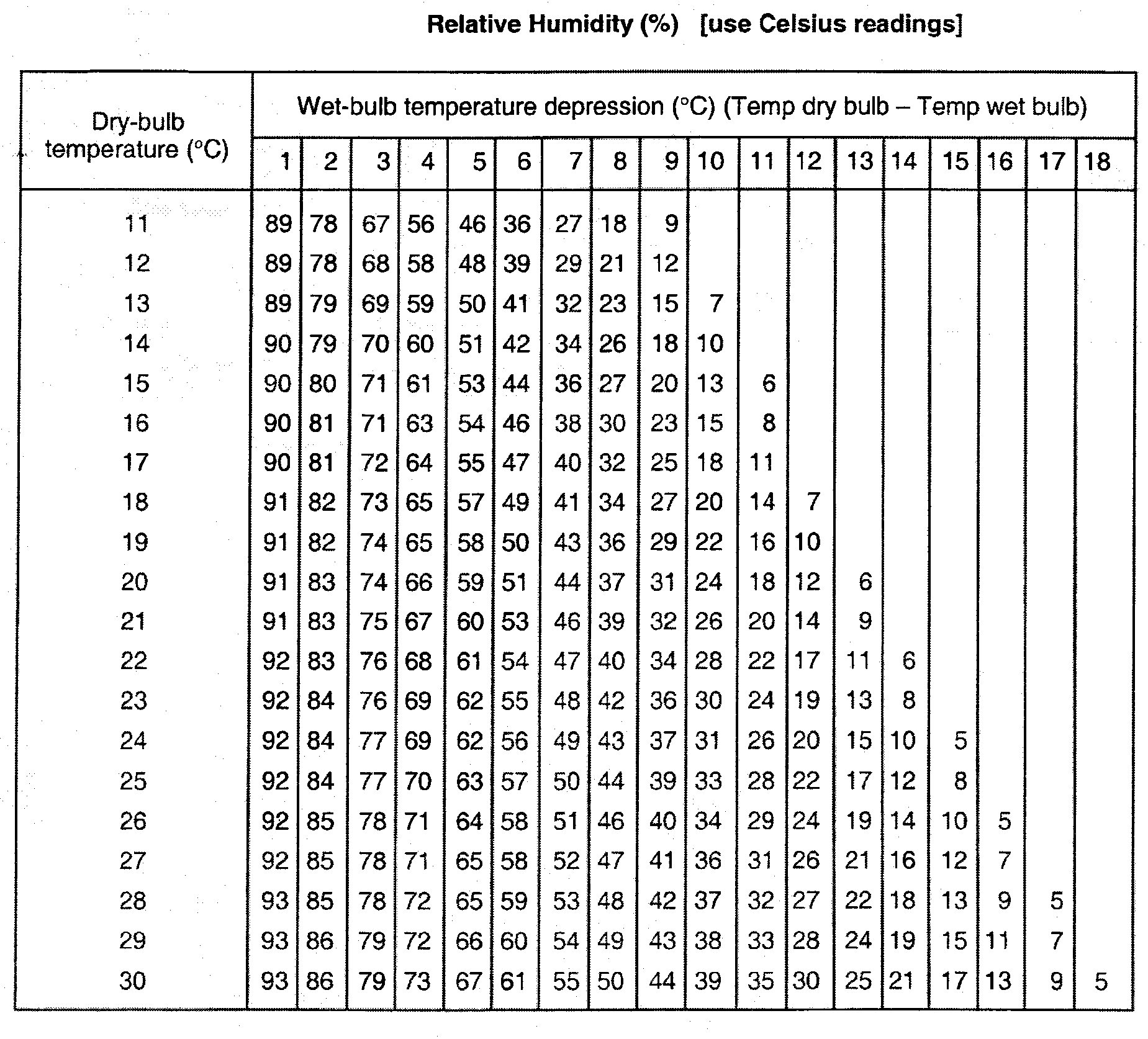
**Cloud Formation & Humidity**

1. What are the 3 main ingredients required for cloud formation?
2. List 2 examples of cloud nuclei.
3. What is the relationship between air temperature and the amount of water vapor it can hold?
4. If air at 80oF has a relative humidity of 65%, what happens to the relative humidity if:
   1. The air is warmed to 98oF?
   2. The air is cooled to 60oF?
5. What happens to the water vapor in the air at the dew point temperature?
6. If air contains 18g/kg of water vapor and the water vapor capacity of the air is 62g/kg, calculate the relative humidity of the air. Show your work and circle your answer.
7. If air could hold 20g/kg of water vapor, and the air contains 20g/kg, what is its relative humidity?

|  |  |
| --- | --- |
|  | **Water Vapor Capacity**  **(Maximum it can hold)**  g/kg  (grams water vapor/kg or air) |
| **30oF** | 2 |
| **40oF** | 4 |
| **50oF** | 12 |

1. Based on the table to the right, if air at 50oF contains 8g of water vapor, calculate its relative humidity. SHOW YOUR WORK. Label your answer with %.
2. Based on the table to the right, if a sample of air contains 4g of water vapor, what is its dew point?
3. List 3 forms of precipitation:
4. Complete the following table:

|  |  |  |
| --- | --- | --- |
|  | **Evaporation** | **Condensation** |
| Definition |  |  |
| To complete the phase change, is latent heat energy absorbed or released? |  |  |



1. Use the table above. After slinging the psychrometer 50 times, the Dry-bulb temperature was 15oC and the Wet-bulb reading was 6oC. Using the table above, what is the relative humidity?
2. Compare and contrast **Orographic Lifting** and **Frontal Wedging:** You must explain similarities and differences. (You cannot say they are both a type of lift mechanism for a comparison. For differences, you must describe both terms.) You may write in sentences or use a Venn diagram. Be specific and detailed.

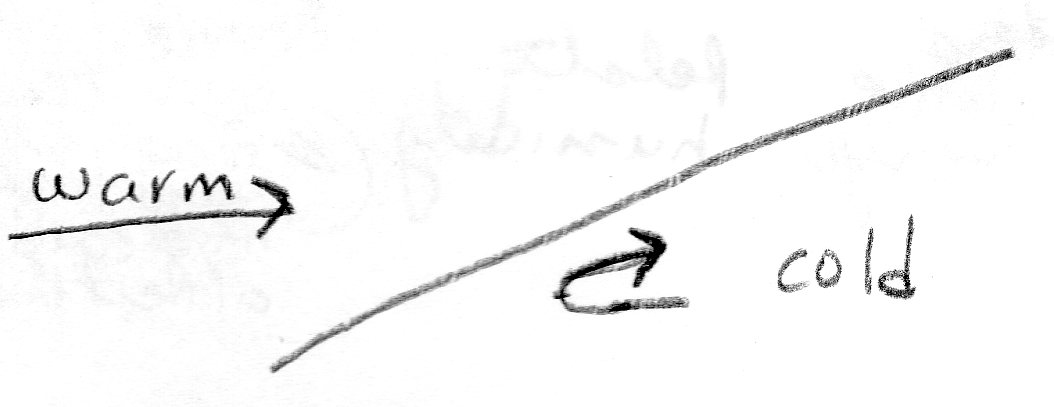
**Chapter 12: Meteorology (Air Masses, Fronts, Pressure Systems)**

1. Complete the “Characteristics of Air Masses” table:

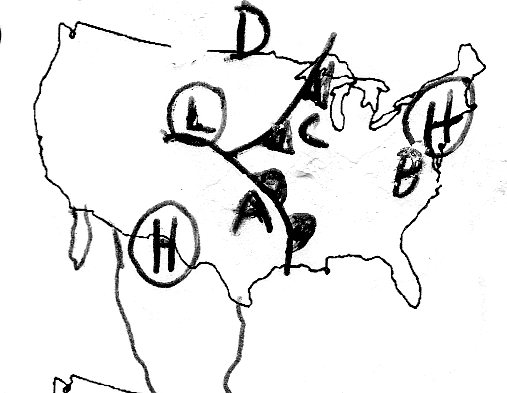
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Symbol** | **Name** | **Relative temp** | **Relative humidity** | **Example source location (that could affect U.S. weather)** |
| mP |  |  |  |  |
| cP |  |  |  |  |
| mT |  |  |  |  |
| cT |  |  |  |  |

1. As a cT air mass that formed over Mexico moves north into the United States through New Mexico, Colorado, Nebraska, etc., what would be the major change in the air masses 2 main characteristics? Explain why.
2. What are the 2 characteristics we classify air masses by?
3. Complete the “Characteristics of Fronts” table:

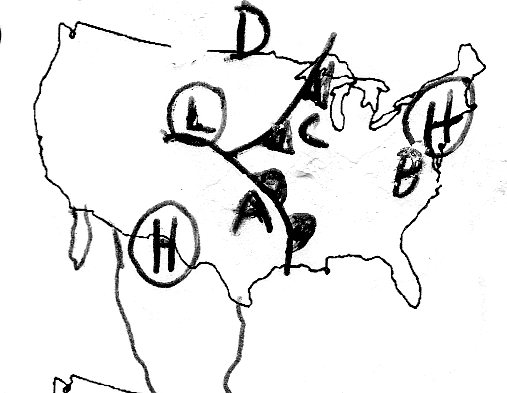
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Relative Steepness**  **of Front** | **Type of Clouds** | **Strength & Length of Storms** | **Map Symbol**  **(Color, shape)** | **Description of Front**  **Use pictures and/or words**  **to describe what is happening** |
| Cold Front |  |  |  |  |  |
| Warm Front |  |  |  |  |  |
| Stationary Front | XXXXXXX  XXXXXXX | XXXXXXXX  XXXXXXXX |  |  |  |
| Occluded Front | XXXXXXX  XXXXXXX | XXXXXXXX  XXXXXXXX |  |  |  |



1. What type of front is shown in the diagram to the right? How do you know?
2. How many air masses are involved in
   1. Warm Front?
   2. Cold Front?
   3. Occluded Front?
3. Before the occluded front formed, what were 2 types of fronts were originally present? Explain what caused the occluded front to form.
4. Three of the fronts only involve the meeting of a warm and a cool air mass. What determines which of the three front types occurs? Explain.

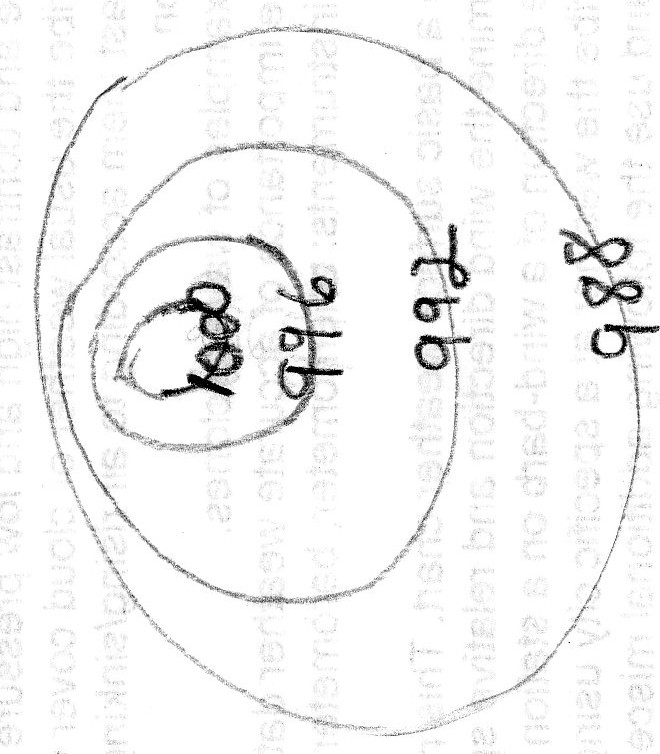
**Use the diagram to the right to answer questions # 55-63:**

1. What type of front is located to the east of city A in the diagram above?
2. What direction is the front near A moving?
3. What type of air mass is A likely to be under now that the front has passed by?
4. What type of air mass is D likely to be under after the front passed by?
5. Which location (A, B, C, D) is likely to have a steady rain, but not a thunderstorm? Explain your reasoning.
6. Which location (A, B, C, D) is likely to have sunny skies? Explain your reasoning.



1. Which location on the map (A,B,C,D) is likely to have the highest temperature? Explain your reasoning.
2. Which location (A,B,C,D) is likely to have the lowest temperature of 45F? Explain your reasoning.
3. When the front passes through city C, describe how the weather is likely to change. (Explain what will happen to temperature, wind direction, precipitation, and cloud cover.
4. Complete the following table about pressure systems:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **System** | **Does Air Rise or Sink?** | **Usual Weather** | **Explain WHY that type of weather is found here** | **Direction of Rotation** |
| Low-Pressure |  |  |  |  |
| High-Pressure |  |  |  |  |

1. On the isobar diagram to the right, circle the area with the greatest wind speed. Then explain how you know the wind speed is greatest there.
2. Is the center of the isobar diagram a high or low pressure center? Put an H or an L, as appropriate in the center.
3. In the isobar diagram, based on the isobar values, draw an arrow showing the direction the wind is blowing.