Concepts

- Air temperature generally decreases with increasing altitude
- The rate at which air temperature decreases depends on whether the air is saturated or unsaturated
- Air is unsaturated if the Air Temperature is greater than the Dew Point Temperature
- Air is saturated if the Air Temperature is equal to the Dew Point Temperature (Relative Humidity equals 100%)
- The Dew Point Temperature will not be greater than the Air Temperature (this would mean that the air is super-saturated, Relative Humidity would be greater than 100%).
- As Unsaturated Air rises, it’s temperature cools at a rate of 5.5°F/1000 feet (10°C/1000 meters)
- As Saturated Air rises, it’s temperature cools at a rate of 3.0°F/1000 feet (6°C/1000 meters)
- As Saturated Air rises, condensation will occur
- As Unsaturated Air rises the Dew Point Temperature of the air decreases by 1.0°F/1000 feet (2°C/1000 meters)
- As Saturated Air rises, the Dew Point Temperature of the air decreases by 3.0°F/1000 feet (6°C/1000 meters)
- As air descends (sinks) it’s Air Temperature AND Dew Point Temperature always warm
- As soon as air begins to descend, condensation stops and clouds will evaporate
- The rate at which Air Temperature warms in descending air is 5.5°F/1000 feet (10°C/1000 meters)
- The rate at which Dew Point Temperature warms in descending air is 1.0°F/1000 feet (2°C/1000 meters)
- Air that is rising may start out rising as unsaturated air, reach saturation, and then continue rising as saturated air

Procedures

1. On the diagram on the reverse side, you are presented with a mountain that is 5,000 feet tall.
2. You are given a starting Air Temperature and Dew Point Temperature at zero (0) feet on the windward side of the mountain.
3. Air is being forced to rise up the windward side and then forced to sink down the leeward side.
4. Using the lapse rates and concepts above, calculate the Air Temperature, Dew Point Temperature and whether the air is Saturated or Unsaturated at each of the 1000 foot intervals on BOTH the windward and leeward sides of the mountain.
5. Draw where you would expect to see a cloud under these conditions.
5,000 feet
  Td = 
  Temperature = 
  Saturated/Unsaturated

4,000 feet
  Td = 
  Temperature = 
  Saturated/Unsaturated

3,000 feet
  Td = 
  Temperature = 
  Saturated/Unsaturated

2,000 feet
  Td = 
  Temperature = 
  Saturated/Unsaturated

1,000 feet
  Td = 
  Temperature = 
  Saturated/Unsaturated

0 feet
  Td = 72°F
  Temperature = 85.5°F
  Saturated/Unsaturated