

Dewpoint (C°)

Dry-Bulb Temperature (°C)	Difference Between Wet-Bulb and Dry-Bulb Temperatures (C°)															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
-20	-20	-33														
-18	-18	-28														
-16	-16	-24														
-14	-14	-21	-36													
-12	-12	-18	-28													
-10	-10	-14	-22													
-8	-8	-12	-18	-29												
-6	-6	-10	-14	-22												
-4	-4	-7	-12	-17	-29											
-2	-2	-5	-8	-13	-20											
0	0	-3	-6	-9	-15	-24										
2	2	-1	-3	-6	-11	-17										
4	4	1	-1	-4	-7	-11	-19									
6	6	4	1	-1	-4	-7	-13	-21								
8	8	6	3	1	-2	-5	-9	-14								
10	10	8	6	4	1	-2	-5	-9	-14	-28						
12	12	10	8	6	4	1	-2	-5	-9	-16						
14	14	12	11	9	6	4	1	-2	-5	-10	-17					
16	16	14	13	11	9	7	4	1	-1	-6	-10	-17				
18	18	16	15	13	11	9	7	4	2	-2	-5	-10	-19			
20	20	19	17	15	14	12	10	7	4	2	-2	-5	-10	-19		
22	22	21	19	17	16	14	12	10	8	5	3	-1	-5	-10	-19	
24	24	23	21	20	18	16	14	12	10	8	6	2	-1	-5	-10	-18
26	26	25	23	22	20	18	17	15	13	11	9	6	3	0	-4	-9
28	28	27	25	24	22	21	19	17	16	14	11	9	7	4	1	-3
30	30	29	27	26	24	23	21	19	18	16	14	12	10	8	5	1

Overview:

TV weather forecasters are devoting more time to the relationship of dewpoint temperatures and to the chance of precipitation. Let's see why. The dewpoint is the temperature the air would need to be cooled down to in order for the water vapor within the air to condense, changing it from a gas to a liquid. When this happens, the air is saturated and clouds, fog, or dew starts forming. Normally the dewpoint temperature is less than the air temperature (it will never be higher) and the air is not saturated. If the dewpoint and air temperature become closer, the relative humidity increases. When these two temperatures are the same, the relative humidity is 100% and the air is saturated. Thus, when the dewpoint temperature is close to the air temperature, relative humidity is high and precipitation may be in the forecast.

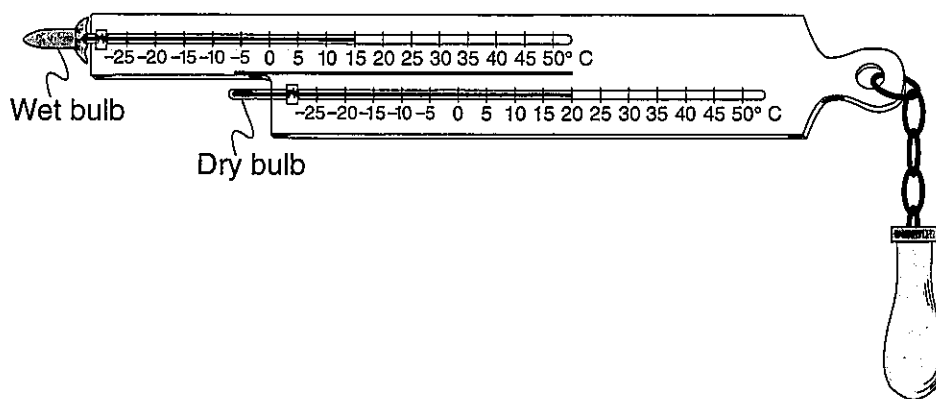
To measure the dewpoint we need an instrument called a sling psychrometer. This instrument has two thermometers, one called the dry-bulb thermometer and the other called the wet-bulb thermometer. The dry-bulb thermometer records the air temperature. The wet-bulb thermometer contains a moistened wick around its bulb. When swung through the air, the moisture on the wet-bulb evaporates, which removes heat, causing a lowering of the wet-bulb temperature. This gives a difference in temperature readings of the two thermometers. Using this difference of temperatures and the Dewpoint chart, the dewpoint temperature of the air can be determined.

The Chart:

As mentioned, the sling psychrometer will have two thermometers, the dry-bulb thermometer and the wet-bulb thermometer. Subtracting these two temperature readings will give you a temperature difference. Locate the “Difference Between the Wet-Bulb and Dry-Bulb Temperatures” columns at the top of this chart. Find the correct column representing your difference in temperature. Move down this column until you reach the correct Dry-Bulb Temperature row. This intersection position is your dewpoint temperature. Let’s try one. What is the dewpoint temperature if the dry-bulb temperature is 20°C and the wet-bulb temperature is 16°C? Subtracting these temperatures gives the difference of 4°C. Locate this column at the top of the chart and move downward until it intersects the Dry-Bulb Temperature of 20°C. If done correctly, the dewpoint is 14°C. Therefore, if this air which is at 20°C cools down to this temperature (14°C), condensation will occur, and produce visible moisture droplets as found in a cloud.

Additional Information:

- If the air is saturated, there will not be any difference between the wet-bulb and the dry-bulb temperatures. When this occurs, the dewpoint temperature is the same as the air temperature and the relative humidity is 100% and condensation can occur.
- Condensation nuclei are microscopic particles of smoke, dust, salt, etc . . . These particles need to be present for condensation to occur.
- Some regents problems give the dewpoint temperature and the difference between the wet-bulb temperature and the dry-bulb temperature and ask to solve the dry-bulb temperature. The solution is to locate the dewpoint in the correct “Difference” column, and then read directly to the left of this position to find the Dry-Bulb Temperature.



Remember: When the above sling psychrometer is swung, the water on the wet-bulb wick evaporates. This process removes heat causing the wet-bulb thermometer to drop in temperature.

Set 1 — Dewpoint (C°)

1. What is the dewpoint when the dry-bulb temperature is 14°C and the wet-bulb temperature is 8°C?

(1) 1°C
(2) -9°C
(3) 6°C
(4) 22°C

1 _____

2. What is the dewpoint when the dry-bulb temperature is 16°C and the wet-bulb temperature is 12°C?

(1) -19°C
(2) -16°C
(3) 7°C
(4) 9°C

2 _____

3. A student used a sling psychrometer to measure the dew point of the air. If the dewpoint was 6°C and the dry-bulb temperature was 10°C, what was the wet-bulb temperature?

(1) 5°C
(2) 7°C
(3) 8°C
(4) 10°C

3 _____

4. A student uses a sling psychrometer outdoors on a clear day. The dry-bulb (air) temperature is 10°C. The water on the wet bulb will most likely

(1) condense, causing the wet-bulb temperature to be higher than the air temperature.
(2) condense, causing the wet-bulb temperature to be equal to the air temperature.
(3) evaporate, causing the wet-bulb temperature to be lower than the air temperature.
(4) evaporate, causing the wet-bulb temperature to be equal to the air temperature.

4 _____

5. Which weather change usually occurs when the difference between the air temperature and the dewpoint temperature is decreasing?

(1) The amount of cloud cover decreases.
(2) The probability of precipitation decreases.
(3) The relative humidity increases.
(4) The barometric pressure increases.

5 _____

Base your answer to question 6 on the weather information below.

A student using a sling psychrometer obtained a dry-bulb reading of 20°C and a wet-bulb reading of 16°C for a parcel of air outside the classroom.

6. State the dewpoint. _____

Set 2 — Dewpoint (C°)

7. What is the dewpoint temperature when the dry-bulb temperature is 12°C and the wet-bulb temperature is 7°C?

(1) 1°C
(2) 5°C
(3) 6°C
(4) 4°C

7 _____

8. What is the dewpoint when the dry-bulb temperature is 24°C and the wet-bulb temperature is 15°C?

(1) 8°C
(2) -18°C
(3) 36°C
(4) 4°C

8 _____

Note: Question 9 has only 3 choices.

9. Weather-station measurements indicate that the dewpoint temperature and air temperature are getting farther apart over the past 3 hours. The chance of precipitation during this time span is

(1) increasing
(2) decreasing
(3) remains the same

9 _____

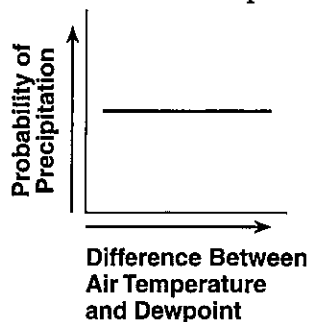
10. Name the instrument that is used to measure dewpoint.

11. The following weather data was collected at Boonville, New York.

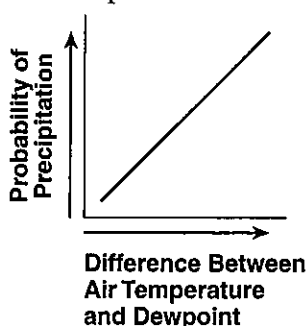
Air temperature	65°F
Dewpoint	64°F
Visibility	2 miles
Present weather	-----
Wind direction	from the west
Wind speed	5 knots
Amount of cloud cover	100%
Barometric pressure	996.2 millibars

Describe what will occur when the air temperature drops one more degree.

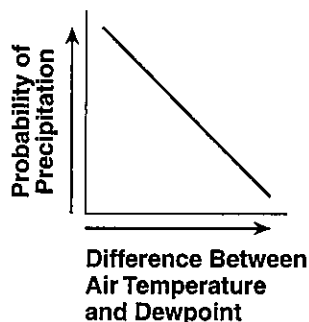
12. Which graph best shows the relationship between the probability of precipitation and the difference between air temperature and dewpoint?



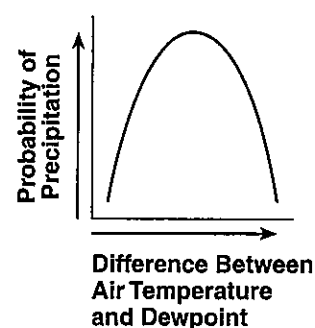
(1)



(2)



(3)



(4)

12 _____