

## Assessment Questions

1. In the situation show below, what is the wet-bulb depression?



*Alt: two thermometers*

*Longdesc: This image shows a snapshot from the relative humidity Gizmo. There are two thermometers, a clock, and a fan blowing. The two thermometers are called the dry bulb thermometer and the wet bulb thermometer. The dry bulb thermometer is exposed to the air. The wet bulb thermometer is wrapped in a wet cloth and has a fan blowing on it. In this image, the clock reads nine o'clock in the morning, the dry bulb thermometer reads twenty-six degrees Celsius, and the wet bulb thermometer reads twenty-two degrees Celsius.*

- A: 0.0°C
- B: 4.0°C
- C: 22.0°C
- D: 26.0°C

**The correct answer is: B.** The wet bulb depression is the difference between the wet bulb temperature and the dry bulb temperature.

$$26.0^{\circ}\text{C} - 22.0^{\circ}\text{C} = 4.0^{\circ}\text{C}$$

2. What is the approximate relative humidity in the situation shown below?

Dry-bulb reading (°C)	Difference between wet and dry-bulb reading (°C)				
	6	7	8	9	10
10	33	23	14	4	
12	38	29	20	11	3
14	42	33	25	17	9
16	45	37	29	22	14
18	48	41	33	26	19
20	51	44	37	30	24
22	53	46	40	34	27
24	55	49	43	37	31
26	57	51	45	39	34
28	59	53	47	42	37
30	61	55	49	44	39
32	62	56	51	46	41
34	63	58	53	48	43
36	64	59	54	50	45
38	65	60	56	51	47
40	66	62	57	52	48

Alt: two thermometers

Longdesc: This image shows a snapshot from the relative humidity Gizmo. There are two thermometers, a clock, a fan blowing, and a large relative humidity table. The two thermometers are called the dry bulb thermometer and the wet bulb thermometer. The dry bulb thermometer is exposed to the air. The wet bulb thermometer is wrapped in a wet cloth and has a fan blowing on it. In this image, the clock reads twelve o'clock midnight, the dry bulb thermometer reads twenty-nine point eight degrees Celsius, and the wet bulb thermometer reads twenty point nine degrees Celsius. According to the table, when the difference between the wet bulb and the dry bulb temperatures is nine degrees and the dry bulb temperature is thirty degrees Celsius, the relative humidity is forty-four percent. When the difference between the wet bulb and the dry bulb temperatures is nine degrees and the dry bulb temperature is twenty degrees Celsius, the relative humidity is thirty percent.

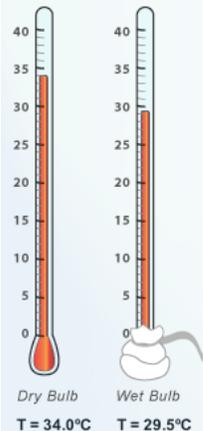
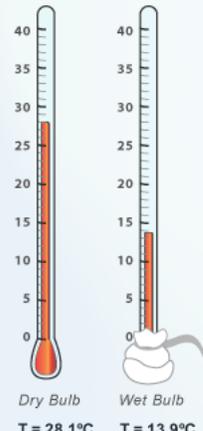
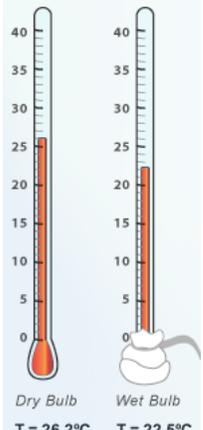
- A: 9%
- B: 21%
- C: 30%
- D: 44%

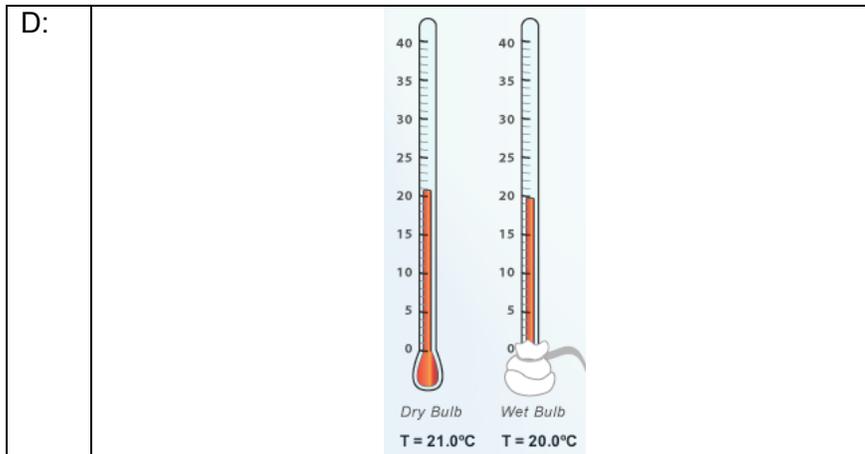
**The correct answer is: D.** To calculate relative humidity, you first calculate the wet bulb depression, which is the difference between the dry bulb temperature and the wet bulb temperature.

$$29.8^{\circ}\text{C} - 20.9^{\circ}\text{C} = 8.9^{\circ}\text{C}$$

Next you check the psychrometric table to determine the relative humidity. First, pick the row in the table that most closely matches your dry bulb temperature. The closest value to 29.8°C is 30°C. Then, pick the column that comes closest to your wet bulb depression. The closest value to 8.9°C is 9°C. This row and this column intersect at a value of 44%, which is the approximate relative humidity under these conditions.

3. Which of the following situations most likely indicates the lowest relative humidity? [NOTE TO GRAPHICS: Make this below as one big ABCD image.]

<p>A:</p>	 <p>Dry Bulb T = 34.0°C Wet Bulb T = 29.5°C</p>
<p>B:</p>	 <p>Dry Bulb T = 28.1°C Wet Bulb T = 13.9°C</p>
<p>C:</p>	 <p>Dry Bulb T = 26.2°C Wet Bulb T = 22.5°C</p>



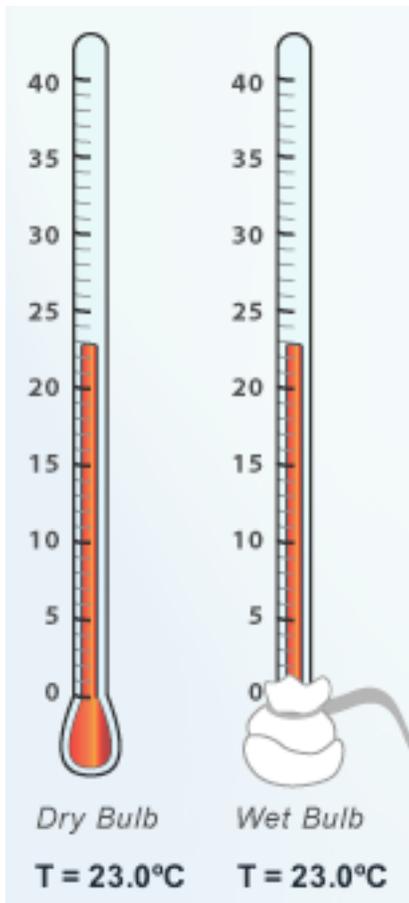
*Alt: four images with two thermometers in each*

*Longdesc: This image shows four answer choices, A, B, C, and D. Each one shows two thermometers, a dry bulb thermometer and a wet bulb thermometer. The dry bulb thermometer is exposed to the air. The wet bulb thermometer is wrapped in a wet cloth. In answer choice A, the dry bulb temperature is thirty four degrees Celsius and the wet bulb temperature is twenty nine point five degrees Celsius. In answer choice B, the dry bulb temperature is twenty eight point one degrees Celsius and the wet bulb temperature is thirteen point nine degrees Celsius. In answer choice C, the dry bulb temperature is twenty six point two degrees Celsius and the wet bulb temperature is twenty two point five degrees Celsius. In answer choice D, the dry bulb temperature is twenty one degrees Celsius and the wet bulb temperature is twenty degrees Celsius.*

- A: situation A
- B: situation B
- C: situation C
- D: situation D

**The correct answer is: B.** At any temperature, the larger the wet bulb depression, the lower the relative humidity. Although the dry bulb temperature differs in each case shown here, answer choice B is the only one that shows a significant wet bulb depression. Therefore, this most likely indicates the lowest relative humidity. Indeed, the relative humidity for the situation in answer B is about 17%. The relative humidities in the other situations are much higher.

4. Consider the thermometers shown. What is true about the dew point under these conditions?



*Alt: two thermometers*

*Longdesc: This image shows a snapshot from the relative humidity Gizmo, showing two thermometers, called the dry bulb thermometer and the wet bulb thermometer. The dry bulb thermometer is exposed to the air. The wet bulb thermometer is wrapped in a wet cloth. Both thermometers are reading twenty three degrees Celsius.*

- A: The dew point is lower than 23°C.
- B: The dew point is equal to 23°C.
- C: The dew point is higher than 23°C.
- D: The dew point is 100°C.

**The correct answer is: B.** The dew point is always lower than or equal to the dry bulb temperature (air temperature). So, you can immediately eliminate answer choices C and D. Then, notice that the dry bulb temperature and the wet bulb temperature are equal. This only happens when the relative humidity is 100%. When the relative humidity is 100%, the dew point is equal to the dry bulb temperature. So, the dew point in this case is 23°C.