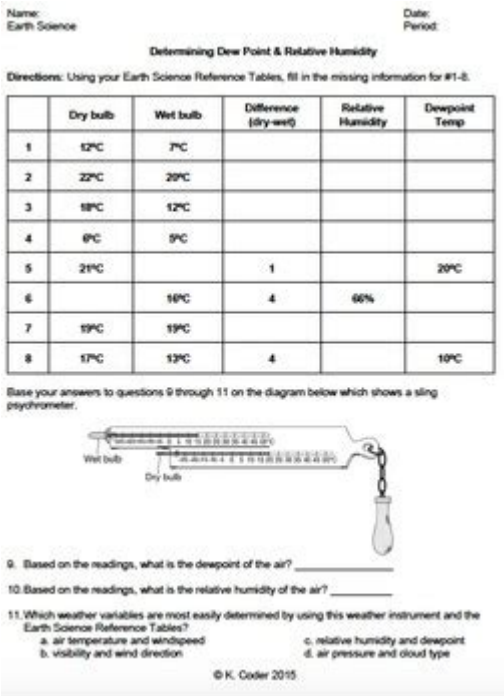
Relative Humidity And Dew Point Answer Key



Name:
Earth Science

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Determining Dew Point & Relative Humidity

Directions: Using your Earth Science Reference Tables, fill in the missing information for #1-8.

	Dry bulb	Wet bulb	Difference (dry-wet)	Relative Humidity	Dewpoint Temp
1	12°C	7°C			
2	22°C	20°C			
3	18°C	12°C			
4	6°C	5°C			
5	21°C		1		20°C
6		16°C	4	66%	
7	19°C	19°C			
8	17°C	13°C	4		10°C

Base your answers to questions 9 through 11 on the diagram below which shows a sling psychrometer.

9. Based on the readings, what is the dewpoint of the air? _____

10. Based on the readings, what is the relative humidity of the air? _____

11. Which weather variables are most easily determined by using this weather instrument and the Earth Science Reference Tables?
a. air temperature and windspeed
b. visibility and wind direction
c. relative humidity and dewpoint
d. air pressure and cloud type

Relative humidity and dew point are two fundamental concepts in meteorology that help us understand the moisture content in the atmosphere. They play a crucial role in weather forecasting, climate studies, and even in our everyday lives. This article delves into the definitions, differences, calculations, and applications of relative humidity and dew point, providing a comprehensive answer key to these essential concepts.

Understanding Relative Humidity

Relative humidity (RH) is defined as the percentage of moisture present in the air relative to the maximum amount of moisture the air can hold at a given temperature. It indicates how close the air is to saturation. For example, if the air can hold a maximum of 20 grams of water vapor per cubic meter at a specific temperature and it currently holds 10 grams, the relative humidity would be:

- RH = (10g / 20g) × 100 = 50%

Factors Influencing Relative Humidity

Several factors can affect relative humidity, including:

1. Temperature: Warmer air can hold more moisture than cooler air. Therefore, as the temperature rises, relative humidity tends to decrease if moisture levels remain constant. Conversely, cooling the air increases relative humidity.
2. Air Pressure: Changes in atmospheric pressure can alter the capacity of air to hold moisture. Lower

pressure generally allows air to hold more water vapor.
3. Water Sources: Proximity to bodies of water, such as lakes and oceans, can increase the moisture in the air, thereby raising relative humidity levels.
4. Weather Systems: Systems like high and low pressures can either draw moisture away or bring moist air into an area, affecting local humidity levels.

Measuring Relative Humidity

Relative humidity is commonly measured using a device called a hygrometer. There are various types of hygrometers, including:

- Mechanical Hygrometers: Use materials that absorb moisture and expand or contract based on humidity levels.
- Electronic Hygrometers: Use sensors that measure changes in electrical resistance or capacitance as humidity changes.
- Psychrometers: Use two thermometers (one dry, one wet) to measure humidity based on the difference in temperature due to evaporation.

Understanding Dew Point

Dew point is the temperature at which air becomes saturated with moisture and water vapor begins to condense into liquid water (dew). It is an absolute measure of humidity and provides insight into the actual moisture content in the air. The higher the dew point, the more moisture the air contains.

The Importance of Dew Point

Dew point is significant for several reasons:

- Comfort Levels: A higher dew point often indicates muggier conditions, which can make the weather feel hotter and more uncomfortable.
- Weather Predictions: Dew point is a critical factor in predicting fog, frost, and precipitation. A rising dew point can lead to increased cloudiness and potential rain.
- Climatology: Dew point measurements are essential for understanding climate and weather patterns over time.

Calculating Dew Point

The dew point can be calculated using various formulas, but one common approximation is based on temperature and relative humidity:

- Dew Point (°C) ≈ T - [(100 - RH)/5]

Where T is the air temperature in degrees Celsius and RH is the relative humidity percentage.

Differences Between Relative Humidity and Dew Point

While both relative humidity and dew point measure moisture in the air, they do so in different ways. Below are key differences:

Aspect	Relative Humidity	Dew Point
Definition	Percentage of moisture relative to saturation	Temperature at which air becomes saturated
Measurement	Affected by temperature changes	Independent of temperature changes
Scale	Percentage (0-100%)	Degrees (°C or °F)
Comfort Indicator	Indicates mugginess and comfort levels	Indicates actual moisture content
Use in Weather	Helps predict precipitation	Helps predict fog, frost, and dew formation

Applications of Relative Humidity and Dew Point

Understanding relative humidity and dew point has practical applications in various fields:

1. Weather Forecasting

Meteorologists use relative humidity and dew point to predict weather patterns accurately. High relative humidity can indicate the likelihood of rain, while a high dew point can signal muggy conditions.

2. HVAC Systems

Heating, ventilation, and air conditioning (HVAC) systems rely on these measurements to maintain comfortable indoor environments. Understanding humidity levels helps in controlling condensation and preventing mold growth.

3. Agriculture

Farmers monitor humidity and dew point to make informed decisions about irrigation, pest management, and crop protection. High humidity can lead to fungal diseases, while low humidity levels can stress plants.

4. Health and Comfort

Understanding humidity levels can help individuals manage their comfort levels at home or work. High humidity can lead to discomfort and health issues, while low humidity can cause dry skin and

respiratory problems.

5. Aviation

In aviation, humidity and dew point are critical for flight safety. Pilots must be aware of dew point to predict conditions that could lead to fog or icing on aircraft.

Conclusion

In summary, **relative humidity and dew point** are vital concepts in understanding atmospheric moisture. While relative humidity provides a percentage of moisture in relation to the air's capacity, dew point offers a more tangible measure of actual moisture content. Both measurements play crucial roles in weather forecasting, comfort levels, and various industries, from agriculture to HVAC systems. By grasping these concepts, we can better appreciate the weather and environmental conditions that affect our daily lives. Understanding relative humidity and dew point is not just for meteorologists; it is essential knowledge for anyone looking to understand the world around them.

Frequently Asked Questions

What is relative humidity and how is it measured?

Relative humidity is the percentage of moisture in the air compared to the maximum amount of moisture the air can hold at a given temperature. It is typically measured using a hygrometer.

How does dew point relate to relative humidity?

Dew point is the temperature at which air becomes saturated and water vapor begins to condense into liquid. A higher dew point indicates higher moisture content in the air, which corresponds to higher relative humidity.

Why is dew point considered a more accurate measure of comfort than relative humidity?

Dew point is considered more accurate because it provides a direct measurement of the amount of moisture in the air, regardless of temperature. It helps indicate how humid it feels, while relative humidity can be misleading at different temperatures.

What are the effects of high relative humidity on human health?

High relative humidity can lead to discomfort, overheating, and increased risk of heat-related illnesses. It can also exacerbate respiratory issues and promote the growth of mold and dust mites.

How can one lower indoor relative humidity levels?

Indoor relative humidity can be lowered by using dehumidifiers, improving ventilation, air conditioning, and reducing sources of moisture such as cooking, showering, and drying clothes indoors.

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