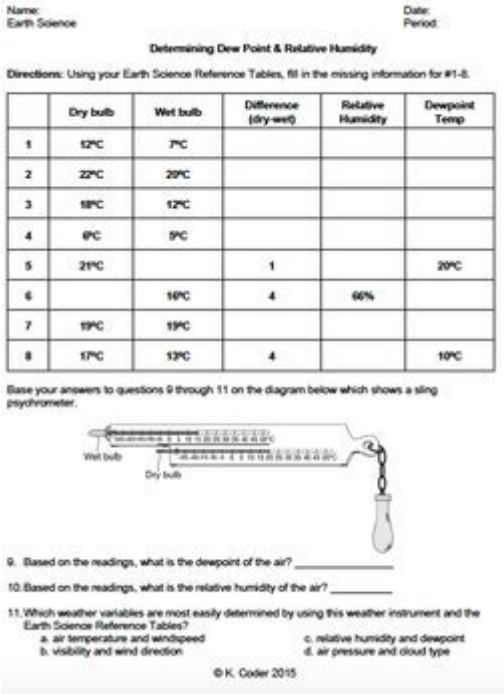
Relative Humidity And Dew Point Worksheet Answer Key



Name: Date:
Earth Science Period:

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 worksheet answer key serves as an essential tool for students and educators in understanding the concepts of humidity and its implications on weather and climate. Both relative humidity and dew point are critical measurements in meteorology and can greatly impact our daily lives, from determining comfort levels indoors to predicting weather patterns. This article will explore the definitions, calculations, and applications of relative humidity and dew point, as well as provide a comprehensive answer key for a typical worksheet that covers these vital concepts.

Understanding Relative Humidity

Relative humidity (RH) is defined as the amount of water vapor present in the air compared to the maximum amount of water vapor the air can hold at a given temperature, expressed as a percentage. It is a crucial measurement for assessing the moisture content in the atmosphere and can influence weather conditions, human comfort, and various ecological processes.

How Relative Humidity is Measured

Relative humidity is typically measured using the following instruments:

1. Hygrometers: These devices can be analog or digital and provide real-time readings of humidity levels in the air.
2. Psychrometers: Consisting of two thermometers (one dry and one wet), psychrometers measure

humidity based on the difference in temperature between the two thermometers.
3. Dew Point Meters: These specialized instruments can directly measure the dew point and derive relative humidity based on temperature readings.

Factors Influencing Relative Humidity

Several factors can affect relative humidity, including:

- Temperature: Warmer air can hold more moisture than cooler air, meaning that as temperature increases, relative humidity may decrease if moisture content remains constant.
- Air Pressure: Variations in atmospheric pressure can affect the capacity of air to hold moisture, thus influencing relative humidity readings.
- Geographic Location: Coastal areas often have higher humidity levels than inland regions due to the proximity of large bodies of water.

The Dew Point Explained

The dew point is the temperature at which air becomes saturated with moisture and water vapor begins to condense into liquid water, forming dew. The dew point is a more accurate measure of humidity than relative humidity as it provides a specific temperature that indicates moisture content.

Importance of Dew Point

Understanding the dew point is crucial for various reasons:

- Comfort Levels: Higher dew points indicate more moisture in the air, leading to a feeling of mugginess and discomfort.
- Weather Forecasting: Meteorologists use dew point measurements to predict fog, frost, and precipitation. High dew points in summer can signal thunderstorms.
- HVAC Applications: In heating, ventilation, and air conditioning systems, the dew point helps determine the necessary cooling or dehumidification needed to maintain comfort.

Calculating Dew Point

The dew point can be calculated using several formulas, one common method being the Magnus-Tetens approximation:

1. Identify the temperature (T) in degrees Celsius and the relative humidity (RH) as a percentage.

2. Use the following formula:
$$
a = 17.27
$$

$$
b = 237.7
$$
$$
\alpha = \frac{a \cdot T}{b + T} + \ln\left(\frac{RH}{100}\right)
$$
$$
Dew \, Point = \frac{b \cdot \alpha}{a - \alpha}
$$

This formula provides a reliable estimate of the dew point based on temperature and relative humidity.

Worksheet Example and Answer Key

To solidify understanding, a worksheet on relative humidity and dew point can be immensely helpful. Below is a sample worksheet followed by an answer key.

Worksheet Questions

1. Define relative humidity and dew point.
2. If the temperature is 30°C and the relative humidity is 60%, calculate the dew point.
3. List three factors that can affect relative humidity.
4. What would be the relative humidity if the air temperature is 20°C and the dew point is 10°C?
5. Explain the importance of dew point in weather forecasting.

Worksheet Answer Key

1. Definitions:
- Relative humidity is the amount of water vapor in the air relative to the maximum amount of water vapor the air can hold at that temperature, expressed as a percentage.
- Dew point is the temperature at which air becomes saturated with moisture and water vapor starts to condense into liquid water.

2. Dew Point Calculation:
- Using the Magnus-Tetens formula:
- $\alpha = \frac{17.27 \times 30}{237.7 + 30} + \ln\left(\frac{60}{100}\right)$
- Solve for α and then use it to find the dew point.
- The calculated dew point is approximately 20.4°C.

3. Factors Affecting Relative Humidity:
- Temperature
- Air Pressure
- Geographic Location

4. Relative Humidity Calculation:
- Using the dew point and temperature:
- RH can be calculated using the formula:
$$
RH = 100 \times \frac{e^{\left(\frac{17.27 \times Dew \, Point}{237.7 + Dew \, Point}\right)}}{e^{\left(\frac{17.27 \times Temperature}{237.7 + Temperature}\right)}}
$$
- The relative humidity is approximately 38.7%.

5. Importance of Dew Point:
- Dew point is crucial for predicting weather conditions, such as fog and frost. It also helps to assess comfort levels in humidity and is used in HVAC systems for maintaining suitable indoor environments.

Conclusion

Understanding relative humidity and dew point is vital for grasping weather patterns, comfort levels, and environmental conditions. By working through worksheets that include calculations and conceptual questions, students can solidify their knowledge of these critical atmospheric measurements. The ability to interpret and utilize these measurements is not only academic but also practical, impacting various aspects of daily life, from weather preparedness to energy efficiency in our living and working spaces.

Frequently Asked Questions

What is relative humidity and why is it important in meteorology?

Relative humidity is the amount of moisture in the air compared to the maximum amount of moisture the air can hold at a given temperature. It is important in meteorology because it helps predict weather patterns, comfort levels, and potential precipitation.

How do you calculate relative humidity using dew point?

Relative humidity can be calculated using the dew point with the formula: RH = (actual vapor pressure / saturation vapor pressure) 100. The actual vapor pressure can be derived from the dew point temperature.

What is the relationship between dew point and relative humidity?

Dew point is the temperature at which air becomes saturated with moisture and forms dew. Higher dew points indicate higher moisture content in the air, leading to higher relative humidity levels.

What are common uses for a relative humidity and dew point

worksheet?

A relative humidity and dew point worksheet can be used for educational purposes, to help students practice calculating humidity and dew points, understand the concepts involved, and apply them in real-world scenarios like HVAC systems or weather forecasting.

Why might an answer key for a relative humidity and dew point worksheet be beneficial?

An answer key provides students with immediate feedback on their calculations and understanding of the concepts, allowing them to identify mistakes, learn from them, and reinforce their knowledge effectively.

What factors can affect dew point and relative humidity readings?

Factors that can affect dew point and relative humidity include temperature, atmospheric pressure, air circulation, and the presence of moisture sources such as bodies of water or vegetation.

Relative Humidity And Dew Point Worksheet Answer Key

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