Module 11: Meteorology

Topic 4 Application: Relative Humidity Scientific Investigation

Before you begin the scientific investigation below, make sure to download the Measuring Humidity Scientific Investigation Report. As you complete this scientific investigation, fill in any needed information on the report template. If you need more information about each section of the report, please visit the Developmental Module.

Introduction

Relative humidity describes the amount of water vapor in the air. Air is generally described as being saturated or unsaturated. Relative humidity gives meteorologists an idea of how close air is to being saturated with water vapor.

Objectives

In this scientific investigation, you will:

- calculate relative humidity using a relative humidity comparison table; and
- measure relative humidity inside and outside using a device called a psychrometer.

Hypothesis

Using the **Procedure and Data Collection** section below, read through the procedural information for this scientific investigation. Based on your understanding of the procedure, develop your own hypotheses which describe your expected results. Specifically, how will the relative humidity inside of your house or classroom compare with the relative humidity outside? Record these hypotheses in the **Hypothesis** section of your *Measuring Humidity Scientific Investigation Report*.

Equipment and Materials

- Calculator
- Water at room temperature
- Two thermometers
- Cotton gauze
- Paper fan

Procedure and Data Collection

1. In your classroom or home, construct a psychrometer by tying a piece of cotton gauze around one of the thermometers.
2. Wet the gauze with room temperature water.
3. Lay the two thermometers side-by-side on a flat surface facing in the same direction. The thermometer with the wet gauze is the wet-bulb thermometer and the thermometer with no gauze is the dry-bulb thermometer.
4. Fan both thermometers for one minute. After one minute, record the temperatures of both thermometers in Celsius in the data table provided in the **Data** section of your *Measuring Humidity Scientific Investigation Report*.
5. Now, enter an outdoor environment. Repeat steps 1-4. Record the wet-bulb and dry-bulb temperatures in the **Data** section of your *Measuring Humidity Scientific Investigation Report*.

6. Use the Relative Humidity Data Table provided at the end of this document to determine the relative humidity for the inside measurements and the outside measurement. Record the relative humidity in the data table.

Data

Use the table provided in the **Data** section of your *Measuring Humidity Scientific Investigation Report* to record your data from this scientific investigation. The data table is also shown below:

	Inside Environment	Outside Environment
Dry-bulb Temperature (°C)		
Wet-bulb Temperature (°C)		
Difference between dry-bulb and wet-bulb temperatures (°C)		
Relative Humidity (%)		

Data Analysis

In the **Data Analysis** section of your *Measuring Humidity Scientific Investigation Report*, provide responses to the following questions:

1. How do the relative humidity measurements for inside and outside compare? Are they similar or different? What are possible reasons for their difference?
2. How would the relative humidity change if the measurements were taken on a day that it is raining?
3. Why are the basements of homes often cool and damp in the summer?
4. Would you expect relative humidity to be higher on average during the winter or the summer months?

Conclusion

Using the **Conclusion** section of your *Measuring Humidity Scientific Investigation Report*, compose three to four sentences describing an overall conclusion based on your data. Were your hypotheses true or false, and how do you know? Use the data and notes that you collected from your investigation to form your conclusion. Make sure that you include information that you gained from data analysis to support your conclusion.

Experimental Sources of Error

On your *Measuring Humidity Scientific Investigation Report*, provide responses to the following questions: Are there any sources of error? If so, what are they, and what could be done to minimize error?

Once you have completed the Measuring Humidity Scientific Investigation Report, please submit your work to the dropbox.

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Topic 4 Application: Relative Humidity Table

Dry-bulb Temperature (°C)	Wet-bulb Temperature																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
-20	28																					
-18	40																					
-16	48	0																				
-14	55	11																				
-12	61	23																				
-10	66	33	0																			
-8	71	41	13																			
-6	73	48	20	0																		
-4	77	54	43	11																		
-2	79	58	37	20	1																	
0	81	63	45	28	11								**Relative Humidity Values**									
2	83	67	51	36	20	6																
4	85	70	56	42	27	14																
6	86	72	59	46	35	22	10	0														
8	87	74	62	51	39	28	17	6														
10	88	76	65	54	43	33	24	13	4													
12	88	78	67	57	48	38	28	19	10	2												
14	89	79	69	60	50	41	33	25	16	8	1											
16	90	80	71	62	54	45	37	29	21	14	7	1										
18	91	81	72	64	56	48	40	33	26	19	12	6	0									
20	91	82	74	66	58	51	44	36	30	23	17	11	5	0								
22	92	83	75	68	60	53	46	40	33	27	21	15	10	4	0							
24	92	84	76	69	62	55	49	42	36	30	25	20	14	9	4	0						
26	92	85	77	70	64	57	51	45	39	34	28	23	18	13	9	5						
28	93	86	78	71	65	59	53	47	42	36	31	26	21	17	12	8	2					
30	93	86	79	72	66	61	55	49	44	39	34	29	25	20	16	12	8	4				
32	93	86	80	73	68	62	56	51	46	41	36	32	27	22	19	14	11	8	4			
34	93	86	81	74	69	63	58	48	48	43	38	34	30	26	22	18	14	11	8	5		
36	94	87	81	75	69	64	59	50	50	44	40	36	32	38	24	21	17	13	10	7	4	
38	94	87	82	76	70	66	60	51	51	46	42	38	34	30	26	23	20	16	13	10	7	5
40	94	89	82	76	71	67	61	52	52	48	44	40	36	33	29	25	22	19	16	13	10	7

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