

Relative Humidity

Relative Humidity is a measure of the amount of water vapor in the air at a particular temperature compared with the total amount of water the air can hold at the same temperature. In this experiment, you will determine relative humidity at several places inside and outside your school.

OBJECTIVES

In this experiment, you will

- Use a computer to measure temperature.
- Determine relative humidity.
- Explain your results.

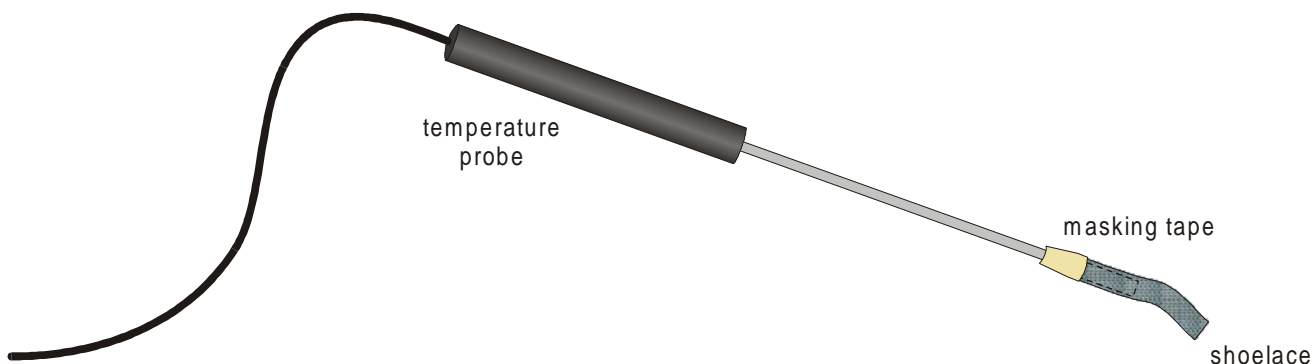


Figure 1

MATERIALS

computer
Vernier computer interface
LoggerPro
2 Temperature Probes

piece of shoelace, 5 cm long
masking tape
beaker
water

PROCEDURE

1. Slip Probe 2 into a 5 cm piece of shoelace until the probe tip is at the middle of the shoelace piece as shown in Figure 1. Fasten the shoelace to the probe with masking tape.
2. Prepare the computer for data collection by opening the file “04 Relative Humidity” from the *Middle School Science with Computers* folder.
3. Wet the shoelace on Probe 2 by placing it into a beaker or cup of water that is at or above room temperature. Probe 1 is to stay dry.

Experiment 4




4. Click  to begin data collection. Take a probe in each hand and gently wave the probes in the air.
5. Continue waving the probes until the temperatures measured by both probes stop changing. Then click  to end data collection. Record both final temperatures in your data table.
6. Choose Store Latest Run from the Experiment menu to store your data.
7. Select Remote ► Set Up from the Experiment menu. Read the instructions on the screen, then click . The amber light on the LabPro interface will come on at this time.
8. Disconnect LabPro from the computer cable and go to your second site. Take a cup water with you to resoak the shoelace. **Two Important Notes:** (1) Be very careful not to press the START/STOP button on LabPro until you are ready to begin collecting data, and (2) do not close the Logger *Pro* computer program.
9. Resoak the shoelace on Probe 2 when you are at the new location. Allow approximately one minute for the Temperature Probes to adjust to the temperature at the new location before beginning data collection.
10. When everything is ready, press the START/STOP button on the LabPro interface. The green light on LabPro should begin to blink. Take a probe in each hand and gently wave the probes in the air. Continue waving the probes for 5 minutes (the green light will stop blinking when data collection ends).
11. Reconnect LabPro to the computer. Follow the instructions on the screen to retrieve the data.
12. Choose Store Latest Run from the Experiment menu to store your data.
13. Repeat Steps 7–11 for a third site. If this site is at an outside location, be sure to use water that is at or above the air temperature. (For example: If the outside air temperature is 22°C, the water temperature must be 22°C or higher.)

TABLE 1 Relative Humidity

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

DATA

	Site 1	Site 2	Site 3
	Classroom	_____	_____
Dry probe temperature (Probe 1)	°C	°C	°C
Wet probe temperature (Probe 2)	°C	°C	°C
Temperature difference	°C	°C	°C
Relative humidity	%	%	%

PROCESSING THE DATA

1. In the space provided in your data table, subtract to find the difference between the dry-probe (Probe 1) and wet-probe (Probe 2) temperatures at each site.
2. Determine the relative humidity at each site using the Relative Humidity table on page 4-2.
 - a. Find the temperature difference you calculated in Step 1 at the top of the table. Keep one finger on this number.
 - b. Find the dry probe (Probe 1) temperature in the first column of the table.
 - c. Look across the row until you find the column marked with your finger. This is the relative humidity.
 - d. Record this number in your data table.
3. How did the wet probe temperature compare with the dry probe temperature at each site? Explain.

4. Which site had the highest relative humidity? Why?

5. Which site had the lowest relative humidity? Explain.

EXTENSIONS

1. Compare relative humidity values at sunny and shaded sites outdoors.
2. Compare relative humidity values at breezy and protected sites outdoors.