WORKSHEET 21

Activity - Wet Air

Purpose

To measure the humidity in the classroom and school ground.

Equipment

- two thermometers
- cotton wool
- rubber band

Safety

Handle thermometers carefully. Students shouldn't try to clean up the mess if a thermometer happens to break. Use a mercury spill-kit or throw sulphur over the mercury and clean it up wearing gloves and using a brush and pan. Remember not to touch it because **mercury is a poisonous metal**.

Procedure

1. Wrap the cotton wool around the bulb of a thermometer. Secure it with a rubber band.

2. Dip the wrapped bulb in water.

3. Gently fan the wet-bulb thermometer until the temperature reaches a minimum.

4. Compare the reading of the wet-bulb thermometer and the dry-bulb thermometer.

5. Record the difference in the two readings.

6. Read the relative humidity from the chart (see the humidity chart below). The numbers on the side of the chart represent the dry-bulb temperature. The numbers at the top represent the difference between the dry and wet bulb temperature. Measurements are in °C. The point at which the row and the column intersect is the percentage humidity in the air. For example, if the dry bulb temperature is 20°C, and the wet bulb depression is 5.5°C, then the humidity is 55 percent.

7. Repeat the exercise elsewhere, such as the school ground.

Questions

1. Why does the wet bulb thermometer register a lower temperature than the dry-bulb thermometer?

2. When is the humidity higher?
   When the temperature difference between a wet-bulb and a dry-bulb thermometer is high?
   Or
   When the temperature difference between a wet-bulb and a dry-bulb thermometer is low?

Explanation

Humidity is a measure of the amount of water vapour in air. If air temperature is 20°C, each cubic metre of air can contain up to 17g of water vapour. If there is only 8.5g of water vapour per cubic metre at 20°C, we can say the relative humidity is 50% Humidity can have a strong influence on how comfortable we feel. Combinations of high temperature and high humidity can be very uncomfortable. Physical activity and exposure to direct sunlight can also increase heat stress.

Humidity Chart

The numbers on the **side** of the chart represent the **dry-bulb temperature**. The numbers at the **top** represent the **difference between the dry and wet bulb temperature**. Measurements are in °C. The point at which the row and the column intersect is the percentage humidity in the air. For example, if the dry bulb temperature is 20°C, and the wet bulb depression is 5.5°C, then the humidity is 55 percent.

	0.5 1 1.5 2 2.5	3 3.5 4 4.5 5	5.5 6 6.5 7 7.5	8 8.5 9 9.5 10	11 12 13 14 15 16
40	97 94 91 88 85	82 80 77 74 72	69 67 64 62 60	57 55 53 51 48	44 40 37 33 29 26
39	97 94 91 88 85	82 79 77 74 71	69 66 64 61 59	57 54 52 50 48	44 40 36 32 28 25
38	97 94 91 87 85	82 79 76 74 71	68 66 63 61 58	56 54 51 49 47	43 39 35 31 27 24
37	97 94 91 87 85	82 79 76 73 70	68 65 63 60 58	55 53 51 48 46	42 38 34 30 26 23
36	97 94 90 87 84	81 78 76 73 70	67 65 62 60 57	55 52 50 48 45	41 37 33 29 25 21
35	97 93 90 87 84	81 78 75 72 70	67 64 61 59 56	54 51 49 47 44	40 36 32 28 24 20
34	97 93 90 86 84	81 78 7572 69	66 64 61 58 56	53 51 48 46 44	39 35 30 26 23 19
33	97 93 90 86 83	80 77 74 71 69	66 63 60 58 56	52 50 47 45 43	38 34 29 25 21 16
32	97 93 90 86 83	80 77 74 71 68	66 62 60 57 54	52 49 46 44 42	37 32 28 24 20 16
31	96 93 90 86 83	80 77 73 70 67	64 62 59 56 53	51 48 45 43 41	36 31 27 22 18 14
30	96 93 89 86 83	79 76 73 70 67	64 61 58 55 52	50 47 44 42 39	34 30 25 21 17 13
29	96 93 89 86 82	79 76 72 69 66	63 60 57 54 52	49 46 43 41 38	33 28 24 19 15 11
28	96 93 89 85 82	79 75 72 69 65	62 59 56 53 51	48 45 42 40 37	32 27 22 18 13 9
27	96 92 88 85 82	78 75 71 68 65	62 59 56 52 50	47 44 41 38 36	30 25 21 16 11 7
26	96 92 88 85 81	78 74 71 67 64	61 58 55 51 49	46 43 40 37 34	29 24 19 14 9 5
25	96 92 88 84 81	77 74 70 67 63	60 57 54 50 47	44 41 38 36 33	27 22 17 12 7 3
24	96 92 88 84 80	77 73 69 66 62	59 56 52 49 46	43 40 37 34 31	26 21 15 10 5
23	96 92 88 84 80	76 72 69 65 62	58 55 51 48 45	42 39 36 33 30	24 18 13 8 3
22	96 92 87 83 79	76 72 68 64 61	57 54 50 47 44	40 39 36 33 30	22 16 11 5
21	96 91 87 83 79	75 71 67 63 60	56 52 49 46 42	39 35 32 29 26	20 14 8 3
20	96 91 87 83 78	74 70 66 62 59	55 51 48 44 41	37 34 30 27 24	18 12 6
19	95 91 86 82 78	74 70 65 61 58	54 50 46 43 39	35 32 29 25 22	15 9 3
18	95 91 86 81 77	73 69 65 60 56	52 49 45 41 37	34 30 27 23 20	13 7
17	95 90 86 81 77	72 68 64 59 55	51 47 43 39 35	32 2824 21 17	10 4
16	95 90 85 81 76	71 67 62 58 54	50 46 41 37 34	30 26 22 18 15	8 1
15	95 90 85 80 75	71 66 61 57 52	48 44 40 36 31	27 24 20 16 12	5
14	95 90 84 79 74	70 65 60 56 51	47 42 38 33 29	25 21 17 14 9	2
13	95 89 84 79 74	69 64 59 54 49	45 40 36 31 27	23 18 14 10 6	
12	94 89 83 78 73	68 63 57 53 48	43 38 34 29 24	20 16 11 7 3	
11	94 88 83 77 72	66 61 56 51 46	41 36 31 26 22	17 13 8 4	
10	94 88 82 77 71	65 60 54 49 44	29 34 29 24 19	14 9 5	

Extension Activities

How is humidity related to weather conditions?

Design an experiment to use wool to measure humidity. Test the experiment by comparing your measurements with the wool to humidity measurements from meteorological instruments.

Fact file

Cows lying down, appearance of large numbers of frogs and snails, wool swelling and straightening, pine cone scales becoming pliable, and your hair getting longer: theses may all be signs of high humidity.

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