

### Wet Air

#### Objectives

By the end of this lesson the student will:

- measure the humidity in the classroom or school yard
- make a wet-bulb thermometer
- record the differences in readings between a wet-bulb and dry-bulb thermometer
- read the relative humidity from a humidity chart.

#### Background

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.

#### Resources and actions

Print off the worksheet for them to write on:

[http://www.bom.gov.au/lam/Students\\_Teachers/Worksheet21.shtml](http://www.bom.gov.au/lam/Students_Teachers/Worksheet21.shtml). See the student worksheet for the procedure and a list of the equipment needed.

Use the following solutions as a guide to assist them. They may come up with other appropriate solutions.

#### 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**.

#### Questions

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

The wet-bulb thermometer registers a lower temperature because the evaporation of water from the wet cotton will take heat away from the bulb of the thermometer and cool it down.

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?

The humidity is higher when the temperature difference between the wet-bulb and dry-bulb thermometer is high. The chart shows us that the relative

humidity decreases as the difference increases (gets higher).

Humidity Chart					
<p>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 intersects 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.</p>					
	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 75 72 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 28 24 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: These may all be signs of high humidity.

### Time

45 - 50 minutes.

### Assessment Task

Q. 1 and 2.