



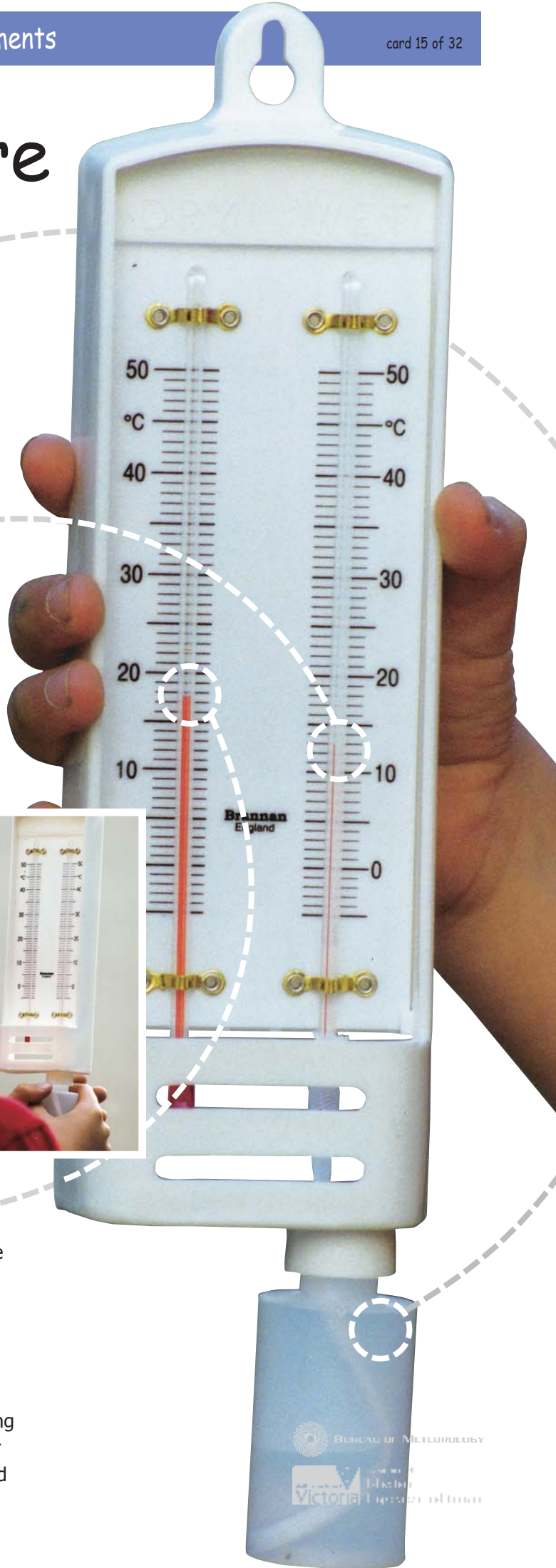
how to measure humidity using a hygrometer

Fill the water bottle and screw it on to the instrument. Then hang the hygrometer (by the loop at the top) on a wall or a tree, for instance, for at least five to 10 minutes before taking the measurements.

Ideally the instrument should be in a well-shaded spot or in a Stevenson screen (refer to "Making your own weather station" in Section 4: Contacts and further information).

The instrument contains two alcohol-in-glass thermometers with a scale of minus 10 to plus 110 degrees Celsius, in 1 degree increments. The end of the 'wet-bulb' thermometer is covered with a damp cloth dipped in water. The other thermometer is the 'dry-bulb'.

- ◆ Record the wet-bulb and dry-bulb temperatures.
- ◆ Calculate the wet-bulb depression – the dry-bulb temperature minus the wet-bulb temperature.
- ◆ Determine the relative humidity (%) using the table (reverse page). Read down from the wet-bulb depression and across from the dry-bulb temperature.



do's and don'ts

- ✓ Be careful with the instrument. The thermometers are made of glass and can easily break.
- ✓ Empty the water bottle before returning the hygrometer to its box.

how it works

The hygrometer works on a similar principle to the whirling psychrometer. The main difference is that the hygrometer is not rotated, so evaporation from the damp cloth around the wet-bulb thermometer occurs more slowly.





humidity

Humidity refers to the concentration of water vapour in the air. A relative humidity of 100 per cent is when the air has as much water vapour as it can hold at a particular temperature, and mists or fogs form.

High humidity can be uncomfortable and may bring on a feeling of impending rain or storms. People sometimes complain: "It's not the heat, it's the humidity!" because in hot, humid weather, perspiration on your skin does not evaporate as quickly, hampering your body's efforts to cool down.

Monitoring the humidity is important because high humidity can have a great impact, particularly on sports people competing in events such as the marathon.

the instrument

The hygrometer has two thermometers mounted side-by-side. They have a temperature range of minus 5 to plus 50 degrees Celsius. One thermometer bulb is exposed to the air (the dry bulb) and the other (the wet bulb) is wrapped in a damp cloth.

The wet bulb thermometer will generally give a lower reading because it is cooled by the evaporation of water from the cloth.

The rate of evaporation and cooling depends on the humidity of the surrounding air. In a dry place, such as a desert, water evaporates quickly and cools the thermometer more than in humid places, such as in the tropics.

You can calculate the humidity by taking readings from the hygrometer, using some simple mathematics, and by referring to the table at right.

for example ...

Suppose the two readings from the hygrometer are:

- dry bulb temperature: 15 degrees
- wet-bulb temperature: 10 degrees
- the wet-bulb depression is: 15 - 10 = 5 degrees

From the chart, reading down from the wet-bulb depression (5) and across from the dry-bulb temperature (15), the relative humidity is 49%.

Difference between DRY BULB and WET BULB readings ° Celsius

Dry Bulb Temp	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
50	97	94	92	89	87	84	82	79	77	74	72	70	68	66	63	61
49	97	94	92	89	86	84	81	79	77	74	72	70	67	65	63	61
48	97	94	92	89	86	84	81	79	76	74	71	69	67	65	62	60
47	97	94	92	89	86	83	81	78	76	73	71	69	66	64	62	60
46	97	94	91	89	86	83	81	78	76	73	71	68	66	64	62	59
45	97	94	91	88	86	83	80	78	75	73	70	68	66	63	61	59
44	97	94	91	88	86	83	80	78	75	72	70	68	65	63	61	58
43	97	94	91	88	85	83	80	77	75	72	70	67	65	62	60	58
42	97	94	91	88	85	82	80	77	74	72	69	67	64	62	59	57
41	97	94	91	88	85	82	79	77	74	71	69	66	64	61	59	56
40	97	94	91	88	85	82	79	76	73	71	68	66	63	61	58	56
39	97	94	91	87	84	82	79	76	73	70	68	65	63	60	58	55
38	97	94	90	87	84	81	78	75	73	70	67	65	62	59	57	54
37	97	93	90	87	84	81	78	75	72	69	67	64	61	59	56	54
36	97	93	90	87	84	81	78	75	72	69	66	63	61	58	55	53
35	97	93	90	87	83	80	77	74	71	68	65	63	60	57	55	52
34	96	93	90	86	83	80	77	74	71	68	65	62	59	56	54	51
33	96	93	89	86	83	80	76	73	70	67	64	61	58	56	53	50
32	96	93	89	86	83	79	76	73	70	67	64	61	58	55	52	49
31	96	93	89	86	82	79	75	72	69	66	63	60	57	54	51	48
30	96	93	89	85	82	78	75	72	68	65	62	59	56	53	50	47
29	96	92	89	85	81	78	74	71	68	65	61	58	55	52	49	46
28	96	92	88	85	81	77	74	70	67	64	60	57	54	51	48	45
27	96	92	88	84	81	77	73	70	66	63	60	56	53	50	47	44
26	96	92	88	84	80	76	73	69	66	62	59	55	52	49	46	42
25	96	92	88	84	80	76	72	68	65	61	58	54	51	47	44	41
24	96	91	87	83	79	75	71	68	64	60	57	53	50	46	43	39
23	96	91	87	83	79	75	71	67	63	59	56	52	48	45	41	38
22	95	91	87	82	78	74	70	66	62	58	54	51	47	43	40	36
21	95	91	86	82	78	73	69	65	61	57	53	49	45	42	38	35
20	95	91	86	81	77	73	68	64	60	56	52	48	44	40	36	33
19	95	90	86	81	76	72	67	63	59	55	50	46	42	38	34	31
18	95	90	85	80	76	71	66	62	58	53	49	45	41	36	32	29
17	95	90	85	80	75	70	65	61	56	52	47	43	39	34	30	26
16	95	89	84	79	74	69	64	60	55	50	46	41	37	32	28	24
15	94	89	84	78	73	68	63	58	53	49	44	39	35	30	26	21
14	94	89	83	78	72	67	62	57	52	47	42	37	32	28	23	18
13	94	88	83	77	71	66	61	55	50	45	40	35	30	25	20	16
12	94	88	82	76	70	65	59	54	48	43	38	32	27	22	17	12
11	94	87	81	75	69	63	58	52	46	41	35	30	25	19	14	9
10	93	87	81	74	68	62	56	50	44	38	33	27	22	16	11	5
9	93	86	80	73	67	61	54	48	42	36	30	24	18	13	7	2
8	93	86	79	72	66	59	52	46	40	33	27	21	15	9	3	
7	93	85	78	71	64	57	50	44	37	31	24	18	11	5		
6	92	85	77	70	63	55	48	41	34	28	21	14				
5	92	84	76	69	61	53	46	39	31	24						
4	92	83	75	67	59	51	44	36								
3	91	83	74	66	57	49										
2	91	82	73	64												
1	90	81														

THERMOMETER HYGROMETER
(Mason's Wet and Dry Bulb Hygrometer)

Fill the reservoir and ensure the wick is wet. Note the Dry Bulb reading (left hand column). Subtract the Wet Bulb reading from the Dry Bulb reading to find the wet Bulb depression. Note the difference along the top line. Follow this column down until level with the Dry Bulb reading for the Percentage Humidity. Best results will be achieved when the instrument is sited in slightly moving air (approx. 1 to 1.5 metres sec).

BRANNAN THERMOMETERS, CLEATOR MOOR, CUMBRIA, ENGLAND