

The Wet-Bulb Number

Name: _____

Date: _____

Class: _____

Read the lesson at myweatherrock.com/journal/explainers/wet-bulb-number (or the printed copy), then answer below.

Remember

The wet-bulb temperature is the lowest temperature the air can reach by evaporating water into it. Dry air accepts a lot of evaporation, so its wet-bulb runs far below the thermometer and sweating works. Humid air accepts almost none, the two readings converge, and sweating quits. Wet-bulb globe temperature, WBGT, folds in sun and wind on top of that, which is why it, and not the plain thermometer, is the number the National Weather Service issues for heat safety and the number athletic trainers and drill instructors actually schedule around.

Questions

1. What is the wet-bulb temperature?

- ☐ A. The temperature of rain when it lands
- ☐ B. The lowest temperature the air can reach through evaporation
- ☐ C. The temperature inside a cloud

2. Why does a wet thermometer read lower than a dry one right next to it?

- ☐ A. Water blocks the sun
- ☐ B. Evaporation off the wick carries heat away
- ☐ C. Wet glass conducts heat differently

3. On a very humid day, the gap between dry-bulb and wet-bulb readings is:

- ☐ A. Large
- ☐ B. Small
- ☐ C. Unchanged from a dry day

4. What does WBGT measure that the heat index does not?

- ☐ A. Barometric pressure
- ☐ B. Direct sun and wind on a working body
- ☐ C. The temperature of the ground

5. In the WBGT formula, the heaviest weighted ingredient is:

- ☐ A. The dry air temperature
- ☐ B. The natural wet-bulb temperature
- ☐ C. The black globe temperature

In your own words

Two days both read 95 degrees: one dry, one humid. Explain which day your body handles better, and why sweat works hard on one and struggles on the other.

Answer key (for the teacher)

1. What is the wet-bulb temperature?

B. The lowest temperature the air can reach through evaporation — It is the reading a wet thermometer settles at once evaporative cooling balances the warmth the air feeds back: the floor that evaporation can buy in that air.

2. Why does a wet thermometer read lower than a dry one right next to it?

B. Evaporation off the wick carries heat away — The fastest water molecules leave the wick and take their energy along. The bulb cools until that loss balances what the air returns.

3. On a very humid day, the gap between dry-bulb and wet-bulb readings is:

B. Small — Loaded air accepts little evaporation, so the gap barely collects and the two readings converge. At saturation they meet.

4. What does WBGT measure that the heat index does not?

B. Direct sun and wind on a working body — The heat index models rest in the shade from temperature and humidity. WBGT adds a black globe for radiant sun and responds to wind, which is why it governs outdoor work and sport.

5. In the WBGT formula, the heaviest weighted ingredient is:

B. The natural wet-bulb temperature — The blend is 0.7 wet-bulb, 0.2 globe, 0.1 dry-bulb. Seven tenths of the safety number is the question of whether sweat can evaporate.