

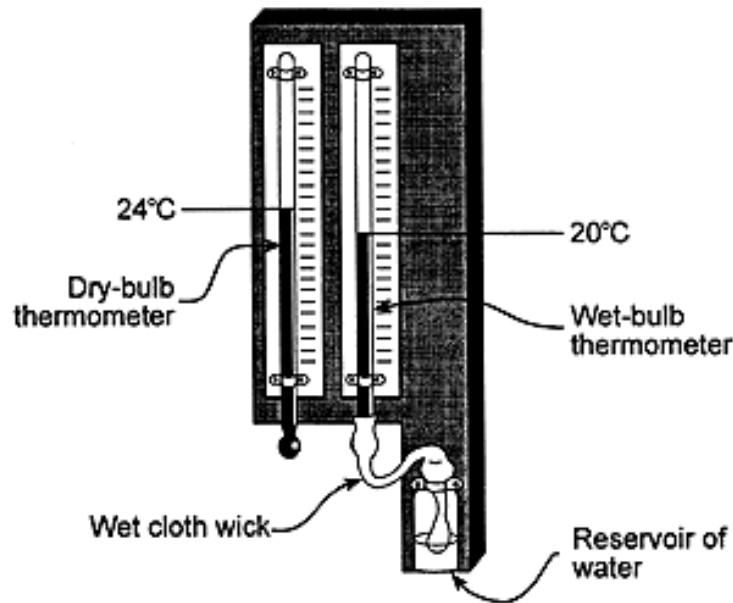
Fa Rp 1 Quiz
Mr. Chase

TEACHER ANSWER KEY
May 29, 2008

'see explanation below'

1. Base your answer on the accompanying diagram, which shows a hygrometer located on a wall in a classroom. The hygrometer's temperature readings are used by the students to determine the relative humidity of the air in the classroom.

Based on the temperature readings shown in this diagram, determine the relative humidity of the air in the classroom. [1]



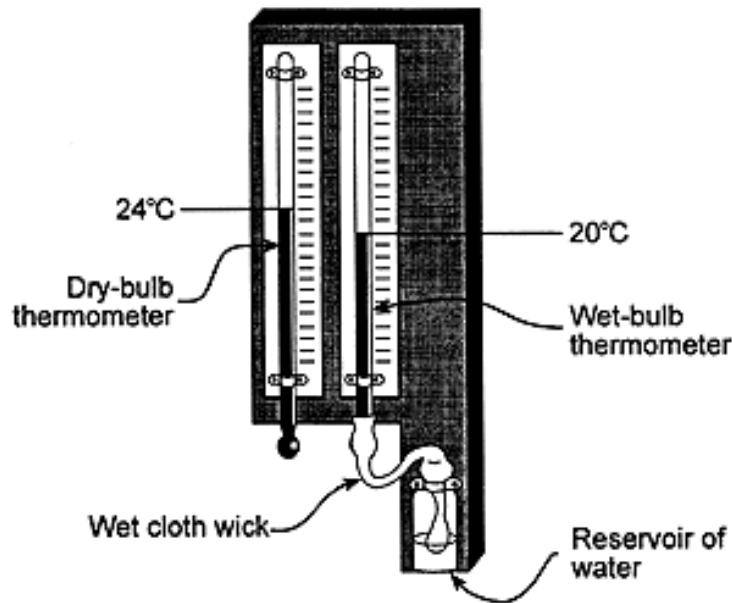
The given diagram shows a dry-bulb temperature of 24°C and a wet-bulb temperature of 20°C. The difference between the wet-bulb and dry-bulb temperatures is 4°C. Find the Relative Humidity (%) chart in the *Earth Science Reference Tables*, and locate 24 in the column headed "Dry-Bulb Temperature (°C)." In the section labeled "Difference Between Wet-Bulb and Dry-Bulb Temperatures (°C)" find the column headed "4." At the intersection of row 24 and column 4, read the relative humidity of the air in the classroom—69%.

One credit is allowed for **69%**.

'see explanation below'

2. Base your answer on the accompanying diagram, which shows a hygrometer located on a wall in a classroom. The hygrometer's temperature readings are used by the students to determine the relative humidity of the air in the classroom.

Besides relative humidity, identify another weather variable of the air in the classroom that may be determined by using both temperature readings on the hygrometer. [1]



Find the Dewpoint Temperatures (°C) chart in the *Earth Science Reference Tables*. Note that the dry-bulb temperature and the difference between the wet-bulb and dry-bulb temperatures can be used to find dewpoint temperatures on this chart. Therefore, another weather variable that may be determined by using both temperature readings on the hygrometer is dewpoint.

One credit is allowed for **dewpoint**.

'see explanation below'

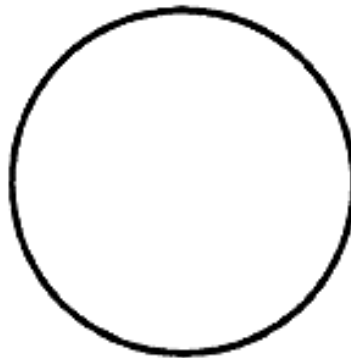
3. A student using a sling psychrometer obtained a dry-bulb reading of 20°C and a wet-bulb reading of 16°C for a parcel of air outside the classroom.

a State the dewpoint.

b State the change in relative humidity as the air temperature and the dewpoint get closer to the same value.

c On another day, the student determined the dewpoint was 70°F. Record the dewpoint, using the proper format, in the correct location on the weather station model provided or one similar on a separate piece of paper.

Note: On the actual exam, this was 3 individual questions.



a. Find in the *Earth Science Reference Tables* the Dewpoint Temperatures (°C) chart. The difference between the student's wet-bulb and dry-bulb temperatures is 20°C – 16°C, or 4°C. Find, at the top of the chart, the column for a 4°C difference between wet-bulb and dry-bulb temperatures, and also, along the left side of the chart, the row for a 20°C dry-bulb temperature. Where the row and column meet, read the dewpoint temperature: 14°C.

One credit is allowed for **14°C**.

b. Find in the *Earth Science Reference Tables* the Dewpoint Temperatures (°C) chart. Note that, for any dry-bulb temperature, as the difference between the wet-bulb and dry-bulb temperatures decreases, the dewpoint temperature gets closer to the air temperature.

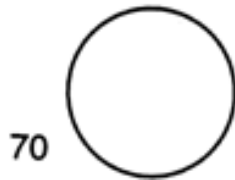
Now find in the *Earth Science Reference Tables* the Relative Humidity (%) chart. Note that, for any dry-bulb temperature, as the difference between the wet-bulb and dry-bulb temperatures decreases, the relative humidity increases. For example, at a dry-bulb temperature of 30°C, when the difference is 15°C the relative humidity is 16%, and when the difference is 1°C the relative humidity is 93%.

Thus, as the air temperature and the dewpoint temperature get closer together, the difference between the wet- and dry-bulb temperatures decreases, and the relative humidity increases.

One credit is allowed for **relative humidity increases**.

c. Find in the *Earth Science Reference Tables* the Weather Map Symbols section. In the Station Model chart, note that "Dewpoint (°F)" is listed to the lower left of the station model. Also note, however, that on the station model, the °F is dropped and only the value of the temperature is shown.

One credit is allowed for correctly indicating the dewpoint as shown below.



'see explanation below'

4. The atmospheric conditions at a given location are represented by the weather station model (see image).

On a separate piece of paper, fill in the correct information for *each* variable listed, based on this weather station model. [2]

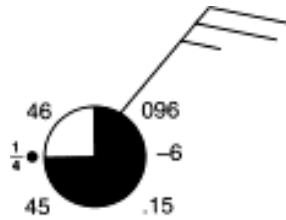
Air pressure: _____ **mb**

Air temperature: _____ **°F**

Amount of precipitation during last six hours: _____ **inch(es)**

Cloud cover: _____ **%**

Present weather: _____



Find the Weather Map Symbols in the *Earth Science Reference Tables*, and refer to the Station Model key. According to the key:

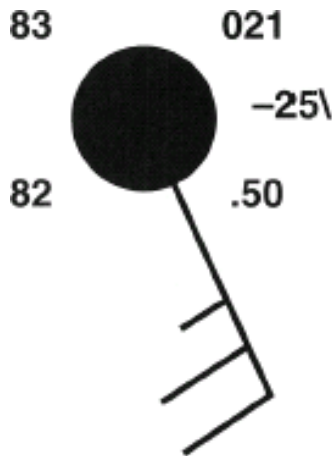
- Air pressure is found at the upper right, and the reading is shortened by dropping the decimal point and the hundreds and thousands digits. In the question, the reading on the station model is 096. This represents an air pressure of **1009.6 millibars (mb)**.
- Air temperature is found at the upper left. The reading on the station model is **46°F**.
- Amount of precipitation during the last six hours is found at the lower right. The reading on the station model is .15. Thus, the amount of precipitation during the last six hours is **0.15** or **.15 inch**.
- Cloud cover is indicated by the percent of the circle that is shaded. Therefore, the cloud cover shown on the station model is **75%**.
- The present weather is shown as a symbol at center left. The symbol shown on the station model is a black dot. Refer to the Present Weather key in the *Earth Science Reference Tables*, and note that this symbol indicates that the present weather is **rain**. (*Note*: No credit is allowed for "precipitation" because it is too general.)

Two credits are allowed for four or five correct responses.

'see explanation below'

5. Base your answer on the accompanying station model, which shows the weather conditions at Rochester, New York, at 4 p.m. on a particular day in June.

The winds shown by this station model were blowing from which compass direction and at what wind speed?



Find the Weather Map Symbols section in the *Earth Science Reference Tables*, and locate the Station Model key. Note that wind direction is indicated by drawing a line outward from the circle in the direction from which the wind is blowing. In the station model in the question, the line extends to the south southeast; therefore the winds are blowing from the south southeast (SSE). Wind speed is indicated by drawing "feathers" on the end of the line; a whole feather represents 10 knots, and a half feather 5 knots. Thus, two whole feathers and one half feather represent 25 knots.

One credit is allowed if *both* the compass direction and the wind speed are correct, as shown below:

from the south southeast (SSE) or southeast (SE) at 25 knots (± 2)