

## Relative Humidity

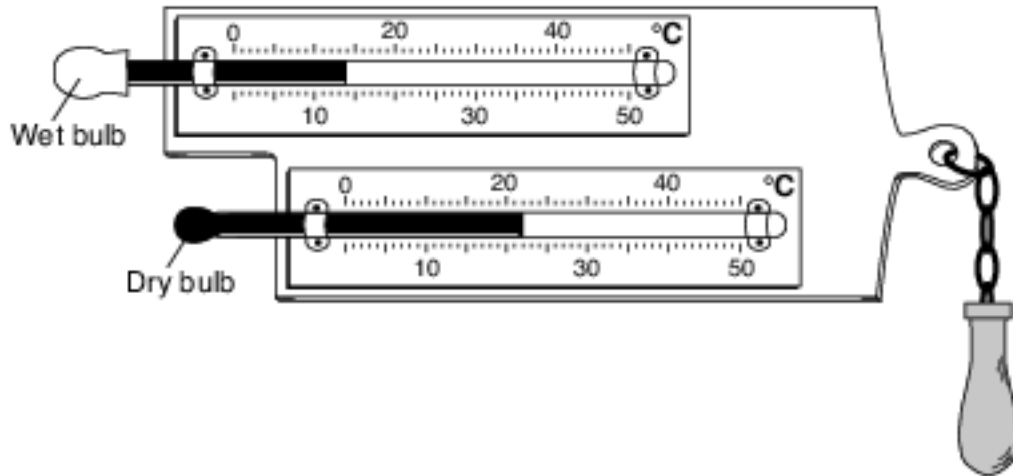
1 What is the relative humidity when the drybulb temperature is  $16^{\circ}\text{C}$  and the wet-bulb temperature is  $10^{\circ}\text{C}$ ?

- (1) 6%
- (2) 14%
- (3) 33%
- (4) 45%

2 If air has a dry-bulb temperature of  $2^{\circ}\text{C}$  and a wet-bulb temperature of  $-2^{\circ}\text{C}$ , what is the relative humidity?

- (1) 11%
- (2) 20%
- (3) 36%
- (4) 67%

3 The diagram below shows a weather instrument used to determine relative humidity.

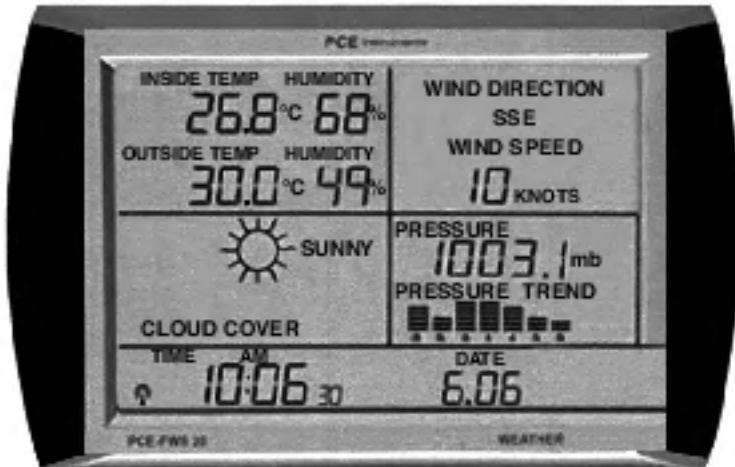


What is the relative humidity?

- (1) 40%
- (2) 36%
- (3) 8%
- (4) 4%

Base your answers to questions 4 on the photographs below and on your knowledge of Earth science. One photograph shows a digital device that recorded several weather variables. The second photograph shows two weather instruments, labeled A and B.

**Digital Device**



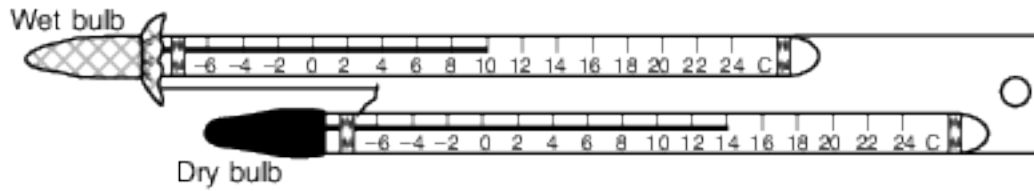
**Weather Instruments**



Adapted from: <https://www.pce-instruments.com/us/measuring-instruments/>

- 4 Based on the outside air temperature and relative humidity shown on the digital device, what is the approximate dewpoint for the time shown on the device?
- (1) 8°C (2) 12°C (3) 18°C (4) 31°C
- 5 A dry-bulb temperature of 30°C and a wet-bulb temperature of 29°C were recorded at a weather station. What are the relative humidity and the most likely weather conditions?
- (1) Relative humidity is 29% with clear skies.  
 (2) Relative humidity is 29% with a good chance of snow.  
 (3) Relative humidity is 93% with clear skies.  
 (4) Relative humidity is 93% with a good chance of rain.
- 6 What is the relative humidity if the dry-bulb temperature is 26°C and the wet-bulb temperature is 18°C?
- (1) 13 % (2) 33 % (3) 45 % (4) 51 %
- 7 What is the relative humidity if the dry-bulb temperature is 16°C and the wet-bulb temperature is 10°C?
- (1) 45% (2) 33% (3) 14% (4) 4%

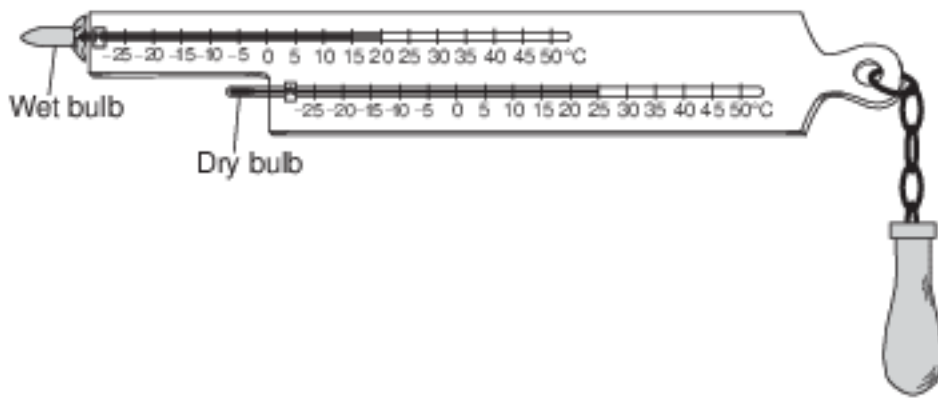
8 The diagram below represents a sling psychrometer.



Based on the wet-bulb temperature and the dry-bulb temperature, what is the approximate relative humidity?

- (1) 6%
- (2) 8%
- (3) 30%
- (4) 60%

9 The diagram below represents the wet-bulb and dry-bulb temperatures on a sling psychrometer.



What was the relative humidity of the air when these temperatures were recorded?

- (1) 5%
- (2) 17%
- (3) 20%
- (4) 63%

10 The data table below shows the dry-bulb and wet-bulb temperatures measured with a psychrometer on four different days at the same location.

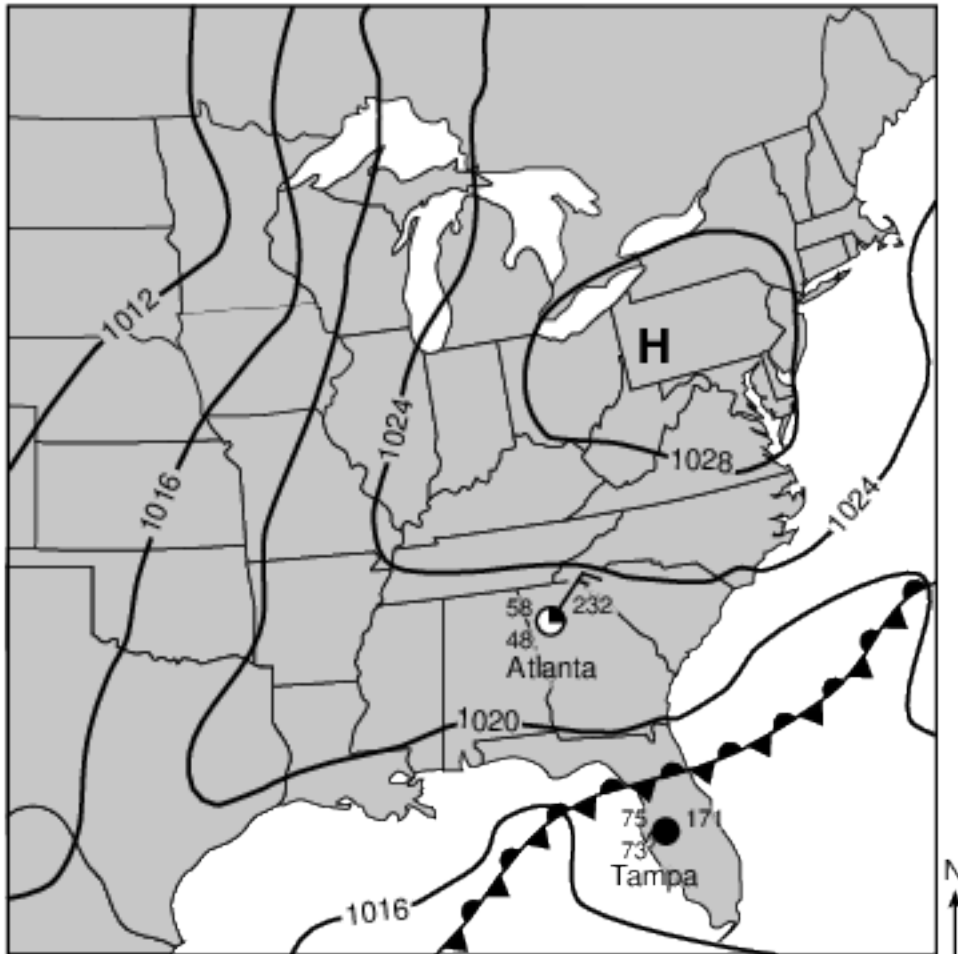
**Temperatures Measured with a Psychrometer**

Day	1	2	3	4
Dry-bulb temperature (°C)	0	5	10	15
Wet-bulb temperature (°C)	-5	0	5	10

According to the data shown in the table, which day had the highest relative humidity?

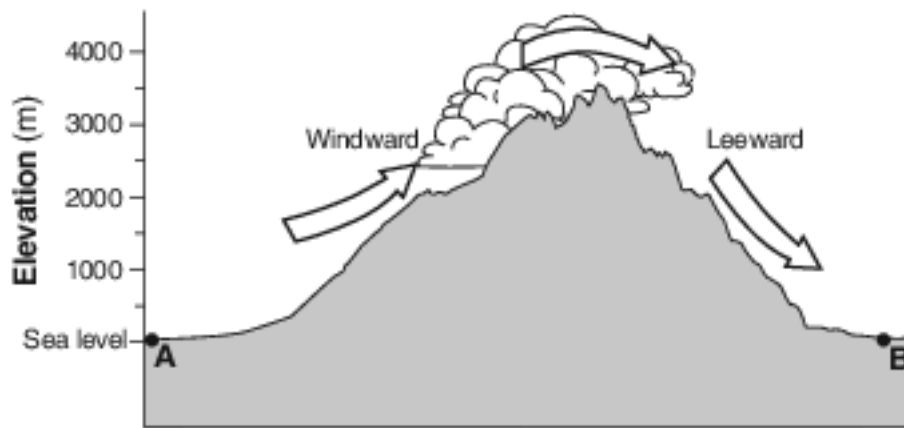
- (1) 1
- (2) 2
- (3) 3
- (4) 4

Base your answers to questions 11 on the weather map below and on your knowledge of Earth science. On the weather map, the location of the center of a high-pressure system (H) and a front are shown. Isobar values are labeled in millibars (mb). Weather station models represent the weather conditions at Atlanta, Georgia, and Tampa, Florida.



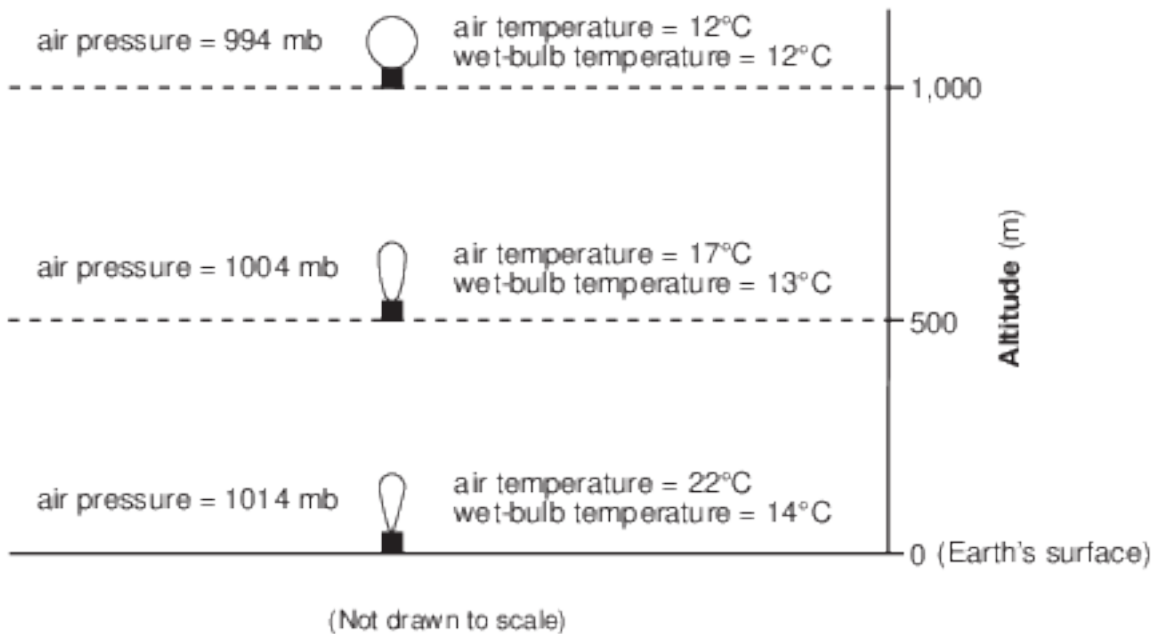
- 11 Describe one piece of evidence shown on the map that indicates that Tampa, Florida, has a high probability of precipitation. [1]

Base your answers to questions 12 on the diagram below, which shows the windward and leeward sides of a mountain range. Arrows show the movement of air over a mountain. Points A and B represent locations at sea level on Earth's surface.



- 12 What is the relative humidity at the base (bottom) of the cloud on the windward side of the mountain? [1]  
%

Base your answers to questions 13 on the diagram below and on your knowledge of Earth science. The diagram represents a weather balloon as it rises from Earth's surface to 1000 meters (m). The air temperature and wet-bulb temperature values in degrees Celsius ( $^{\circ}\text{C}$ ) and the air pressure values in millibars (mb) are given for three altitudes.



- 13 Determine the dewpoint and the relative humidity of the air at Earth's surface. [1]  
Dewpoint: \_\_\_\_\_ $^{\circ}\text{C}$   
Relative humidity: \_\_\_\_\_%

## Answer Keys

1 4

2 3

3 1

4 3

5 4

6 3

7 1

8 4

9 4

10 4

11 Allow 1 credit. Acceptable responses include, but are not limited to:

- — The dewpoint and air temperature are close together./high relative humidity
- — 100% cloud cover/overcast
- — Tampa is close to a front.
- — The air pressure is low.

12 Allow 1 credit for 100%.

13 Allow 1 credit if both dewpoint and relative humidity are correct.

- Dewpoint: 8°C
- Relative humidity: 40%