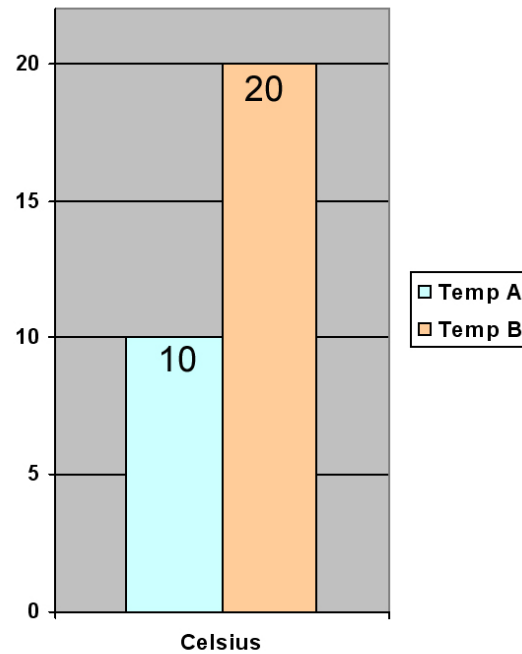
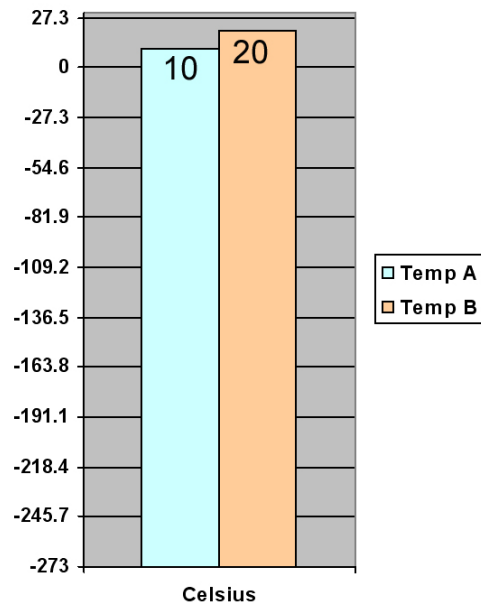


Ratio versus Interval Data

Imagine that you are vacationing in Canada, where, like in most of the world, they use the Celsius scale of temperature. When you get up in the morning you tune in the weather station and the forecaster says “The low this morning was 10 degrees, but the forecast high this afternoon is 20 degrees, twice as hot. Well, 20 to 10 surely does sound like a 2 to 1 ratio, as illustrated in the plot below:

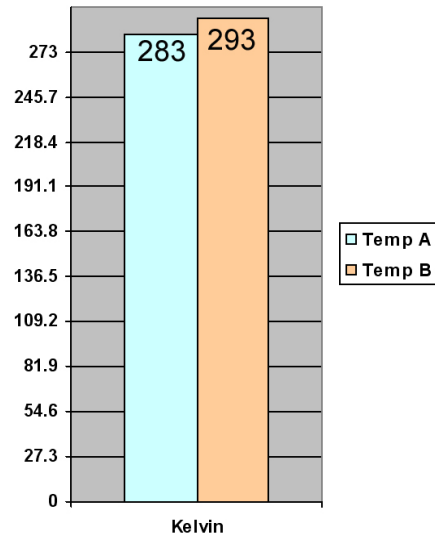


However, the 0 value here is not true, it does not represent the absence of molecular motion. The true (absolute) zero point on the Celsius scale is -273, as shown here:

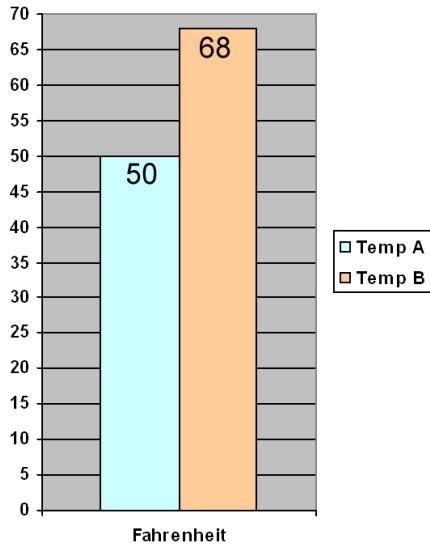


The first plot is basically what I have elsewhere called a “Gee Whiz” plot – a big chunk of the ordinate (vertical axis) was left out, creating the misperception of a much larger difference in the height of the two bars.

To find the ratio of the two temperatures, you need convert to a ratio scale, such as the Kelvin scale. In degrees Kelvin the two temperatures are 283 and 293, and the ratio is not 2 but rather $293/283 = 1.035$. As a chart,



For those of you more familiar with the Fahrenheit scale, [our two temperatures are 50 and 68](#). The Fahrenheit scale, like the Celsius scale, is interval, not ratio, as the zero is not true. The ratio of 68 to 50 is 1.36, also meaningless in this context



Degrees Fahrenheit is not a ratio scale. Accordingly, one cannot interpret ratios using degrees Fahrenheit. One would first need to [convert to a ratio scale](#), such as degrees Kelvin. 68 degrees Fahrenheit is 293.15 degrees Kelvin. 50 degrees Fahrenheit is 283.15, so the correct ratio is 293.15 divided by 283.15= 1.035. That is. 68 degrees Fahrenheit is only 1.035 times as hot as 50 degrees Fahrenheit.

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