Express Riddler

21 February 2020

Riddle:

On a warm, sunny day, Nick glanced at a thermometer, and noticed something quite interesting. When he toggled between the Fahrenheit and Celsius scales, the digits of the temperature—when rounded to the nearest degree—had switched. For example, this works for a temperature of 61 degrees Fahrenheit, which corresponds to a temperature of 16 degrees Celsius.

However, the temperature that day was not 61 degrees Fahrenheit. What was the temperature?

Solution:

The easiest way to solve this is to plug in several Fahrenheit temperatures into a spreadsheet, calculate the Celsius values, and visually compare the results. I have done this in the file `Temperatures.xlsx`, where I have checked values between 50° and 100° Fahrenheit. The values I checked were in 0.4°increments, so that the resolution was more than twice that of whole-number increments, to be wary of any intermediate rounding issues. The value of 0.4 is otherwise just arbitrary.

Looking at the file, it is clear there are two solutions: 61° F/16° C and 82° F/28° C. Since 61/16 was already ruled out, the solution is 82° F/28° C.

Out of curiosity, I wanted to check what actual range of temperatures to which this solution corresponds. The limits for 82° F are 81.5–82.5, which correspond to 27.5–28.056° C. The limits for 28° C are 27.5–28.5, which correspond to 81.5–83.3° F. Of course, the more stringent limits give the answer, which means the more precise temperature the thermometer recorded were in the range 81.5–82.499° F/27.5–28.056° C.