Problem of the Week
Problem B and Solution
Temperature Conversions

Problem

Two common units to measure temperature are degrees Celsius and degrees Fahrenheit. From time to time, we need to convert temperatures from degrees Celsius to degrees Fahrenheit.

(a) The exact conversion from degrees Celsius to degrees Fahrenheit is as follows:

Step 1: Take the temperature in degrees Celsius and multiply by 1.8.

Step 2: Take the result from Step 1 and add 32.

Using this exact conversion, convert the following temperatures in degrees Celsius to degrees Fahrenheit. The first has been done for you.

Temperature in degrees Celsius	Temperature in degrees Fahrenheit
100	212
30	
20	
10	
0	

(b) Sometimes when we want to convert between degrees Celsius and degrees Fahrenheit, we don't have a pencil and paper or calculator nearby. In that case, using an approximation and mental math can be helpful. One way to approximate the conversion from degrees Celsius to degrees Fahrenheit is as follows:

Step 1: Take the temperature in degrees Celsius and multiply by 2.

Step 2: Take the result from Step 1 and add 30.

Using this approximate conversion, convert the following temperatures in degrees Celsius to degrees Fahrenheit. The first has been done for you.

Temperature in degrees Celsius	Approximate temperature in degrees Fahrenheit
100	230
30	
20	
10	
0	

(c) Did any of the approximate conversions in part (b) give the same temperature as the exact conversion in part (a)?

EXTENSION:

If you let C represent the temperature in degrees Celsius and F represent the temperature in degrees Fahrenheit, can you write formulas for the conversions in parts (a) and (b)?

Solution

(a) The completed table is below.

Temperature in degrees Celsius	Temperature in degrees Fahrenheit
100	212
30	86
20	68
10	50
0	32

(b) The completed table is below.

Temperature in degrees Celsius	Approximate temperature in degrees Fahrenheit
100	230
30	90
20	70
10	50
0	30

(c) The conversion of 10°C to 50°F gave the same temperature when using both the approximate and exact conversions.

EXTENSION:
In part (a), we have $F = 1.8 \times C + 32$.
In part (b), we have $F = 2 \times C + 30$.