

Exercise 95

Convert the temperature of the coldest area in a freezer, $-10\text{ }^{\circ}\text{F}$, to degrees Celsius and kelvin.

Solution

Begin with the formula relating Fahrenheit and Celsius temperature.

$$^{\circ}\text{F} = \frac{9}{5}(^{\circ}\text{C}) + 32.0$$

$$^{\circ}\text{F} - 32.0 = \frac{9}{5}(^{\circ}\text{C})$$

$$\frac{5}{9}(^{\circ}\text{F} - 32.0) = ^{\circ}\text{C}$$

Consequently, the Celsius temperature is

$$\begin{aligned}^{\circ}\text{C} &= \frac{5}{9}(^{\circ}\text{F} - 32.0) \\ &= \frac{5}{9}(-10 - 32.0) \\ &= \frac{5}{9}(-42) \\ &\approx -23 \quad (\text{rounded to two significant figures}),\end{aligned}$$

and the Kelvin temperature is

$$\begin{aligned}\text{K} &= ^{\circ}\text{C} + 273.15 \\ &= \frac{5}{9}(-42) + 273.15 \\ &\approx -23 + 273.15 \\ &\approx 250 \quad (\text{rounded to the ones place}).\end{aligned}$$