**1.47**   The normal temperature of the human body is 98.6°F ± 1°F. Determine the normal temperature range, in °C, for the human body.

**KNOWN:** The normal temperature range of the human body is given in °F.

**FIND:** Determine the normal temperature range of the human body in °C.

**SCHEMATIC AND GIVEN DATA:**



$T = 98.6°F ± 1°F$
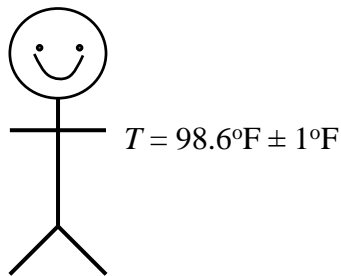
**ANALYSIS:**
Convert body temperature from °F to °R by rearranging Eq. 1.18

$$T(°F) = T(°R) - 459.67 \qquad \rightarrow \qquad T(°R) = T(°F) + 459.67$$

$$T(°R) = 98.6\,°F + 459.67 = 558.27°R$$

Since temperature differences on the Fahrenheit scale and the Rankine scale are identical, the body temperature range in °R is

$$T(°R) = 558.27°R ± 1°R$$

Next rearrange Eq. 1.16 to solve for body temperature and its range in K

$$T(°R) = 1.8T(K) \qquad \rightarrow \qquad T(K) = T(°R)/1.8$$

$$T(K) = 558.27°R/1.8 = 310.15\ K \qquad \text{and} \qquad T(K) = 1°R/1.8 = 0.56\ K$$

Convert body temperature from K to °C by using Eq. 1.17.

$$T(°C) = T(K) - 273.15$$

$$T(°C) = 310.15\ K - 273.15 = 37°C$$

Since temperature differences on the Celsius scale and the Kelvin scale are identical, the body temperature range in °C is

$$\underline{\mathbf{T(°C) = 37°C ± 0.56°C}}$$