**1.42** The 30-year average temperature in Toronto, Canada, during summer is 19.5°C and during winter is –4.9°C. What are the equivalent average summer and winter temperatures in °F and °R?

**KNOWN:** Average summer and winter temperatures in Toronto, Canada.

**FIND:** Determine average summer and winter temperatures in °F and °R.

**SCHEMATIC AND GIVEN DATA:**

$T_{summer} = 19.5°C$
$T_{winter} = -4.9°C$

**ANALYSIS:**
First convert temperatures from °C to K by rearranging Eq. 1.17 to solve for temperature in K

$$T(°C) = T(K) - 273.15 \quad \rightarrow \quad T(K) = T(°C) + 273.15$$

For summer: $T_{summer}(K) = 19.5°C + 273.15 = 292.65 \text{ K}$

For winter: $T_{winter}(K) = -4.9°C + 273.15 = 268.25 \text{ K}$

Next apply Eq. 1.16 to solve for temperatures in °R

$$T(°R) = 1.8T(K)$$

For summer: $T_{summer}(°R) = (1.8)(292.65 \text{ K}) = \underline{\textbf{526.77 °R}}$

For winter: $T_{winter}(°R) = (1.8)(268.25 \text{ K}) = \underline{\textbf{482.85°R}}$

Finally, apply Eq. 1.18 to solve for temperatures in °F

$$T(°F) = T(°R) - 459.67$$

For summer: $T_{summer}(°F) = 526.77 °R - 459.67 = \underline{\textbf{67.10 °F}}$

For winter: $T_{winter}(°F) = 482.85°R - 459.67 = \underline{\textbf{23.18 °F}}$