7.30. **Model:** The two blocks form a system of interacting objects.

**Visualize:** Please refer to Figure P7.30.

**Solve:** It is possible that the left-hand block (Block L) is accelerating down the slope faster than the right-hand block (Block R), causing the string to be slack (zero tension). If that were the case, we would get a zero or negative answer for the tension in the string.

Newton’s first law applied to the $y$-direction on Block L yields

$$\sum F_y = 0 = n_L - (F_G)_L \cos 20^\circ \Rightarrow n_L = m_L g \cos 20^\circ$$

Therefore

$$f_k = (\mu_k)_L m_L g \cos 20^\circ = (0.20)(1.0 \text{ kg})(9.80 \text{ m/s}^2)\cos 20^\circ = 1.84 \text{ N}$$

A similar analysis of the vertical forces on Block R gives $(f_k)_R = 1.84 \text{ N}$ as well. Using Newton’s second law in the $x$-direction for Block L,

$$\sum F_x = m_L a = T_{\text{on L}} - (F_G)_L \sin 20^\circ \Rightarrow m_L a = T_{\text{on L}} - 1.84 \text{ N} + m_L g \sin 20^\circ.$$  

For Block R,

$$\sum F_x = m_R a = (F_G)_R \sin 20^\circ - 1.84 \text{ N} - T_{\text{on R}} \Rightarrow m_R a = m_R g \sin 20^\circ - 1.84 \text{ N} - T_{\text{on R}}.$$  

These are two equations in the two unknowns $a$ and $T_{\text{on R}} = T_{\text{on L}} = T$. Solving them, we obtain $a = 2.12 \text{ m/s}^2$ and $T = 0.61 \text{ N}$.

**Assess:** The tension in the string is positive, and is about $1/3$ of the kinetic friction force on each of the blocks, which is reasonable.