7.10. **Model:** The blocks are to be modeled as particles and denoted as 1, 2, and 3. The surface is frictionless and along with the earth it is a part of the environment. The three blocks are our three systems of interest.

**Visualize:**

The force applied on block 1 is \( F_{A,1} = 12 \text{ N} \). The acceleration for all the blocks is the same and is denoted by \( a \).

**Solve:**

(a) Newton’s second law for the three blocks along the \( x \)-direction is

\[
\sum (F_{on})_x = F_{A,1} - F_{2,1} = m_1a \]
\[
\sum (F_{on})_x = F_{1,2} - F_{3,2} = m_2a \]
\[
\sum (F_{on})_x = F_{2,3} = m_3a
\]

Adding these equations and using Newton’s third law \((F_{2,1} = F_{1,2} \text{ and } F_{3,2} = F_{2,3})\), we get

\[
F_{A,1} = (m_1 + m_2 + m_3)a = (1 \text{ kg} + 2 \text{ kg} + 3 \text{ kg})a = 6 \text{ m/s}^2
\]

Using this value of \( a \), the force equation on block 3 gives

\[
F_{2,3} = m_3a = (3 \text{ kg})(2 \text{ m/s}^2) = 6 \text{ N}
\]

(b) Substituting into the force equation on block 1,

\[
12 \text{ N} - F_{2,1} = (1 \text{ kg})(2 \text{ m/s}^2) \Rightarrow F_{2,1} = 10 \text{ N}
\]

**Assess:** Because all three blocks are pushed forward by a force of 12 N, the value of 10 N for the force that the 2 kg block exerts on the 1 kg block is reasonable.