35. (a) Let m_1 be the mass of the block on the left, v_{1i} be its initial velocity, and v_{1f} be its final velocity. Let m_2 be the mass of the block on the right, v_{2i} be its initial velocity, and v_{2f} be its final velocity. The momentum of the two-block system is conserved, so $m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$ and

$$v_{1f} = \frac{m_1 v_{1i} + m_2 v_{2i} - m_2 v_{2f}}{m_1} = \frac{(1.6)(5.5) + (2.4)(2.5) - (2.4)(4.9)}{1.6}$$

which yields $v_{1f} = 1.9$ m/s. The block continues going to the right after the collision.

(b) To see if the collision is elastic, we compare the total kinetic energy before the collision with the total kinetic energy after the collision. The total kinetic energy before is

$$K_i = \frac{1}{2} m_1 v_{1i}^2 + \frac{1}{2} m_2 v_{2i}^2 = \frac{1}{2}(1.6)(5.5)^2 + \frac{1}{2}(2.4)(2.5)^2 = 31.7 \text{ J} .$$

The total kinetic energy after is

$$K_f = \frac{1}{2} m_1 v_{1f}^2 + \frac{1}{2} m_2 v_{2f}^2 = \frac{1}{2}(1.6)(1.9)^2 + \frac{1}{2}(2.4)(4.9)^2 = 31.7 \text{ J} .$$

Since $K_i = K_f$ the collision is found to be elastic.

(c) Now $v_{2i} = -2.5\,\text{m/s}$ and

$$v_{1f} = \frac{m_1 v_{1i} + m_2 v_{2i} - m_2 v_{2f}}{m_1} = \frac{(1.6)(5.5) + (2.4)(-2.5) - (2.4)(4.9)}{1.6}$$

which yields $v_{1f} = -5.6$ m/s. Thus, the velocity is opposite to the direction shown in Fig. 10-37.