

So, use conservation of momentum to figure out the boot's speed:

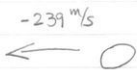
$$(Al + \text{boot}) \overset{\text{before}}{(-0.07 \text{ m/s})} = \overset{\text{after}}{(Al)(2.96 \frac{\text{m}}{\text{s}})} + (\text{boot}) V_B$$

$$(m_A + m_B)(-0.07 \text{ m/s}) = m_A(2.96 \frac{\text{m}}{\text{s}}) + m_B V_B$$

$$\rightarrow V_B = \frac{(m_A + m_B)(-0.07 \frac{\text{m}}{\text{s}}) - m_A(2.96 \text{ m/s})}{m_B}$$

$$= \frac{(80 \text{ kg})(-0.07 \frac{\text{m}}{\text{s}}) - (79 \text{ kg})(2.96 \text{ m/s})}{1 \text{ kg}}$$

$$= -239 \text{ m/s}$$



The relative speed of the boot and Al is

$$\boxed{\approx 242 \text{ m/s}}$$

which is how fast Al must have thrown the boot away from his hand.

Wow!