

### Answer on Question #73307 - Physics / Other

A  $m_1 = 1.75$  kg cannon is mounted on top of a  $m_2 = 2.5$  kg stationary cart and is loaded with a  $m_3 = 48.0$  g ball. The cannon is ignited and it launches the ball forward with a speed of  $v = 80$  m/s. Determine the post-explosion velocity of the cannon and cart.

#### Solution:

Let  $u$  is the post-explosion velocity of the cannon and cart.

The momentum conservation law gives

$$(m_1 + m_2)u + m_3v = 0$$

Thus

$$u = -\frac{m_3}{m_1 + m_2}v$$

$$u = -\frac{0.048}{1.75 + 2.5} \times 80 = -0.9 \frac{\text{m}}{\text{s}}$$

**Answer:**  $0.9 \frac{\text{m}}{\text{s}}$  backward

Answer provided by <https://www.AssignmentExpert.com>