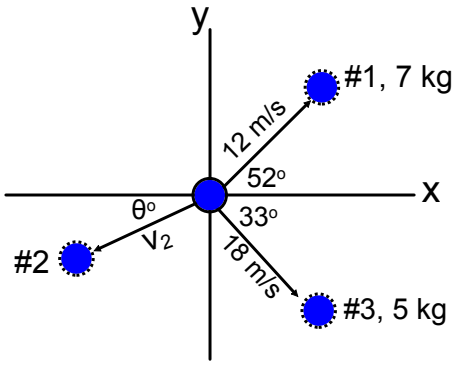
A 15 kg object explodes in to three pieces numbered 1, 2, and 3. The velocities of piece 1 and 3 are labeled below. Calculate the velocity of piece 2. Diagram is not to scale.



Before

$\vec{P}_{oT} = 0 \text{ kg}\cdot\text{m/s}$

$m_2 = 15 - 7 - 5$

$m_2 = 3 \text{ kg}$

After

$v_{1fx} = 12\cos 52 = 7.39 \text{ m/s}$

$v_{1fy} = 12\sin 52 = 9.46 \text{ m/s}$

$v_{3fx} = 18\cos 33 = 15.1 \text{ m/s}$

$v_{3fy} = -18\sin 33 = -9.80 \text{ m/s}$

$v_{2f} = ?$

$v_{2fx} = ?$

$v_{2fy} = ?$

x-dir

$0 = m_1 v_{1fx} + m_2 v_{2fx} + m_3 v_{3fx}$

$0 = (7)(7.39) + 3v_{2fx} + (5)(15.1)$

$0 = 51.73 + 3v_{2fx} + 75.5$

$-127.23 = 3v_{2fx}$

$-42.41 \text{ m/s} = v_{2fx}$

y-dir

$0 = m_1 v_{1fy} + m_2 v_{2fy} + m_3 v_{3fy}$

$0 = (7)(9.46) + 3v_{2fy} + (5)(-9.8)$

$0 = 66.22 + 3v_{2fy} - 49$

$-17.22 = 3v_{2fy}$

$-5.72 \text{ m/s} = v_{2fy}$

Attachments

collision-lab_en.jar