

Answer on Question #51607 - Physics - Mechanics | Kinematics | Dynamics

A 1 kg stationary bomb is exploded in three parts having masses in the ratio 1:1:3 respectively. Parts having same mass move in perpendicular direction with velocity 30 m/s, then the velocity of bigger part will be?

Solution

$$m_s = 1 \text{ kg}; m_1:m_2:m_3 = 1:1:3; v_1 = v_2 = 30 \text{ m/s}.$$

$$m_1 = m_2 = m = 1/5 \text{ kg} = 0.2 \text{ kg}.$$

$$m_3 = 3m = 0.6 \text{ kg}.$$

The Law of conservation of momentum:

$$OX: 0 = m_1 v_1 - m_3 v_{x3}; m v_1 = 3 m v_{x3}; v_{x3} = v_1/3.$$

$$OY: 0 = m_2 v_2 - m_3 v_{y3}; m v_2 = 3 m v_{y3}; v_{y3} = v_2/3.$$

$$v_3 = \sqrt{v_{x3}^2 + v_{y3}^2} = \sqrt{10^2 + 10^2} \frac{m}{s} = \sqrt{200} \text{ m/s} \approx \mathbf{14.14 \text{ m/s}}.$$

Answer: $v_3 = 14.14 \text{ m/s}$