Answer on Question #46897-Physics-Other

A bomb of mass $m_0 = 1kg$ initially at rest, explodes and breaks into 3 fragments of masses in the ratio 1:1:3. The two pieces of equal mass fly off perpendicular to each other with speed $v = 15\frac{m}{s}$ each. The speed of heavier fragment is

(1)$5\frac{m}{s}$

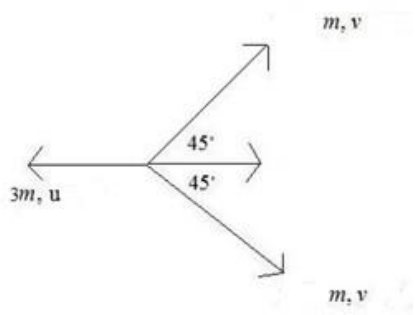
(2) $15\frac{m}{s}$

(3) $45\frac{m}{s}$

(4)$5\sqrt{2}\frac{m}{s}$

Solution

Initial mass $m_0 = 1kg$. The three masses into which it breaks is $m = \frac{1}{5}m_0$, $m = \frac{1}{5}m_0$, and $3m = \frac{3}{5}m_0$.



The initial moment of a bomb is zero. That's why vertical and horizontal components of final moment of a system are zero too. The horizontal components of final moment is

$$mv\cos 45 + mv\cos 45 - 3mu = 0 \to 2\frac{v\sqrt{2}}{2} = 3u \to u = \frac{v\sqrt{2}}{3} = \frac{15\sqrt{2}}{3} = 5\sqrt{2}\frac{m}{s}.$$

Answer: (4)$5\sqrt{2}\frac{m}{s}$.