

A grenade having mass of 10kg flying horizontally with velocity of 10 m/s into two fragments. The larger fragment has velocity of 25 m/s in the direction of the grenade .the smaller fragment has velocity of 12.5 m/s in the opposite direction. The masses of the fragments are?

The law of conservation of momentum:

$$Mv_0 = m_1v_1 + m_2v_2$$

Sum of mass of fragments equals:

$$M = m_1 + m_2$$

From second: $m_1 = M - m_2$, substitute to first:

$$Mv_0 = (M - m_2)v_1 + m_2v_2$$
$$m_2 = M \frac{v_0 - v_1}{v_2 - v_1} = 10 \frac{25 - 10}{25 - (-12.5)} kg = 4 kg$$

And

$$m_1 = M - m_2 = M - M \frac{v_0 - v_1}{v_2 - v_1} = M \frac{v_2 - v_0}{v_2 - v_1} = 10 \frac{-12.5 - 10}{-12.5 - 25} = 6 kg$$

Answer: 6 and 4 kg