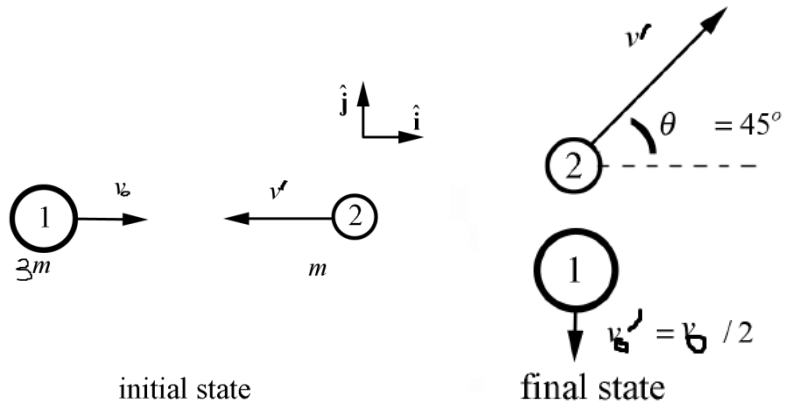
**Answer on Question #55879-Physics-Mechanics-Relativity**

particle 1 of mass 3 m initially moving with a speed $v_o$ in the positive x direction collides with particle 2 of mass m moving in opposite x direction with unknown speed v. After collision particle 1 moves along the negative y direction with speed $\frac{v_o}{2}$ and particle 2 moves with v' in a direction making angle of 45deg with positive x direction. Determine v and v'.

**Solution**




From the conservation of momentum on the x-axis:

$$3mv_0 - mv = mv' \cos 45 = \frac{\sqrt{2}}{2} mv'.$$

From the conservation of momentum on the y-axis:

$$0 = mv' \sin 45 - 3m\frac{v_0}{2} = mv'\frac{\sqrt{2}}{2} - 3m\frac{v_0}{2}.$$

So,

$$v' = 3\frac{\sqrt{2}}{2} v_o.$$

Substitute it in the first equation

$$3mv_0 - mv = \frac{\sqrt{2}}{2} m \cdot 3\frac{\sqrt{2}}{2} v_o = \frac{3}{2} mv_0.$$

Then,

$$v = \frac{3}{2} v_0.$$

**Answer:** $\boldsymbol{v = \frac{3}{2} v_0; v' = 3\frac{\sqrt{2}}{2} v_o}$.