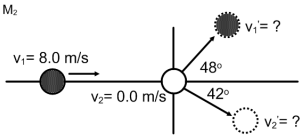
1) $M_1 = M_2$



Answers
v_1= 5.3 m/s
v_2= 6.0 m/s

Before

$v_{1ox} = 8$ m/s
$v_{1oy} = 0$ m/s
$v_{2ox} = 0$ m/s
$v_{2oy} = 0$ m/s

After

$v_{1fx} = v_{1f}\cos 48$
$v_{1fy} = v_{1f}\sin 48$
$v_{2fx} = v_{2f}\cos 42$
$v_{2fy} = -v_{2f}\sin 42$ (down)

x-dir consv. of momentum

$m_1 v_{1ox} + m_2 v_{2ox} = m_1 v_{1fx} + m_2 v_{2fx}$

$m_1 = m_2$

$v_{1ox} + v_{2ox} = v_{1fx} + v_{2fx}$

$8 + 0 = v_{1fx} + v_{2fx}$ ← can't solve

y-dir

$m_1 = m_2$

$v_{1oy} + v_{2oy} = v_{1fy} + v_{2fy}$

$0 = v_{1fy} + v_{2fy}$ ← can't solve

From x-dir

$8 = v_{1f}\cos 48 + v_{2f}\cos 42$

From y-dir

$0 = v_{1f}\sin 48 + (-v_{2f}\sin 42)$

Solve these two equations:

$8 = 0.6691 v_{1f} + 0.7431 v_{2f}$

$0 = 0.7431 v_{1f} - 0.6691 v_{2f}$

$0.6691 v_{2f} = 0.7431 v_{1f}$

$0.9004 v_{2f} = v_{1f}$ Sub in x-dir equation

$\Rightarrow 8 = (0.6691)(0.9004 v_{2f}) + 0.7431 v_{2f}$

$8 = 0.6025 v_{2f} + 0.7431 v_{2f}$

$8 = 1.3456 v_{2f}$

$5.9 \text{ m/s} = v_{2f}$

Solve for v_{1f}

$0.9004 v_{2f} = v_{1f}$

$0.9004(5.9) = v_{1f}$

$5.3 \text{ m/s} = v_{1f}$

$5.9 \text{ m/s} = v_{2f}$

Attachments

collision-lab_en.jar