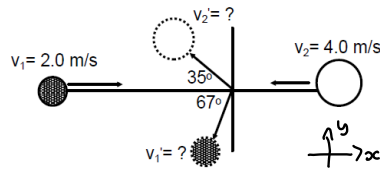


4) $M_1 = 2.0 \text{ kg}$; $M_2 = 5.0 \text{ kg}$



Answers
 ~~$v_1' = 4.0 \text{ m/s}$~~
 ~~$v_2' = 3.0 \text{ m/s}$~~
 $v_1' = 4.1 \text{ m/s}$
 $v_2' = 2.6 \text{ m/s}$

x-direction

<u>Before</u>	<u>After</u>
$v_{1x} = 2.0 \text{ m/s}$	$v_{1x}' = -v_1' \cos 67^\circ = -0.391 v_1'$
$v_{2x} = -4.0 \text{ m/s}$	$v_{2x}' = -v_2' \cos 35^\circ = -0.819 v_2'$
$m_1 = 2.0 \text{ kg}$	
$m_2 = 5.0 \text{ kg}$	

$$m_1 v_{1x} + m_2 v_{2x} = m_1 v_{1x}' + m_2 v_{2x}'$$

$$(2)(2) + (5)(-4) = (2)(-0.391 v_1') + (5)(-0.819 v_2')$$

$$4 - 20 = -0.782 v_1' - 4.095 v_2'$$

$$(-16 = -0.782 v_1' - 4.095 v_2') \times -1$$

$$16 = 0.782 v_1' + 4.095 v_2' \quad \textcircled{1}$$

y-dir

<u>Before</u>	<u>After</u>
$v_{1y} = 0 \text{ m/s}$	$v_{1y}' = -v_1' \sin 67^\circ = -0.921 v_1'$
$v_{2y} = 0 \text{ m/s}$	$v_{2y}' = v_2' \sin 35^\circ = 0.574 v_2'$

$$m_1 v_{1y} + m_2 v_{2y} = m_1 v_{1y}' + m_2 v_{2y}'$$

$$0 = (2)(-0.921 v_1') + (5)(0.574 v_2')$$

$$0 = -1.842 v_1' + 2.87 v_2' \quad \textcircled{2}$$

Solve Eq ② for v_2'

$$\frac{1.842 v_1'}{2.87} = \frac{2.87 v_2'}{2.87}$$

$$0.642 v_1' = v_2' \Rightarrow \text{Sub into } \textcircled{1}$$

$$\textcircled{1} \quad 16 = 0.782 v_1' + 4.905 v_2'$$

$$16 = 0.782 v_1' + 4.905(0.642 v_1')$$

$$16 = 0.782 v_1' + 3.148 v_1'$$

$$\frac{16}{3.93} = \frac{3.93 v_1'}{3.93}$$

$$4.1 \text{ m/s} = v_1' \Rightarrow 0.642 v_1' = v_2'$$

$$0.642(4.1) = v_2'$$

$$2.6 \text{ m/s} = v_2'$$

$$\begin{aligned} v_1' &= 4.1 \text{ m/s} \\ v_2' &= 2.6 \text{ m/s} \end{aligned}$$