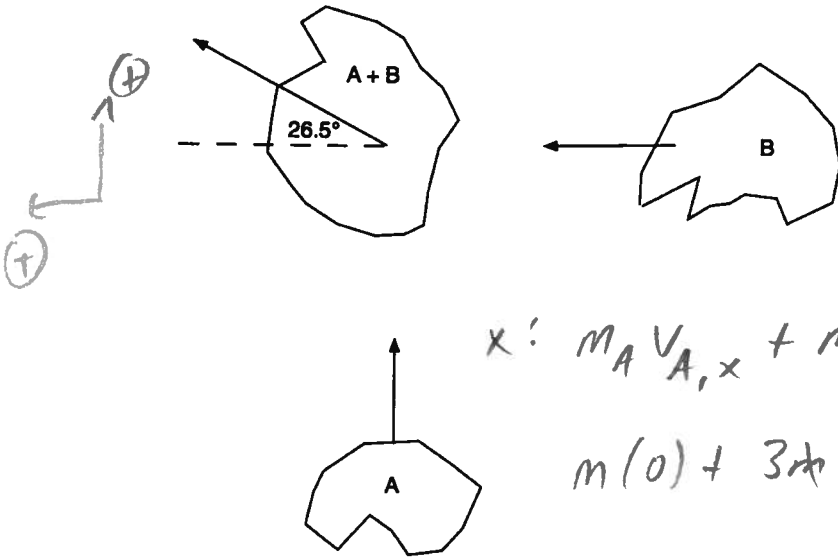


### Physics 10154 - Quiz 7D

Two alien spacecraft collide accidentally during a disastrous first-contact mission. They call in Earth investigators to reconstruct the collision and helpfully provide mks units for everything. The Ataran ship was moving at a rate of 31.0 m/s in the +y direction. The Burfian ship was moving at an unknown speed in the -x direction and is 3.00 times more massive than the Ataran ship.

After the collision, the two ships stuck together and moved off at an angle of  $26.5^\circ$  above the -x direction. What was the initial speed of the Burfian ship?



$$x: m_A v_{A,x} + m_B v_{B,x} = (m_A + m_B) v_{f,x}$$

$$m(0) + 3m v_B = (4m) v_f \cos 26.5^\circ$$

$$v_B = 1.33 v_f \cos 26.5^\circ$$

$$y: m_A v_{A,y} + m_B v_{B,y} = (m_A + m_B) v_{f,y}$$

$$m(31) + 3m(0) = 4m v_f \sin 26.5^\circ$$

$$31 = 4 v_f \sin 26.5^\circ$$

$$\Rightarrow v_f = 17.37 \text{ m/s}$$

$$\Rightarrow v_B = 20.7 \text{ m/s}$$