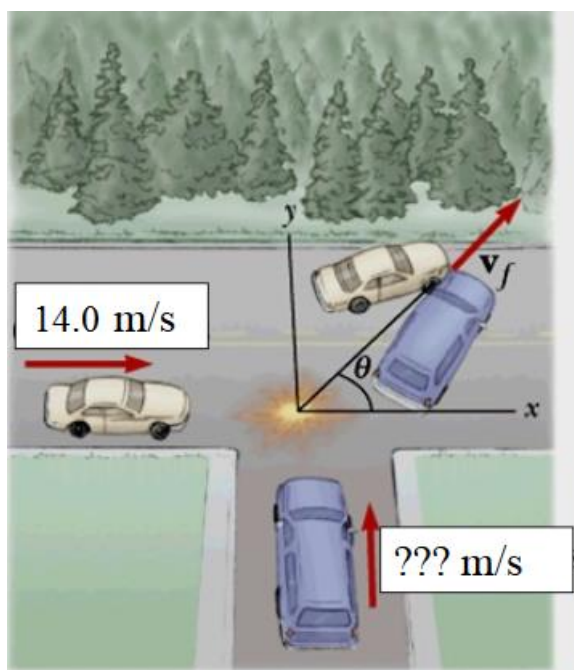


### Answer on Question #63211, Physics / Other

Two automobiles of equal mass approach an intersection. One vehicle is traveling with velocity 14.0 m/s toward the east and the other is traveling north with speed  $v_{2i}$ . Neither driver sees the other. The vehicles collide in the intersection and stick together, leaving parallel skid marks at an angle of  $57.5^\circ$  north of east. What was the initial speed of the northward-moving vehicle?

#### Solution:



Let the final speed be  $V_f$ .

By conservation of momentum:

northwards,

$$2mV_f \sin(57.5^\circ) = mv_{2i}$$

eastwards,

$$2mV_f \cos(57.5^\circ) = m \cdot 14.0;$$

thus, dividing the terms on either side of these two equations into one another, we find

$$\tan 57.5^\circ = \frac{v_{2i}}{14.0}$$

Thus,

$$v_{2i} = 14.0 \cdot \tan 57.5^\circ = 21.98 \text{ m/s} \approx 22.0 \text{ m/s}$$

**Answer:** 22.0 m/s