Answer on Question #72637 Physics / Mechanics | Relativity

At a crossing a truck travelling towards the north collides with a car travelling towards the east. After the collision the car and the truck stick together and move off at an angle of $\alpha = 30°$ east of north. If the speed of the car before the collision was $v = 20\ \text{ms}^{-1}$, and the mass of the truck is twice the mass of the car m, calculate the speed of the truck before and after the collision.

Solution:

Let us apply momentum conservation law

$$2mv_1 = 3mv\sin 30°$$

$$m \times 20 = 3mv\cos 30°$$

Thus

$$v_1 = 10\tan 30° = 5.77\frac{\text{m}}{\text{s}}$$

$$v = \frac{2}{3}\frac{v_1}{\sin 30°} = 7.7\ \frac{\text{m}}{\text{s}}$$

Answers: $7.7\ \frac{\text{m}}{\text{s}}$, $5.77\frac{\text{m}}{\text{s}}$.