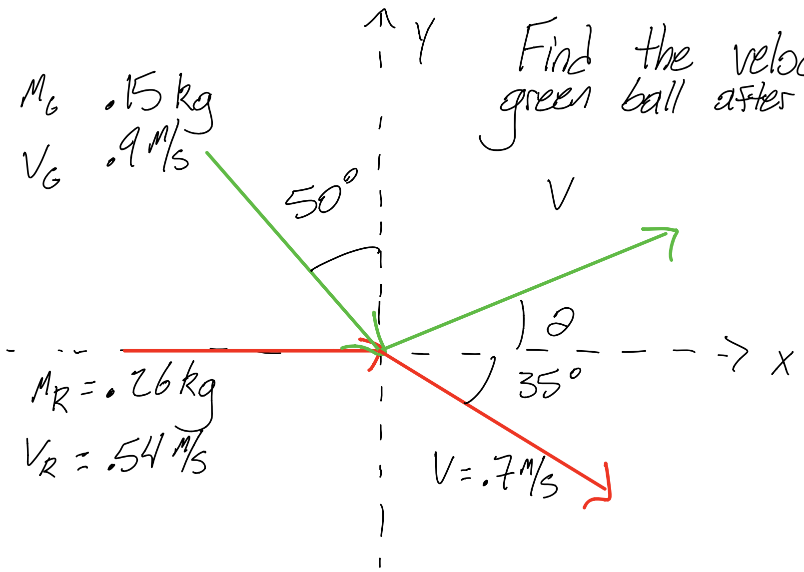
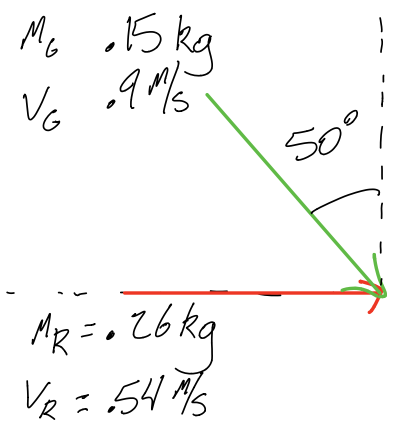
Find the velocity of the green ball after the collision

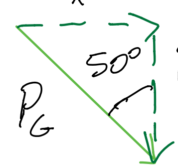


Momentum before collision

$P_G = (.15)(.9) = .135 \text{ kg}\frac{m}{s}$



$P_{Gx} = P_G \sin(50)$



$P_{Gy} = P_G \cos(50)$

$P_{Gx} = .103 \text{ kg}\frac{m}{s}$

$P_{Gy} = -.086 \text{ kg}\frac{m}{s}$

$P_R = P_{Rx} = (.26)(.54) = .1404 \text{ kg}\frac{m}{s}$

b/c the red ball only moves in the x-direction

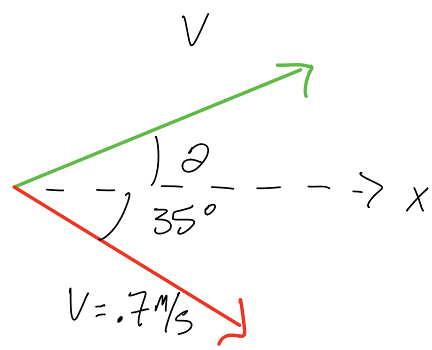
Now that I have broken the initial momenta into x + y components, I am ready to compute the total momentum.

$P_x = .103 + .1404 = .2434 \text{ kg}\frac{m}{s}$

$P_y = -.086 \text{ kg}\frac{m}{s}$

This is the total momentum of the system before and after the collision.

Momentum after collision



$$P_{G_x} = (.15)V\cos\theta$$

$$P_{G_y} = (.15)V\sin\theta$$

$$P_{R_x} = (.26)(.7)\cos(35) = .149\ kg\frac{m}{s}$$

$$P_{R_y} = -(.26)(.7)\sin(35) = -.104\ kg\frac{m}{s}$$

Now that I have broken the final momenta into x + y components, I am ready to compute the total momentum.

$$P_x = .149 + (.15)V\cos\theta$$

$$P_y = -.104 + (.15)V\sin\theta$$

Momentum is conserved therefore the total momentum of the system will not change

or

$$F_{net}\Delta t = 0 = \Delta p$$

or

$$\frac{dp}{dt} = 0, \quad dp = 0, \quad \int_{p_i}^{p_f} dp = 0, \quad p_f - p_i = 0, \quad p_f = p_i$$

or

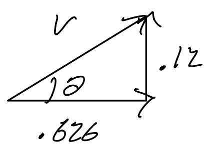
$$\lim_{\Delta t \to 0} \frac{p(t+\Delta t) - p(t)}{\Delta t + t} = 0 \quad \therefore \quad p(t) = p(t+\Delta t)$$

$P_x = .149 + (.15)v\cos\theta = .2434$

$.094 = (.15)v\cos\theta \quad , \quad v\cos\theta = \frac{.094}{.15} = .626\ \frac{m}{s}$

$P_y = -.104 + (.15)v\sin\theta = -.086$

$.018 = (.15)v\sin\theta \quad , \quad v\sin\theta = \frac{.018}{.15} = .12\ \frac{m}{s}$



$\tan\theta = \frac{.12}{.626}$

$\theta = \tan^{-1}\left(\frac{.12}{.626}\right) = 10.8^\circ$

$v = \sqrt{v^2\cos^2\theta + v^2\sin^2\theta} = \sqrt{(.626)^2 + (.12)^2} = .637\ m/s$