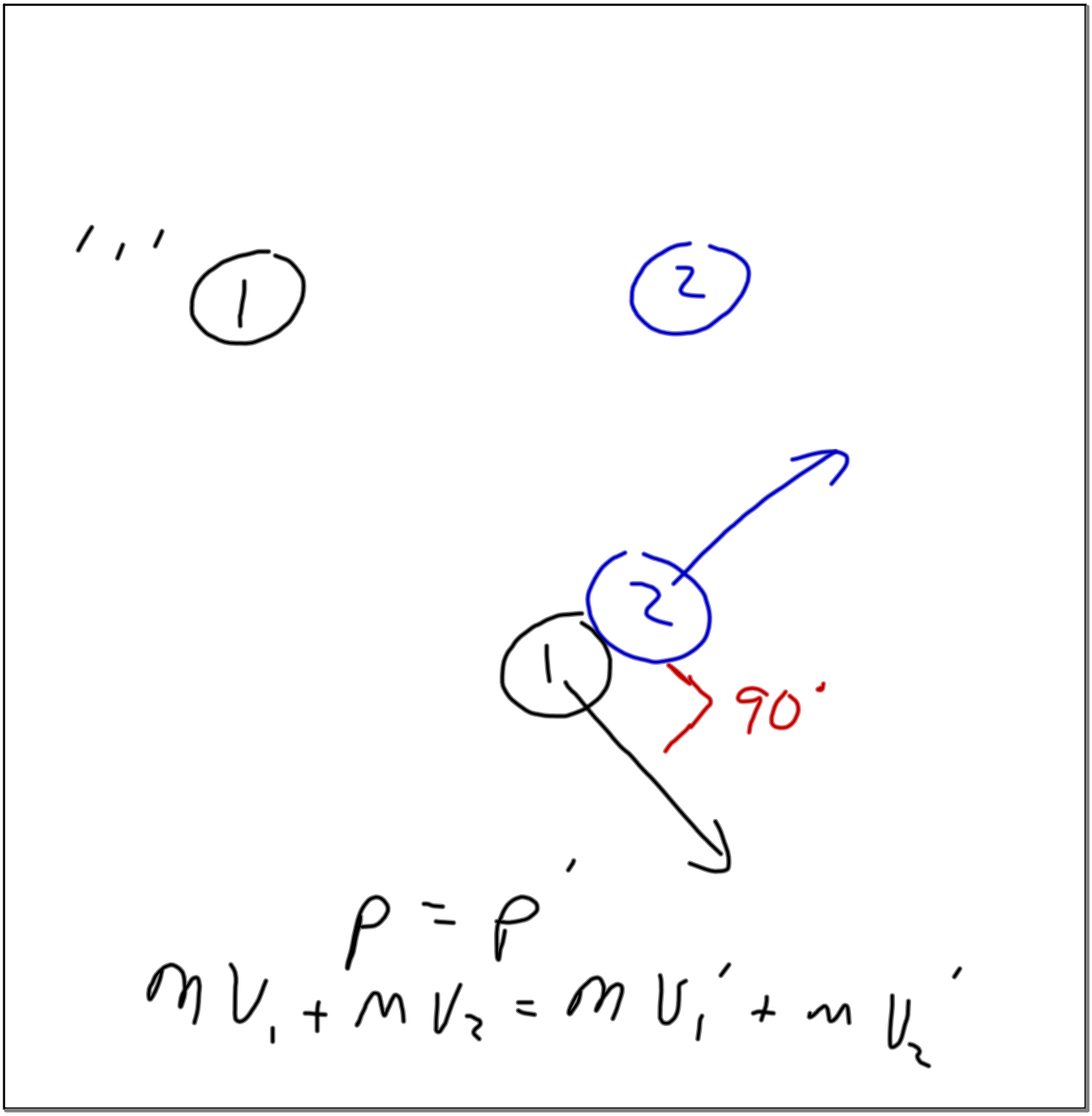


$$p = p'$$

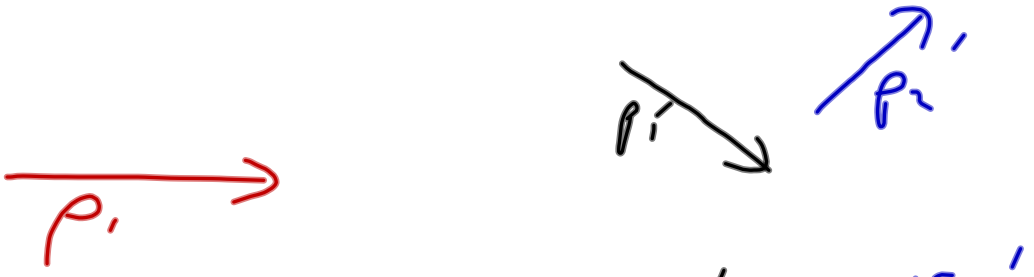
$$m v_1 + m v_2 = m v_1' + m v_2'$$

$$p = mv$$

$$mv_1 + mv_2 = mv_1' + mv_2'$$

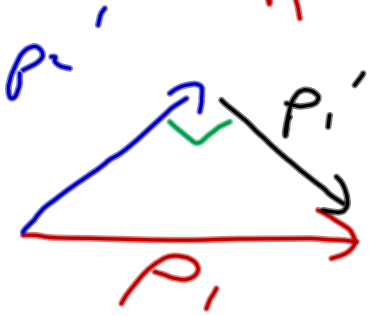
$$0$$

$$mv_1 = mv_1' + mv_2'$$



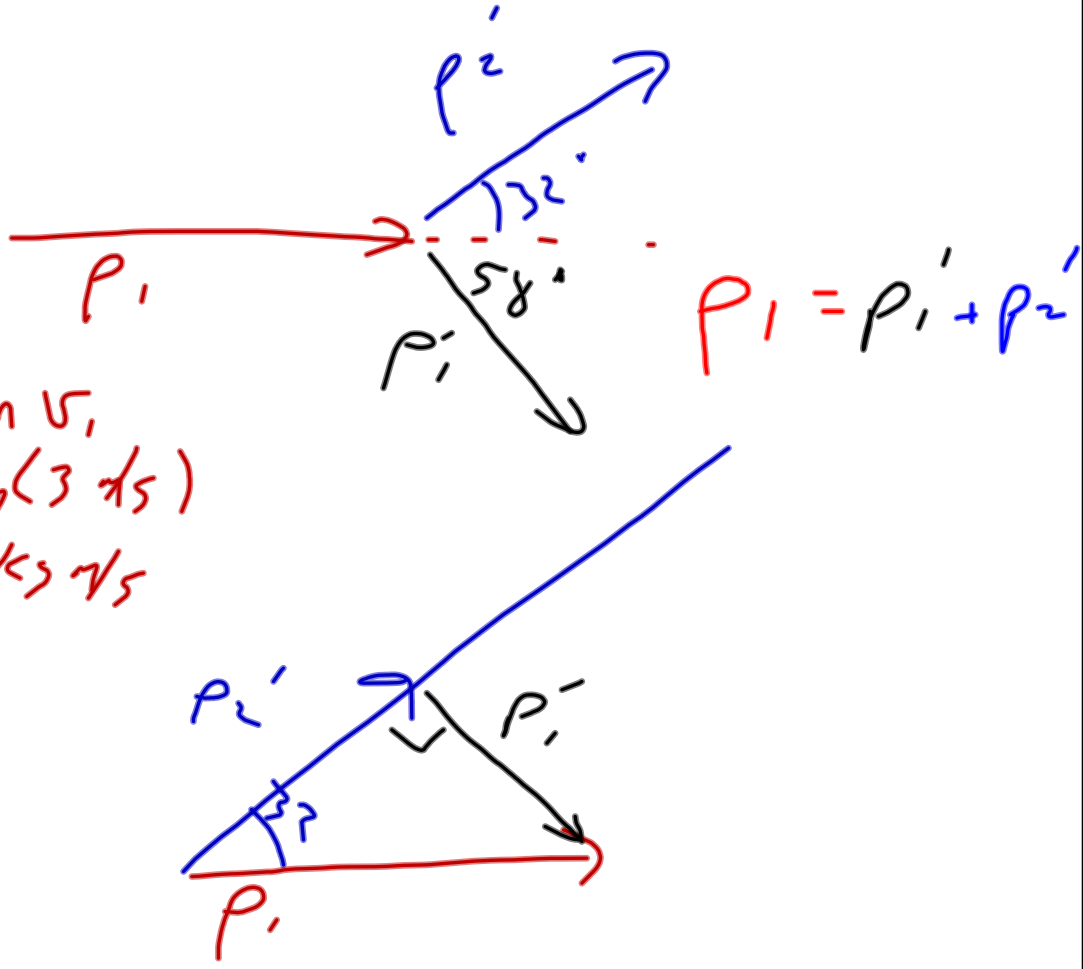
$$mv_1 = mv_1' + mv_2'$$

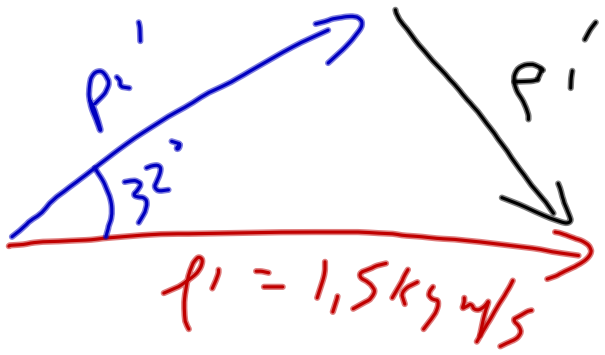
$$R = C_1 + C_2$$



ex 1

A 500 g cue ball traveling at 3.0 m/s strikes a 500 g stationary #2 ball. After the collision the #2 ball takes off at 32 degrees above its original position.





$$\cos 32 = \frac{p_2'}{1{,}5\ kg\ m/s}$$

$$p_2' = \cos 32\,(1{,}5\ kg\ m/s)$$

$$p_2' = 1{,}27\ kg\ m/s$$

$$p_2' = m v_2'$$

$$v_2' = \frac{p_2'}{m_2} = \frac{1{,}27\ kg\ m/s}{.5\ kg}$$

$$v_2' = 2{,}54\ m/s$$

$$\sin 32 = \frac{p_1'}{1{,}5\ kg\ m/s}$$

$$p_1' = \sin 32\,(1{,}5\ kg\ m/s)$$

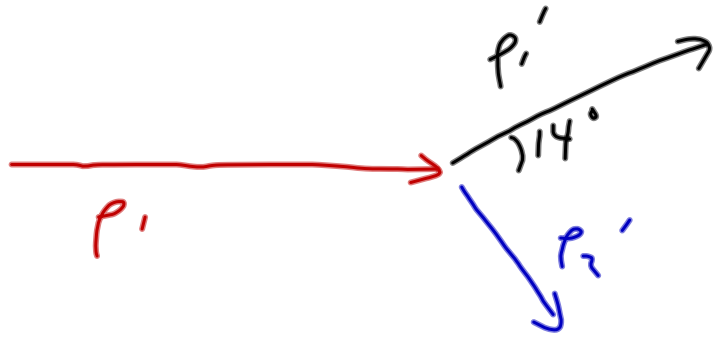
$$p_1' = .79\ kg\ m/s$$

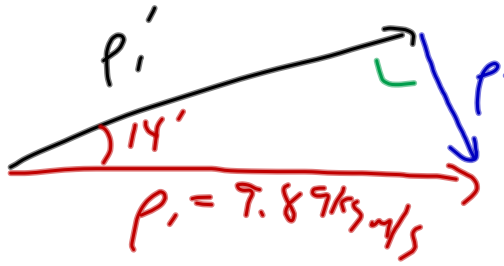
$$p_1' = m v_1'$$

$$v_1' = \frac{p_1'}{m} = \frac{.79\ kg\ m/s}{.5\ kg}$$

$$v_1' = 1{,}58\ m/s$$

A 2.3 kg ball traveling at 4.3 m/s strikes a stationary ball of 2.9 kg. What are the respective velocities of each ball if the 1st ball takes off at a 14 degree angle after they strike?





$p_1 = mv_1$

$p_1 = 2.3\,kg\,(4.3\,m/s)$

$p_1 = 9.89\,kg\,m/s$

$p_1' = \cos 14\,(9.89\,kg\,m/s)$

$p_1' = 9.60\,kg\,m/s$

$v_1' = \frac{p_1'}{m} = \frac{9.60\,kg\,m/s}{2.3\,kg} = 4.2\,m/s$

$p_2' = \sin 14\,(9.89\,kg\,m/s)$

$p_2' = 2.39\,kg\,m/s$

$v_2' = \frac{p_2'}{m_2} = \frac{2.39\,kg\,m/s}{2.9\,kg}$

$v_2' = .83\,m/s$

What force is applied to a 6.2 kg head traveling at 78 km/hr if it stops in 0.083 s?

m = 6.2 kg
v = 78 km/hr
22 m/s
t = 0.083 s
F = ?
a = ?
d = ?

$a = \frac{F}{m} = \frac{-1600\,N}{6.2\,kg}$

$a = -260\ m/s^2$

$a = \frac{\Delta v}{t} = \frac{0 - 22\ m/s}{.083\ s}$

$a = -260\ m/s^2$

Ft = mv

F = mv/t = 6.2 kg(22 m/s)/0.083 s

Fv = 1600 N

$d = \bar{v}t$

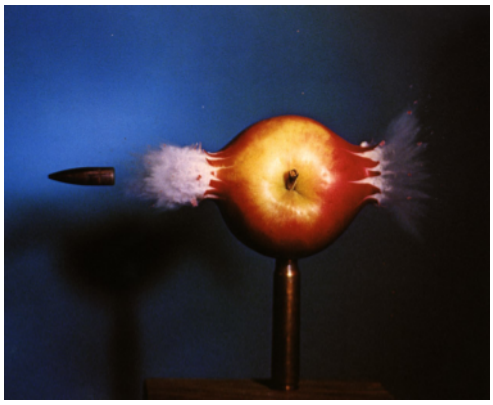
$d = 11\ m/s\,(.083) = .91\ m$

$d = \frac{1}{2}at^2 = \frac{1}{2}(260\ m/s^2)(.083\ s)^2 = .90\ m$

$d = \frac{v_2^2 - v_1^2}{2a} = \frac{0 - (22\ m/s)^2}{2(-260\ m/s^2)} = .93\ m$

What impulse does an apple give a 45 g bullet traveling at 424 m/s if it slows it to 380 m/s as hits and exits the unfortunate apple?

m = 45 g
v1 = 424 m/s
v2 = 380 m/s
Ft = ?
dia. of apple is 11.0 cm
F = ?



$Ft = \Delta mv$

$Ft = .045kg(380\,m/s - 424\,m/s)$

$Ft = 1.98\,kg\,m/s$

$d = \bar{v}t$

$t = \frac{d}{\bar{v}} = \frac{.11\,m}{\left(\frac{424\,m/s + 380\,m/s}{2}\right)}$

$t = .00027_2$

$Ft = mv$

$F = mv/t = \frac{1.98\,kg\,m/s}{.00027_2\,m/s}$

$F = 7300N$

Jan 31 - 12:44 PM