

Momentum Before Collision

$$P_{ci} = m \cdot v_{ci}$$

$$P_{di} = 0 \rightarrow \text{Stationary}$$

After the collision  
Both Balls move & have momentum  
(Ignore outside forces: friction)  
 $\therefore$  System is closed & isolated  
Law of Conservation of momentum

$$P_{ci} = P_{cf} + P_{df}$$

$v_{cf} = 3 \text{ m/s} \sin 40$   
 $1.93 \text{ m/s Right}$

$v_{df} = 3 \text{ m/s} \cos 40$   
 $2.3 \text{ m/s Left}$

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1,325 kg C moving north at 27 m/s  
Collides w/ D 2,165 kg moving  
East at 11 m/s

$m_c = 1,325 \text{ kg}$     $m_d = 2,165 \text{ kg}$   
 $v_{ci} = 27 \text{ m/s}$     $v_{di} = 11 \text{ m/s}$

$P_{ci} = (1,325)(27) = 3.58 \times 10^4 \text{ kgm/s North}$   
 $P_{di} = (2,165)(11) = 2.38 \times 10^4 \text{ kgm/s South west}$

$P_f = \sqrt{(3.58 \times 10^4)^2 + (2.38 \times 10^4)^2}$     $P_f = m \cdot v_f$   
 $\frac{4.3 \times 10^4 \text{ kgm/s}}{(1,325 + 2,165)}$   
 $\tan^{-1} = \frac{3.58 \times 10^4}{2.38 \times 10^4}$   
 $56.40^\circ$

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Car C 975 Kg moving south at 22.5 m/s  
 collides w/a truck D 2,165 Kg  
 moving west at 17.5 m/s

what direction + speed

$$43,780.3 = \sqrt{(975 \cdot (-22))^2 + (2165 \cdot (-17.5))^2}$$

$$\frac{43,780.3}{(975 + 2165)}$$

$$V_f = 13.9 \text{ m/s}$$

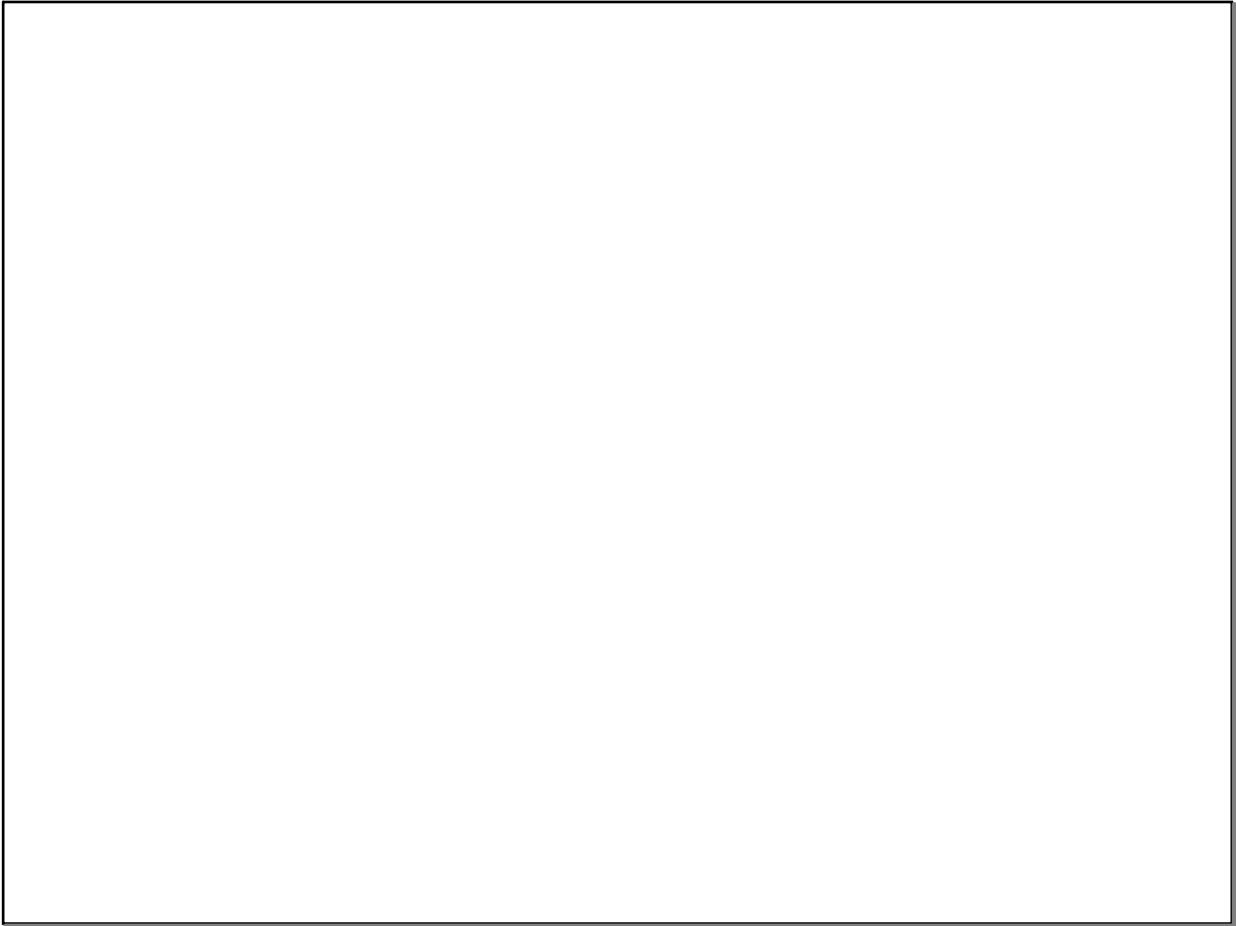
$$\tan^{-1} \left( \frac{(-22.5)(975)}{-17.5(2165)} \right) = 59.9^\circ$$

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Pg. 243

22 - (24)

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