DATA ANALYSIS

Mass Measurements:

	M (kg)	u_M (kg)	u_M/M
Mass 1			
Mass 2			

Speed Before collision:

	v (m/s)	u_v (m/s)	u_v/v
Mass 1			
Mass 2			

Angle Before Collision:

	θ (deg)	u_θ (rad)
Mass 1		
Mass 2		

Speed After Collision:

	v (m/s)	u_v (m/s)
Mass 1		
Mass 2		

Angles After Collision:

	θ (deg)	u_θ (rad)
Mass 1		
Mass 2		

Sample Calculation: (**Mass 1** before collision)

$$u_\theta = \frac{\pi}{180} u_\theta \text{ (deg)} = \_\_\_\_\_$$

Components of Momentum Before Collision:

	P_x (kg m/s)	u_{Px} (kg m/s)	P_y (kg m/s)	u_{Py} (kg m/s)
Mass 1				
Mass 2				
System				

Components of Momentum After Collision:

	P_x (kg m/s)	u_{Px} (kg m/s)	P_y (kg m/s)	u_{Py} (kg m/s)
Mass 1				
Mass 2				
System				

Sample Calculation: (P_x and u_{Px} of **Mass 1** before the collision)

$P_x = mv\cos\theta =$ _____

$u_{P_x} = \sqrt{(v\cos\theta \cdot u_m)^2 + (m\cos\theta \cdot u_v)^2 + (mv\sin\theta \cdot u_\theta)^2}$

= _____

Sample Calculation: (P_x and u_{Px} of the **System** before the collision)

$P_x = P_{x,mass1} + P_{x,mass2} =$ _____

$u_{\mathbf{P_x}} = \sqrt{u^2_{\mathbf{P_{x,mass1}}} + u^2_{\mathbf{P_{x,mass2}}}} =$ _____

Total Momentum of the System:

	P (kg m/s)	u_P (kg m/s)	θ (deg)	u_θ (deg)
BEFORE				
AFTER				

Sample Calculation: (Before the collision. Note: P_x and P_y below are $P_{x,system}$ and $P_{y,system}$)

$$P = \sqrt{P_x^2 + P_y^2} = \_\_\_\_\_$$

$$u_P = \sqrt{\left(\frac{P_x}{P}\right)^2 u_{P_x}^2 + \left(\frac{P_y}{P}\right)^2 u_{P_y}^2}$$

$$= \_\_\_\_\_$$

$$\theta = \tan^{-1}\left(P_y / P_x\right) = \_\_\_\_\_$$

$$u_{\left(P_y/P_x\right)} = \left(\frac{P_y}{P_x}\right)\sqrt{\left(\frac{u_{P_x}}{P_x}\right)^2 + \left(\frac{u_{P_y}}{P_y}\right)^2}$$

$$= \_\_\_\_\_$$

$$u_\theta = \left(1 + \left(\frac{\mathbf{P_Y}}{\mathbf{P_X}}\right)^2\right)^{-1} u_{\left(P_y/P_x\right)} \quad \text{(where } u_\theta \text{ is in radians)}$$

$$= \_\_\_\_\_$$

convert u_θ from rad to deg. : $u_\theta(\text{deg}) = \frac{180}{\pi} u_\theta(\text{rad}) = \_\_\_\_\_$

Kinetic Energy Before Collision:

	K(J)	u_K (J)
Mass 1		
Mass 2		
System		

Kinetic Energy After Collision:

	K(J)	u_K (J)
Mass 1		
Mass 2		
System		

Sample Calculation: (**Mass 1** Before Collision)

$$K = \frac{1}{2} M v^2 = \_\_\_\_\_$$

$$u_K = \sqrt{\left(\frac{v^2}{2}\right)^2 u_m^2 + (Mv)^2 u_v^2}$$

$$= \_\_\_\_\_$$

Sample Calculation: (**System** Before Collision)

$$K = K_{mass1} + K_{mass2} = \_\_\_\_\_$$

$$u_k = \sqrt{u_{K,mass1}^2 + u_{K,mass2}^2} = \_\_\_\_\_$$

where $u_{K,mass1} = K_{mass1} \sqrt{\left(\frac{u_{M,mass1}}{M_{mass1}}\right)^2 + \left(2\frac{u_{v,mass1}}{v_{mass1}}\right)^2}$ and similarly for K_{mass2}