

PhysiXplore Session 3 – Conservation of Momentum & Collision

Materials:

1. Atwood machine apparatus
2. Balance
3. Mass
4. Cart
5. Track
6. Motion sensor

Procedure:

1. Measure the mass of the cart by using the balance
2. Set up the Atwood machine by placing the carts on the track. Put the motion sensor at the end of the track
3. For elastic collision, the carts will be repelled (by magnets) when placed end to end
4. Push cart 1 to cart 2 and start the motion sensor as soon as you let it go (make the velocity of cart 2 be zero)
5. Record the initial and final velocity of both carts by using the velocity-time graph
6. Repeat step 3-4 for at least 3 times
7. For inelastic collision, the carts will stick together (by magnets) after colliding so make sure the magnets on the carts stick to each other when placed end to end.
8. Push cart 1 to cart 2 while starting start the motion sensor (make the velocity of cart 2 be zero)
9. Record the initial velocity for cart 1 (cart 2 is at rest), and the final velocity for both carts after the collision (they will stick together and share the same velocity)
10. Repeat step 8-9 for at least 3 times
11. Repeat step 3-10 but change the mass of the cart by adding additional mass on the cart (skip this if we do not have enough time)

Elastic collision data

Before Collision

Trial	Cart A		Cart B	
	Velocity Cart A (m/s)	Momentum (kg*m/s)	Velocity Cart B (m/s)	Momentum (kg*m/s)
1			0	
2			0	
3			0	
4			0	
5			0	

After collision

Trial	Cart A		Cart B	
	Velocity Cart A (m/s)	Momentum (Kg*m/s)	Velocity Cart B (m/s)	Momentum (kg*m/s)
1	0			
2	0			
3	0			
4	0			
5	0			

Inelastic Collision

Before Collision

Trial	Cart A		Cart B	
	velocity Cart A (m/s)	momentum kg*m/s	velocity Cart B (m/s)	momentum kg*m/s
1			0	
2			0	
3			0	
4			0	
5			0	

After Collision

Carts A+B

Trial	Velocity Carts A +B (m/s)	Momentum carts A+B (kg*m/s)
1		
2		
3		
4		
5		

Elastic Collision with increased mass of Cart A

Trial	Cart A (with added mass)		Cart B	
	Velocity Cart A (m/s)	Momentum (kg*m/s)	Velocity Cart B (m/s)	Momentum (kg*m/s)
1			0	
2			0	
3			0	
4			0	
5			0	