Lab Investigations: Impulse, Momentum, & Energy

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B) Maximum force of bumper on cart when cart bounces off bumper

Setup: We took 3 trials each for each type of hoop (thick hoop, thin hoop). We measured the impulse exerted from the bumper onto the cart. We then compared measured impulse to change in momentum and checked if they were the same.

Hypothesis: Conservation of momentum holds for both thin and thick hoops.

Results:

- Conservation of momentum holds for thin hoops.

Average impulse for thin hoops	Average momentum
0.123667	0.121014

Roughly equal
(Aligns with what we should have gotten)

- Conservation of momentum did not hold for thin hoops.

Average Impulse for thick hoops	Average momentum for thick hoops
0.1306666667	0.1152372

Not equal
(Doesn't align with what we should have gotten)

D) Elastic Collision w/ Magnets

Setup: The carts were placed on opposing sides. Then, they were pushed towards each other, and magnets were used to ensure that the carts would bounce off without touching, simulating an elastic collision.

Hypothesis: we expect that the change in momentum and change in kinetic energy will be 0 kg m/s and 0 N respectively because elastic collisions should not change the total kinetic energy or momentum of the objects colliding.

Results:

Initial Velocity Car 1	Initial Velocity Car 2	FInal Velocity Car 1	Final Velocity Car 2	Momentum Initial	Momentum Final	KE Initial	KE Final	Absolute Change in Momentum	Absolute Change in KE	% Change in Momentum	% Change in KE
0.298	-0.367	-0.358	0.287	-0.021243	-0.020463	0.03329661	0.031319058	0.00078	-0.00198	-3.67180	-5.93920

Conclusion: Since the percent changes are small, it supports the idea that elastic collisions will not change the total kinetic energy or momentum. The likely reason that the momentum and KE decreased is because KE was lost to friction and heat.