Activity Sheet: Momentum and Collisions
Name:

Instructions

Two pit crews will pair up to measure the mass and velocity of two toy cars before and after a collision. You can use the velocities to calculate the total momentum of the two cars.

Step 1: Background knowledge

Define momentum and elastic/inelastic collision and come up with your own example.

Step 2: Form a hypothesis

Predict what type of collision will occur and whether momentum was conserved as a result of your experiment.

Step 3: Set Up and Test

1. Have two pit crews team up, as you will need two cars and launchers for this experiment.
2. Build a track in a straight line on the floor with the car launchers on each end.
3. Place one car at one end of the track, use the stopwatch (or preferably the StopwatchCamera app) to measure the time it takes for the car to travel from the car launcher to the end of the track. This value will be used to find the velocity of one car.
4. Measure the length of the track to determine the distance the first car traveled. This value will also be used to find the velocity of one car.
5. Now do the same thing for the other car, starting at the opposite end of the car.

6. Use the formula velocity = distance / time to calculate the initial velocity of each car going down the tracks individually (before making them collide).
7. Use the formula for momentum (p = m * v) to calculate the momentum of each car before the collision, where m is the mass of the car and v is the velocity. To find the product of momentum in Newtons (N) you must convert the units to the metric units: g for mass, m for distance/radius, and s for time.
8. Have the two cars collide with each other.
9. Determine what type of collision you are dealing with. Did the two cars stick and move together? Did they bounce off each other? In other words, what type of collision occurred?
10. Repeat this experiment several times and record your observations.

Step 4: Observations and Calculations

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Step 5: Conclusion

Review your hypothesis. Was momentum conserved? Was kinetic energy conserved? In other words, were the cars going as fast after the collision as they were before? How could you prove this? Where does kinetic energy get lost?