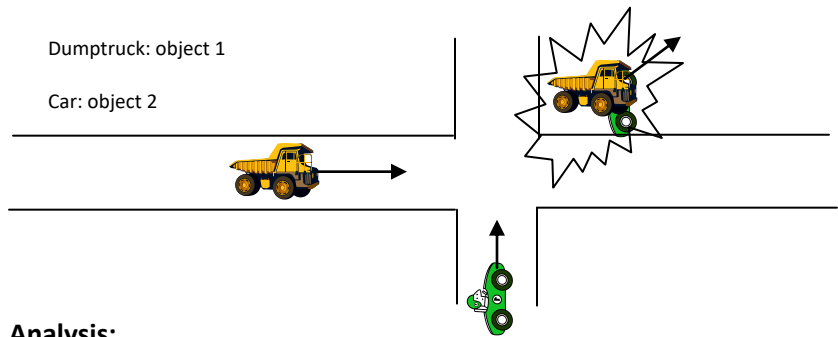


Inelastic 2D Collisions – Walkthrough

Name: _____ Date: _____

Analysis of a Simulated Crash

A 3000 kg dumptruck and an 800 kg car are involved in an accident at an intersection. The dumptruck was moving with a velocity of 15 m/s [East] while the car was travelling with a velocity of 32 m/s [North]. They collided directly in the centre of the intersection. When the two vehicles collide they become entangled and move together (inelastic collision). What is the speed and direction of the vehicles after the collision?



Analysis:

- Determine the total momentum in the x-direction and in the y-direction.

$$P_{1x} =$$

$$P_{2x} =$$

$$P_{1y} =$$

$$P_{2y} =$$

$$P_{xi} =$$

$$P_{yi} =$$

- Based on the law of conservation of momentum what are the values of the x and y momenta after the collision?

$$P_{xf} =$$

$$P_{yf} =$$

- The two become entangled during the collision so we can assume that the velocities of the two cars are the same and the masses are combined.
- Use Pythagorean Theorem to find the resultant momentum after the collision using the two components from step 2. Include a diagram.

$$P_{Tf} =$$

5. Determine the angle, θ , from the diagram in step 4. Show your work.

$$\theta =$$

6. Using your knowledge from step 4 and 5 determine the speed and direction (velocity) of the two vehicles after the collision. Show your work and include a diagram.

$$v =$$

$$\theta =$$