

## Quiz 9

Name: \_\_\_\_\_ Group: \_\_\_\_\_

- Two vehicles collide head on. Initially the first vehicle is traveling at 10.0 m/s due North and the second vehicle, which is twice the mass of the first, is traveling due South at 20.0 m/s. After the collision, the bumpers are locked.
  - What is the final velocity of the two vehicles?
  - What is the impulse delivered to each vehicle?
- Explain why, using conservation of angular momentum, a skater spins faster when they bring their arms tighter into their body.

$$\vec{p} = m\vec{v}$$

$$\vec{F} \Delta t = \Delta \vec{p}$$

$$\vec{p}_i = \vec{p}_f$$

$$\Sigma \vec{F} = m\vec{a}$$

$$g = 9.8 \text{ m/s}^2$$

$$v_x = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{\Delta t}$$

$$x_f = x_i + v_{xi} \Delta t + \frac{1}{2} a_x (\Delta t)^2$$

$$\sin \theta = \text{opp/hyp}$$

$$a^2 + b^2 = c^2$$

$$a_x = \frac{\Delta v_x}{\Delta t} = \frac{v_{xf} - v_{xi}}{\Delta t}$$

$$v_{xf} = v_{xi} + a_x \Delta t$$

$$\cos \theta = \text{adj/hyp}$$

$$v_{xf}^2 = v_{xi}^2 + 2a_x (\Delta x)$$

$$\tan \theta = \text{opp/adj}$$