IMPULSE AND MOMENTUM **Name** _____

1. Calvin is walking down the street at 4.0km/hr. If he has a mass of 70. Kg, what is his momentum? (Caution: watch units!)

2. How fast must a 20.0kg child be moving on her tricycle to have the same momentum as a 1.20×10^3kg car traveling at 2.00m/s?

3. On April 15, 1912; the luxury cruise liner Titanic sank after running into an iceberg.

   A) What momentum would the 4.23×10^8kg ship have imparted to the iceberg if it hit it head on with a speed of 11.6m/s? (In reality it was a glancing blow.)

   B) If the captain of the ship had seen the iceberg a kilometer ahead and had tried to slow down, use the idea of impulse to explain why would this have been a futile effort?

4. Auto companies frequently test the safety of automobiles by putting them through crash test to observe the integrity of the passenger compartment. If a 1.00×10^2kg car is sent towards a cement wall with a speed of 14.0m/s, and the impact stops the car in 8.00×10^{-2}s; with what force was it brought to rest?

5. A 1.0×10^4kg freight car is rolling along a track at 3.0m/s. Calculate the time needed for a force of 1.0×10^2N to stop the car.

6. Rhonda, who has a mass of 60.0kg, is riding at 35.0m/s in her sports car when she must suddenly slam on the brakes to avoid hitting a dog crossing the road. She is wearing her seat belt, which brings her to a stop in 0.400s.

   A) What force was produced by the seatbelt on Rhonda?

   B) If she had not been wearing her seatbelt, and the windshield had stopped her head in 1.00×10^{-3}s, what force would the windshield have produced on her head?

   C) How many times greater is the stopping force of he windshield than the seatbelt?

EXTRA CREDIT

During an autumn storm, a 1.00kg hail stone traveling at 20.0m/s made a 0.200cm deep dent in the hood of Casey's new car. What average force did the car hood exert to stop the damaging hail stone?