

# Momentum Problem Set: Solutions

## Physics 11

Complete the following problems on a separate piece of paper. At least one of these problems will be the quiz problem for tomorrow.

(1) In the NHL SuperSkills fastest skater competition, two players make a loop of the rink with the fastest skater moving along. Assuming they travel 400 ft (double the length of the rink) and assuming they are traveling at a constant velocity, find the momentum of the winners from the following years (note: 1 ft = 0.3048m).

- 2012, Carl Hagelin (80 kg) 13.218 s.

700 kg m/s

- 2004, Scott Niedermayer (91 kg) 13.783 s.

800 kg m/s

- 1994, Sergei Fedorov (93 kg) 13.525 s.

800 kg m/s

(2) Zdeno Chara has the record for the fastest slap shot at 175.1 km/h. A hockey puck has a mass of 0.17 kg. What is the momentum of Chara's slap shot? If a bullet has a mass of 0.02 kg and is shot at 320m/s, does Chara's slap shot or the bullet have a greater momentum?

+8.3kg m/s

If a bullet has a mass of 0.02 kg and is shot at 320m/s, does Chara's slap shot or the bullet have a greater momentum?

$\mathbf{p}_{bullet} = +6.4\text{kg m/s}$

Chara's slapshot has the larger momentum.

(3) A compact car with mass 725 kg is moving at +100 km/h.

(a) Find the momentum of the car.

$2 \times 10^4 \text{kg m/s}$

(b) How fast would a larger car, mass 2175 kg, be going if it had the same momentum?

$30 \text{ km/h}$

(4) Bill Nye said that the ping ping ball did not have enough momentum to push down the bowling pins. Assuming a 6 kg bowling ball travels at 16 mph (1mile=1.609km), how fast would a 2.7 g ping pong ball have to be moving to have the same momentum?

$4 \times 10^4 \text{ mph}$