

# ICP - Physics – Momentum Worksheet

1. Calculate the momentum of the Titanic ( $m = 4.2 \times 10^7$  kg) moving at 14 knots (1 kt = 1.852 km/h).
2. If the momentum of the NASA space shuttle as it leaves the atmosphere is  $3.75 \times 10^8$  kgm/s and its mass is 75000 kg, what is its speed?
3. A 59 kg physics student jumps off the back of her Laser sailboat (42kg). After she jumps, the Laser is found to be traveling at 1.5 m/s. What is the speed of the physics student?
4. The same physics student jumps off the back of her Laser again, but this time the Laser is already travelling at 3.1 m/s before she jumps. If the physics student jumps off with a speed of 2.1 m/s, how fast is the Laser going after she jumps?
5. The Titanic hit an iceberg estimated to be half of her mass. Before hitting the iceberg, the Titanic was estimated to be going 22 kts (11.3 m/s). After hitting the iceberg, the Titanic was estimated to be going about 6.0 knots (3.1 m/s). How fast was the iceberg going after the collision?  
(Assume a head-on collision) (Hint: first find the momentum of the Titanic before the collision. Then write the expression for the total momentum after the collision, which is the sum of the momentum of the Titanic and the momentum of the iceberg. Make the expression equal to the momentum before and solve.)
6. A 59 kg physics student is riding her 220 kg Harley at 12 m/s when she has a head-on collision with a 2.1 kg pigeon flying the opposite direction at 44 m/s. The bird is still on the motorcycle after the collision. How fast is the motorcycle going after the collision?