Impulse & Momentum – 3 – Practice

1. A golf ball, mass 50 g, reaches a speed of 40 m/s when struck by a club.
   The time of contact is 1.5ms.

   Calculate:

   (a) the impulse of the stroke. *(2.0 kgm/s)*

   (b) the average contact force. *(1.3x10^3 N)*

2. A water rocket squirts 0.50 kg water out of a jet at a speed of 120 m/s in a time of 2.0s. Calculate the force produced by the jet. *(30N)*

3. A Space Shuttle had three main engines, using liquid hydrogen and liquid oxygen, in addition to two solid fuel boosters. Each main engine could produce 1860 kN thrust, ejecting exhaust gases at 4400 m/s.
   Calculate the rate at which burnt fuel (mainly water vapour) was ejected from each of the main engines. *(420 kg/s)*

4. A fire hose has a nozzle of diameter 40 mm and water comes out at a speed of 15 m/s.
   Density of water = 1000kg/m^3.

   Calculate:

   (a) the mass of water that comes out of the hose each second. *(18.8 kg/s)*

   (b) the force needed to hold the hose. *(282 N)*

5. An airliner of mass 250 tonnes touches down on the runway at a speed of 270 km/hr.
   The engines apply reverse thrust for 10 seconds after which the speed is halved.
   Calculate the magnitude of the reverse thrust. *(940 kN)*