

# Newton's Laws – 1 – Practice

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1. A snooker ball, mass 200g, travelling at 0.10 m/s has a frictional force of  $5.0 \times 10^{-3}$  N acting on it. Calculate:
  - (a) the deceleration that this force produces, ( $2.5 \times 10^{-2} \text{ m/s}^2$ )
  - (b) the distance the ball travels before stopping. ( $0.20 \text{ m}$ )
2. A tractor pulls a log of mass 2000 kg. When the tractor pulls with a force of 1300 N, the acceleration of the log is  $0.050 \text{ m/s}^2$ . Calculate the frictional force between the log and the ground. ( $1200\text{N}$ )
3. A car, mass 800 kg, accelerates from rest to 8.0 m/s in a time of 30 s. Calculate the average resultant force acting on the car. ( $210 \text{ N}$ )
4. Two people push a car of mass 800 kg to start it. Each pushes with a force of 300 N and the total resistance force is 160N. Calculate the acceleration of the car? ( $0.55 \text{ m/s}^2$ )
5. A man, of mass 80kg, goes up in a lift while standing on a set of bathroom scales. The scales register an apparent mass of 88 kg. Calculate the acceleration of the lift. ( $0.98\text{m/s}^2$ )
6. The A380 AirBus is powered by four engines, each of which develops a maximum thrust of 311kN.
  - (a) The maximum take-off mass of an A380 is  $5.6 \times 10^5$  kg. Calculate the maximum horizontal acceleration of the AirBus at take-off under full engine power and full load. ( $2.2\text{m/s}^2$ )
  - (b) An A380 which is operating empty (except for fuel) has a mass of  $2.77 \times 10^5$  kg. Calculate:
    - (i) the lift force which has to be produced by the wings to just support the weight of this plane when it is flying. ( $2710\text{kN}$ )
    - (ii) the **extra** lift force need to give the plane a vertical acceleration of  $0.5 \text{ m/s}^2$ . ( $139\text{kN}$ )

