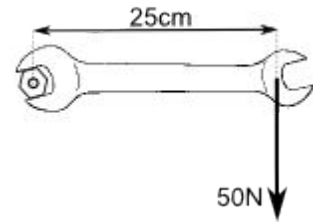# Equilibrium of parallel forces – Practice

1. A force of 50N is applied at right angles to the end of a spanner, 25cm long, to tighten a nut.

   What is the torque applied to the nut? *(12.5Nm)*
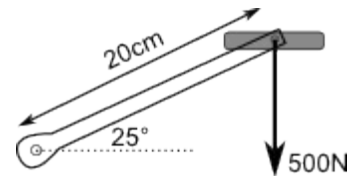
   

2. A torque wrench, length 80cm, is being used to tighten cylinder head nuts to a torque of 90Nm.

   Calculate the minimum force that must be used.

   *(113N)*

   

3. A cyclist pushes vertically down with a force of 500N on the pedal crank, length 20cm, which is at an angle of 25° to the horizontal.

   Calculate the torque applied to the axle? *(91Nm)*

   

4. A child weighing 400N sits 1.8m from the pivot of a lightweight see-saw.

   (a) Calculate how far from the pivot an adult weighing 600N must sit in order to balance? *(1.2m)*

   (b) Calculate the force on the pivot?  *(1000N)*

5. A uniform plank, 5.0m long, balances at a point 1.80m from one end, when a mass of 20kg is placed 0.60m from the same end.
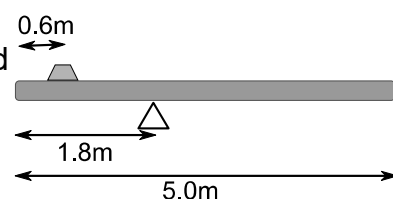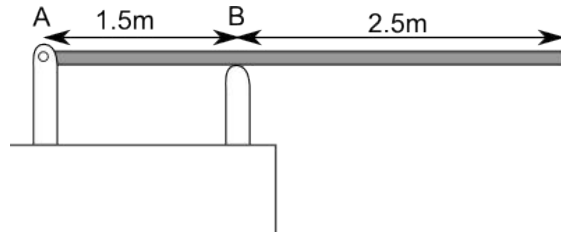
   (a) Draw a free-body diagram of the plank.

   (b) Calculate the mass of the plank. *(34kg)*

6. A car, mass 800kg is 8m from the end A of a bridge AB.
   The bridge has mass $20 \times 10^3$ kg and length 30m.
   Calculate the forces on the supports at A and at B.
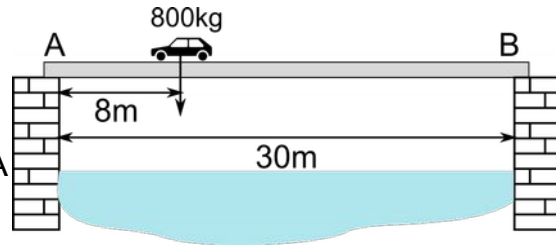
   

   *(104 kN, 100 kN)*

7. A uniform diving board at a swimming pool has a weight of 150N and length 4.0m. It is held by two supports, A at one end and B, 1.5m from A.

   

   (a) Draw a free-body diagram of the board.

   (b) Calculate the force exerted by support A. *(50N)*

   (c) A diver of mass 50kg walks to the end of the board. Calculate:
       (i) the force exerted by support A. *(868N)*
       (ii) the force exerted by support B. *(1.51kN)*