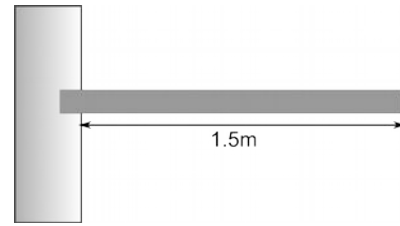


Equilibrium of parallel forces – Tutorial

1. A uniform cantilever balcony, mass 200kg, length 1.5m, is fixed to a vertical wall.

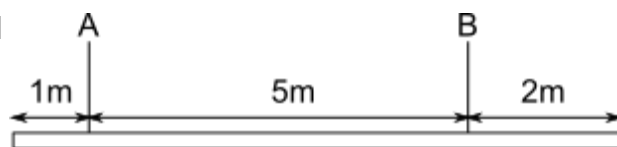
Calculate the moment supplied by the fixing at the wall. (1.47kNm)



2. A uniform ladder, of length 4.0m and weight 500N, is carried horizontally by Alice, who holds the ladder at one end, and Ben, who holds it 0.50m from the other end.
- Draw a free body diagram of the ladder.
 - What force is used by Ben? (286N)
 - What force is used by Alice? (214N)

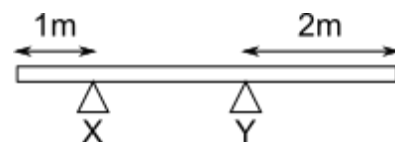
3. A boy of mass 50kg and a girl of mass 30kg play on a uniform see-saw, mass 30kg and length 7.0m, pivoted in the centre. Each child sits 2.0m from the centre, and their mother has to push down on one end to keep the see-saw balanced.
- Draw a free-body diagram of the see-saw.
 - Calculate what vertical force the mother must apply to keep it balanced. (112N)
 - Calculate the total downward force on the centre support of the see-saw. (1.19kN)

4. A uniform beam has length 8 m and mass 60 kg. It is suspended by two ropes, A & B, as shown in the diagram.



Calculate the tension in A and the tension in B. (353N, 235N)

5. A uniform beam, of mass 50 kg and length 5 m, rests on two supports, X & Y, as shown in the diagram.



Calculate:

- the force exerted by X and the force exerted by Y, (368N, 123N)
- the maximum mass that could be placed at **either** end of the beam if it is to remain in equilibrium. (12.5kg)