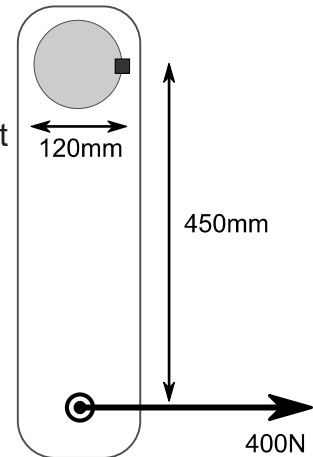


Equilibrium of non-parallel forces – Practice

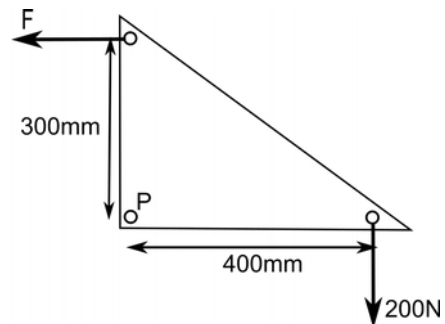
1. A lever is keyed to a 120mm diameter shaft. A force of 400N is applied at right angles to the lever at a distance of 450mm from the centre of the shaft, which does not rotate.



Calculate:

- (a) the torque on the shaft, (180Nm)
 (b) the force applied to the key. (3000N)

2. The diagram shows a lever to turn a vertical force into a horizontal force. Calculate the force F which will stop the lever turning about the pivot P .



(267N)

3. A uniform ladder, weight 150N, length 4.0m, leans with its upper end against a frictionless wall. Its lower end rests on the ground 1.0m from the foot of the wall.
- (a) Draw a free-body diagram of the ladder, showing the vertical and horizontal components of the force, F , from the ground on the ladder.
- (b) Calculate:
- (i) the push of the wall on the ladder. (19.4N)
 (ii) the resultant force, F , from the ground and the angle it makes with the vertical. (151N, 7.4°)

4. An inn sign hangs at the centre of a bar, length 1.4m, which is freely hinged to the wall. It is supported by a wire attached to the end at an angle of 30° to the horizontal, as shown. The total weight of the sign and bar is 300N, acting in the centre.

Take moments about the hinge to find the tension in the wire. (300N)

