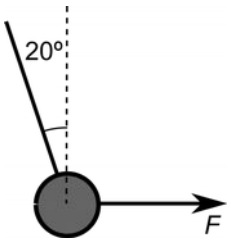
Forces at a point in equilibrium – Practice

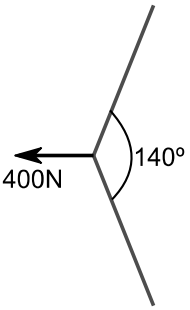
1. A metal demolition ball, mass 600kg, is suspended from a cable and pulled aside at an angle of 20º, by a horizontal force, *F*, using a rope.

   Draw a closed vector triangle for the three forces acting on the ball. Calculate the size of the force *F*. *(2.14kN)*



2. The string of a longbow is pulled back and held stationary with a force of 400N, so that the string has an angle of 140º between the two parts.

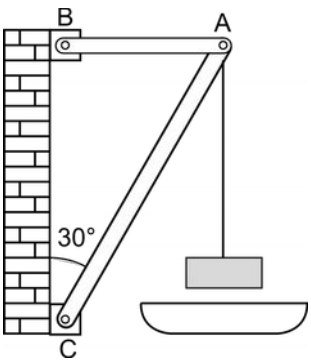
   Draw a closed vector triangle for the three forces acting at the point where the string is pulled.
   (hint: think about the direction of the forces and that they are symmetrical)
   Calculate the tension in the string. *(585N)*



3. A load of cargo is hanging from a derrick (crane) on a harbour wall. The mass of the cargo is 500kg.

   (a) What is the direction of the force exerted on point A by
   (i) the strut AC? (ii) the tie AB?

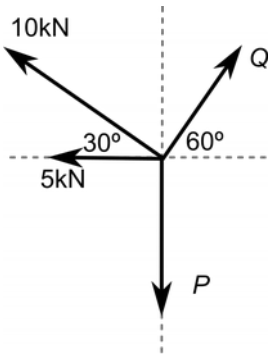
   (b) Draw a triangle of forces representing the forces acting at A and calculate:
   (i) the magnitude of the force in the strut AC,
   (ii) the magnitude of the force in the tie AB.
   (5.66kN, 2.8kN)



4. The four forces shown are in equilibrium.

   Use the fact that the sum of x and y components are zero to calculate *P* and *Q*. *(hint: use x-components first)*

   (28.6kN, 27.3kN)



5. A load of wood, mass 100kg, is held still, ready to be lifted, by two ropes. AB makes an angle of 30° with the vertical, AC makes an angle of 65° with the vertical.
   Calculate the tensions, T_{AB} and T_{AC}, in the ropes.
   (892N, 492N)