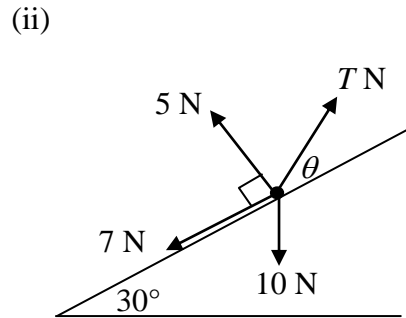
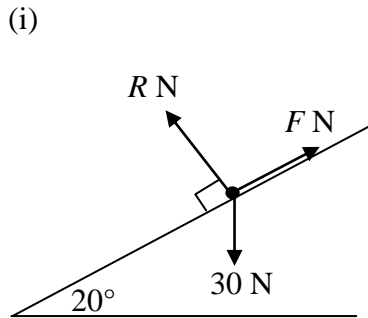


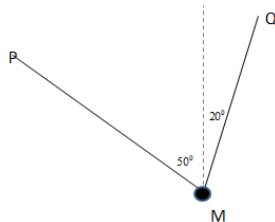
## Section 1: Resolving forces

### Exercise level 2

- Two forces of magnitudes 7 N and 9 N act at an angle  $\alpha$  such that  $\sin \alpha = 0.4$ . Find the magnitudes of two possible resultants.
- Both diagrams below show a particle in equilibrium under the action of various forces. In each case find the values of the unknown forces and angles.



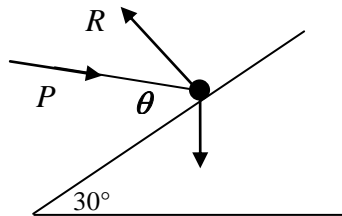
- A particle  $M$ , of mass  $m$  kg is attached to two points  $P$  and  $Q$  by two light strings.  $M$  hangs in equilibrium with  $MP$  and  $MQ$  making angles of  $50^\circ$  and  $20^\circ$  respectively with the upward vertical. Given that the tension in  $MP$  is 12 N, find
  - the tension in  $MQ$
  - the value of  $m$



- A particle of weight 40 N is attached to the end of a light inextensible string of length 2 m. The other end of the string is attached to a vertical wall. The particle is held at a distance of 1.2 m from the wall by a horizontal force  $F$ . Find the magnitude of  $F$  and the tension in the string.
- A body of mass 8 kg is held at rest on a smooth plane inclined at  $60^\circ$  to the horizontal by a force  $F$ . Find  $F$  given that it acts
  - horizontally
  - vertically upwards
  - parallel to the plane.
- A block of weight 20 N is held at rest on a smooth plane inclined at  $20^\circ$  to the horizontal by a string that makes angle  $\alpha$  with the plane. If the tension in the string is 10 N find  $\alpha$  and the reaction between the block and the plane.

## AQA A level Maths Forces in 2D 1 Exercise

7. A light inextensible string of length 50 cm has its upper end fixed at point A and carries a particle of mass 8 kg at its lower end. A horizontal force  $P$  applied to the particle keeps it in equilibrium 30 cm from the vertical through A. By resolving vertically and horizontally, find the maximum of  $P$  and the tension in the string.
8. A force  $P$  holds a particle of mass  $2m$  kg in equilibrium on a smooth plane which is inclined at  $30^\circ$  to the horizontal. If  $P$  makes an angle  $\theta$  with the plane, find  $\theta$  when  $R$ , the normal reaction between the particle and plane, is  $2.5mg$ .



9. A package of mass 40 kg is held in equilibrium by two light inextensible ropes that pass over smooth pulleys as shown in the diagram. The end of one rope is attached to a block of 80 kg at rest on a slope inclined at angle  $\alpha$  to the horizontal; the other rope is attached to a block of mass 60 kg at rest on a slope inclined at angle  $\beta$  to the horizontal. Find  $\alpha$  and  $\beta$ .

