

Question 1 continued

Lined writing area for the response to Question 1 continued.

(Total 10 marks)

Q1

--	--



3.

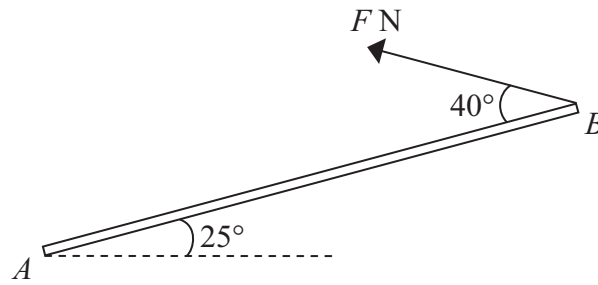


Figure 1

A uniform rod AB , of mass 5 kg and length 4 m, has its end A smoothly hinged at a fixed point. The rod is held in equilibrium at an angle of 25° above the horizontal by a force of magnitude F newtons applied to its end B . The force acts in the vertical plane containing the rod and in a direction which makes an angle of 40° with the rod, as shown in Figure 1.

- (a) Find the value of F . **(4)**

- (b) Find the magnitude and direction of the vertical component of the force acting on the rod at A . **(4)**



4.

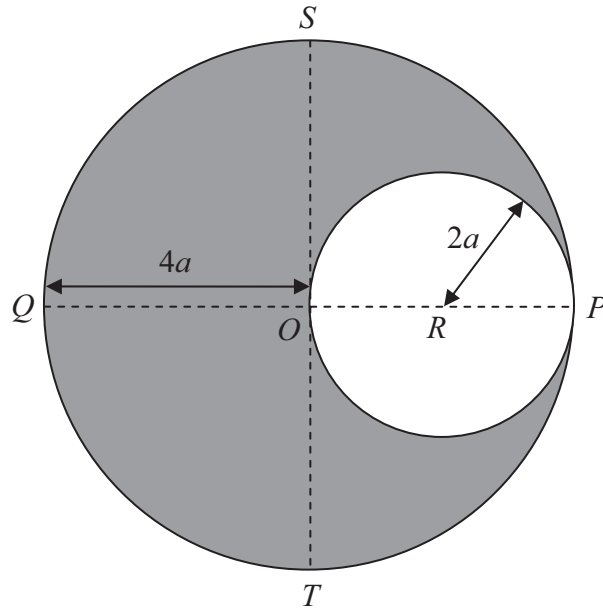


Figure 2

A uniform circular disc has centre O and radius $4a$. The lines PQ and ST are perpendicular diameters of the disc. A circular hole of radius $2a$ is made in the disc, with the centre of the hole at the point R on OP where $OR = 2a$, to form the lamina L , shown shaded in Figure 2.

- (a) Show that the distance of the centre of mass of L from P is $\frac{14a}{3}$. **(4)**

The mass of L is m and a particle of mass km is now fixed to L at the point P . The system is now suspended from the point S and hangs freely in equilibrium. The diameter ST makes an angle α with the downward vertical through S , where $\tan \alpha = \frac{5}{6}$.

- (b) Find the value of k . **(5)**



