



Let  $p$  and  $q$  be positive real numbers. Let  $P$  denote the point  $(p, 0)$  and  $Q$  denote the point  $(0, q)$ .

(i) Show that the equation of the circle  $C$  which passes through  $P$ ,  $Q$  and the origin  $O$  is

$$x^2 - px + y^2 - qy = 0.$$

Find the centre and area of  $C$ .

(ii) Show that

$$\frac{\text{area of circle } C}{\text{area of triangle } OPQ} \geq \pi.$$

(iii) Find the angles  $OPQ$  and  $OQP$  if

$$\frac{\text{area of circle } C}{\text{area of triangle } OPQ} = 2\pi.$$