9.

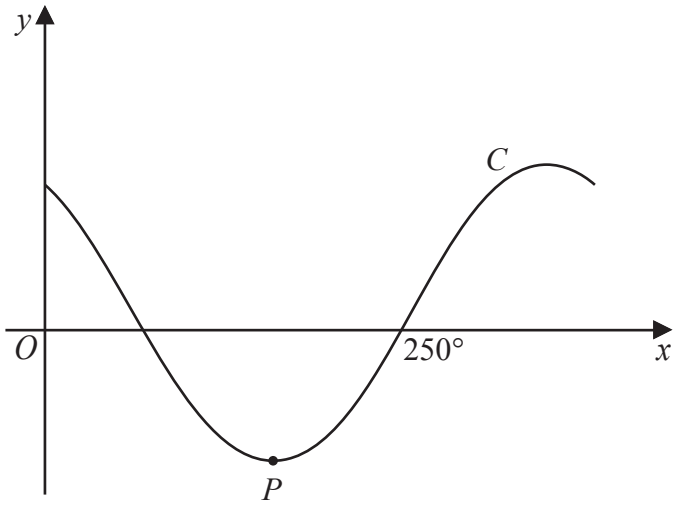


Figure 5

Figure 5 shows a sketch of the curve C with equation

$$y = \cos(x + k°) \qquad 0 \leqslant x < 360°$$

where x is measured in degrees and k is a constant.

The curve C

- cuts the x-axis at $250°$
- has a minimum point at P

as shown in Figure 5.

(a) State the value of k.

(1)

(b) State the coordinates of P.

(1)

(c) Solve the equation

$$\cos(x + k°) = 0$$

for values of x in the range $3600° \leqslant x < 3960°$

(2)

(d) Find the coordinates of the point to which P is mapped when C is transformed to the curve with equation

(i) $y = -4\cos(x + k°)$

(ii) $y = \cos(x - 3k°)$

(2)

(Total for Question 9 is 6 marks)

10.

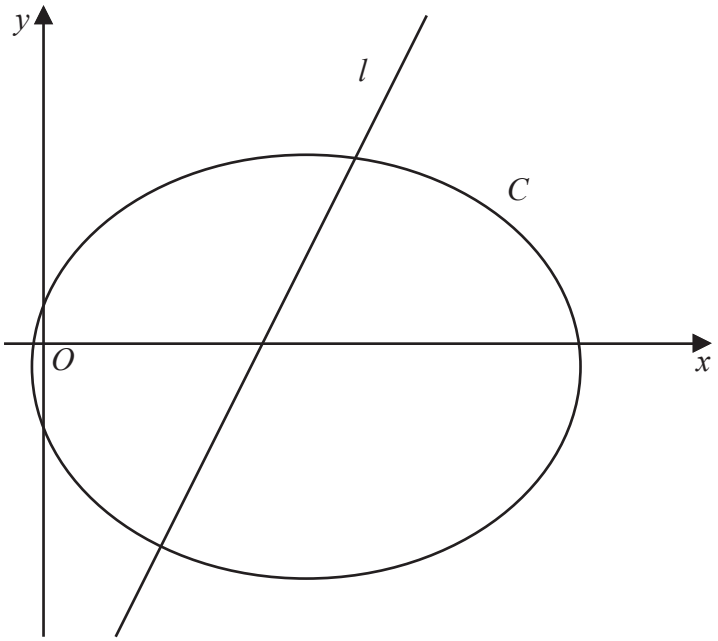


Figure 6

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

Figure 6 shows a sketch of

- the curve C with equation $x^2 + 2y^2 - 6x + y - 1 = 0$
- the line l with equation $y = 2x + k$ where k is a constant

Given that k can vary,

(a) show that when l touches C

$$2k^2 + 25k - 13 = 0$$

(4)

Given further that

- $k < 0$
- l touches C at the point P

(b) find the exact coordinates of P

(5)

(Total for Question 10 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS