

12. In this question you should show all stages of your working.

Solutions relying entirely on calculator technology are not acceptable.

(i) Solve, for  $0 < \theta \leq 450^\circ$ , the equation

$$5 \cos^2 \theta = 6 \sin \theta$$

giving your answers to one decimal place.

(5)

(ii) (a) A student's attempt to solve the question

“Solve, for  $-90^\circ < x < 90^\circ$ , the equation  $3 \tan x - 5 \sin x = 0$ ”

is set out below.

$$\begin{aligned} 3 \tan x - 5 \sin x &= 0 \\ 3 \frac{\sin x}{\cos x} - 5 \sin x &= 0 \\ 3 \sin x - 5 \sin x \cos x &= 0 \\ 3 - 5 \cos x &= 0 \\ \cos x &= \frac{3}{5} \\ x &= 53.1^\circ \end{aligned}$$

Identify two errors or omissions made by this student, giving a brief explanation of each.

(2)

The first four positive solutions, in order of size, of the equation

$$\cos(5\alpha + 40^\circ) = \frac{3}{5}$$

are  $\alpha_1, \alpha_2, \alpha_3$  and  $\alpha_4$

(b) Find, to the nearest degree, the value of  $\alpha_4$

(2)

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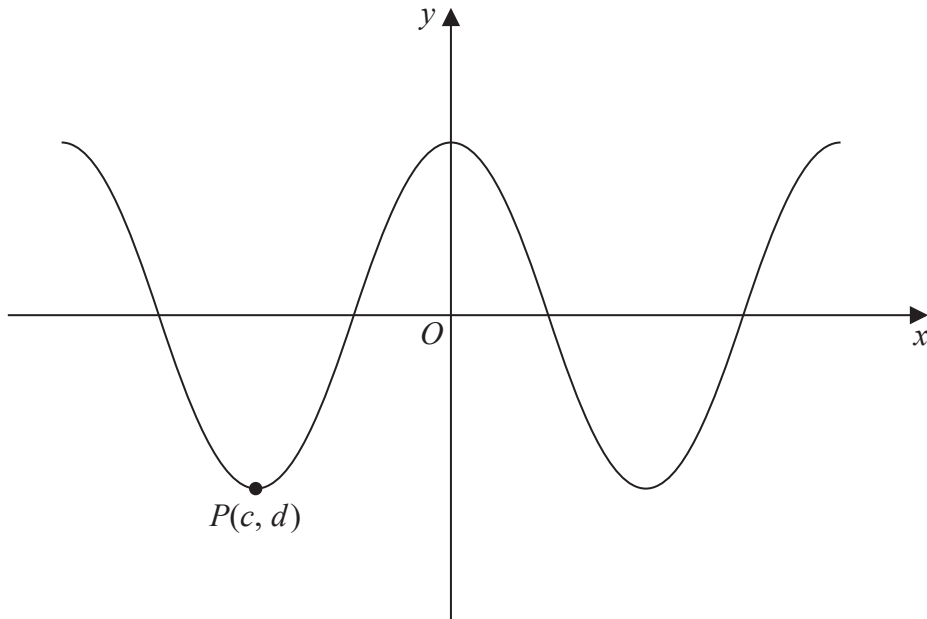


Figure 3

Figure 3 shows part of the curve with equation  $y = 3 \cos x^\circ$ .

The point  $P(c, d)$  is a minimum point on the curve with  $c$  being the smallest negative value of  $x$  at which a minimum occurs.

(a) State the value of  $c$  and the value of  $d$ . (1)

(b) State the coordinates of the point to which  $P$  is mapped by the transformation which transforms the curve with equation  $y = 3 \cos x^\circ$  to the curve with equation

(i)  $y = 3 \cos \left( \frac{x^\circ}{4} \right)$

(ii)  $y = 3 \cos (x - 36)^\circ$  (2)

(c) Solve, for  $450^\circ \leq \theta < 720^\circ$ ,

$$3 \cos \theta = 8 \tan \theta$$

giving your solution to one decimal place.

**In part (c) you must show all stages of your working.**

**Solutions relying entirely on calculator technology are not acceptable.** (5)

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9. Solve, for  $360^\circ \leq x < 540^\circ$ ,

$$12 \sin^2 x + 7 \cos x - 13 = 0$$

Give your answers to one decimal place.

*(Solutions based entirely on graphical or numerical methods are not acceptable.)*

(5)

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