QQQ – Pure Year 2 – Chapter 8 – Parametric Equations (Version 2)

Total Marks: 23

(23 = Platinum, 21 = Gold, 18 = Silver, 16 = Bronze)

1.

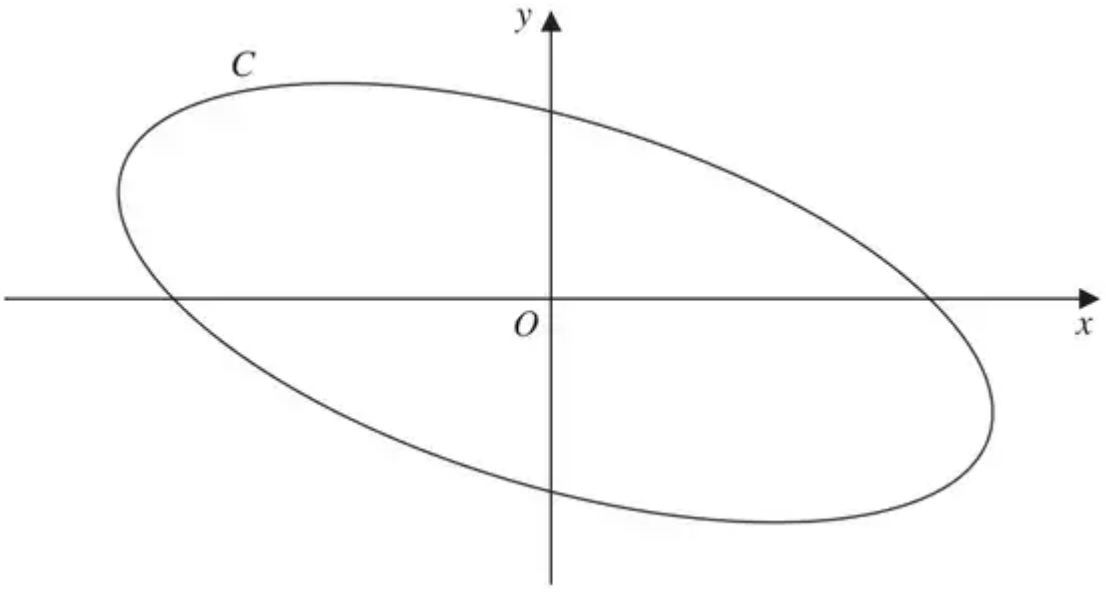


Figure 3

Figure 3 shows a sketch of the curve C with parametric equations

$$x = 4\cos\left(t + \frac{\pi}{6}\right), \quad y = 2\sin t, \qquad 0 \leqslant t < 2\pi$$

(a) Show that

$$x + y = 2\sqrt{3}\cos t$$

(3)

(b) Show that a cartesian equation of C is

$$(x + y)^2 + ay^2 = b$$

where a and b are integers to be determined. **(2)**

(Total 5 marks)

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2. Fig. 12 shows a curve C with parametric equations $x = 4t^2,\ y = 8t$. The point P, with parameter t, is a general point on the curve. Q is the point on the line $x + 4 = 0$ such that PQ is parallel to the x-axis. R is the point $(4, 0)$.

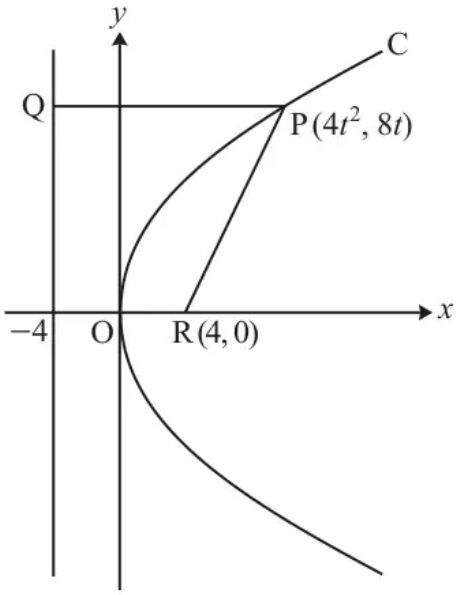


Fig. 12

(a) Show algebraically that P is equidistant from Q and R. **[4]**

(b) Find a cartesian equation of C. **[2]**

(Total 6 marks)

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3. The curve C is defined, for $0 \leqslant t < 2\pi$, by the parametric equations

$x = 4k + k\sin t, \quad y = 2 + 4\cos t,$

where k is a constant.

(a) Find a cartesian equation for C. You do **not** need to simplify your answer. **[2]**

You are given that C is a circle.

(b) **(i)** Determine the radius of C. **[2]**

(ii) Find the possible coordinates for the centre of C. **[2]**

(Total 6 marks)

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4.

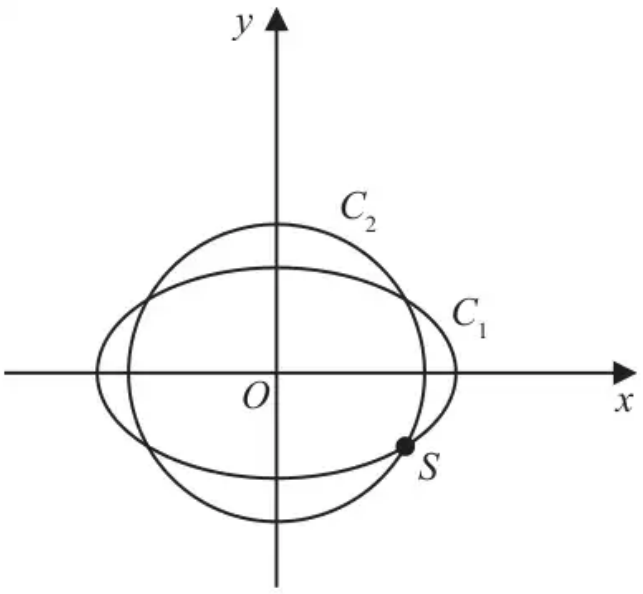


Figure 2

The curve C_1 with parametric equations

$$x = 10\cos t, \quad y = 4\sqrt{2}\sin t, \quad 0 \leqslant t < 2\pi$$

meets the circle C_2 with equation

$$x^2 + y^2 = 66$$

at four distinct points as shown in Figure 2.

Given that one of these points, S, lies in the 4th quadrant, find the Cartesian coordinates of S.

(6)

(Total 6 marks)

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