

Cambridge International AS & A Level

Mathematics

9709/12

Paper 1 Pure Mathematics 1

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Question No (2)

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Question No (2)

Find the coordinates of the points of intersection of the curve and the line with equations

$$2xy + 5y^2 = 24 \text{ and } 2x + y + 4 = 0$$

Solution:

$$2xy + 5y^2 = 24 \rightarrow (1)$$

$$2x + y + 4 = 0 \rightarrow (2)$$

From Equation (2)

$$2x + y + 4 = 0$$

$$2x = -y - 4$$

$$x = \frac{-y-4}{2} \rightarrow (3)$$

put $x = \frac{-y-4}{2}$ in Equation (1)

$$2\left(\frac{-y-4}{2}\right)y + 5y^2 = 24$$

$$-y^2 - 4y + 5y^2 = 24$$

$$4y^2 - 4y - 24 = 0$$

$$4(y^2 - y - 6) = 0$$

$$y^2 - y - 6 = 0$$

By factorization

$$y^2 - 3y + 2y - 6 = 0$$

$$y(y-3) + 2(y-3) = 0$$

$$(y-3)(y+2) = 0$$

$$y = 3, y = -2$$

put $y = -2$ in Equation (3)

$$x = \frac{-y-4}{2}$$

$$x = \frac{-(-2)-4}{2} = \frac{2-4}{2} = -\frac{2}{2} = -1$$

$$(-1, -2)$$

when $y = 3$, Equation (3) becomes

$$x = \frac{-(3)-4}{2} = -\frac{7}{2}$$

so points of intersection

$$(-1, -2) \quad (-\frac{7}{2}, 3)$$