

1.4 Answers

GCSE and Preparatory A-Level Mathematics Conic Sections (Simultaneous Equations IV)

1.4.1 Solutions (1.3 Exercise)

Answer 1

(i)

$$2x^2 + 6x + 4 = 0$$

$$x^2 + 3x + 2 = 0$$

$$(x + 2)(x + 1) = 0$$

$$\text{Either } x + 2 = 0 \quad \text{or} \quad x + 1 = 0$$

$$\text{Solutions : } x = -2 \quad \text{or} \quad x = -1$$

(ii) The graph has zero height, that is $y = 0$, when $x = -2$ or when $x = -1$

Answer 2

(i)

$$3x^2 + 15x + 18 = 0$$

$$x^2 + 5x + 6 = 0$$

$$(x + 3)(x + 2) = 0$$

$$\text{Either } x + 3 = 0 \quad \text{or} \quad x + 2 = 0$$

$$\text{Solutions : } x = -3 \quad \text{or} \quad x = -2$$

(ii) The graph has zero height, that is $y = 0$, when $x = -3$ or when $x = -2$

Answer 3

(i)

$$x^2 + (x - 4)^2 = 58$$

$$x^2 + x^2 - 8x + 16 = 58$$

$$2x^2 - 8x - 42 = 0$$

$$\text{after dividing through by 2} \quad x^2 - 4x - 21 = 0$$

$$(x + 3)(x - 7) = 0$$

$$\text{Either } x + 3 = 0 \quad \text{or} \quad x - 7 = 0$$

$$\text{Solutions : } x = -3 \quad \text{or} \quad x = 7$$

$\therefore$ Points of intersection are $(-3, -7)$ or $(7, 3)$

(ii) The graph shows an intersection of the line and the curve at points that could be $(-3, -7)$ or $(7, 3)$ so there is nothing “obviously wrong” !

Answer 4**(i)**

$$x^2 + (3x - 1)^2 = 5$$

$$x^2 + 9x^2 - 6x + 1 = 5$$

$$10x^2 - 6x - 4 = 0$$

$$\text{after dividing through by 2} \quad 5x^2 - 3x - 2 = 0$$

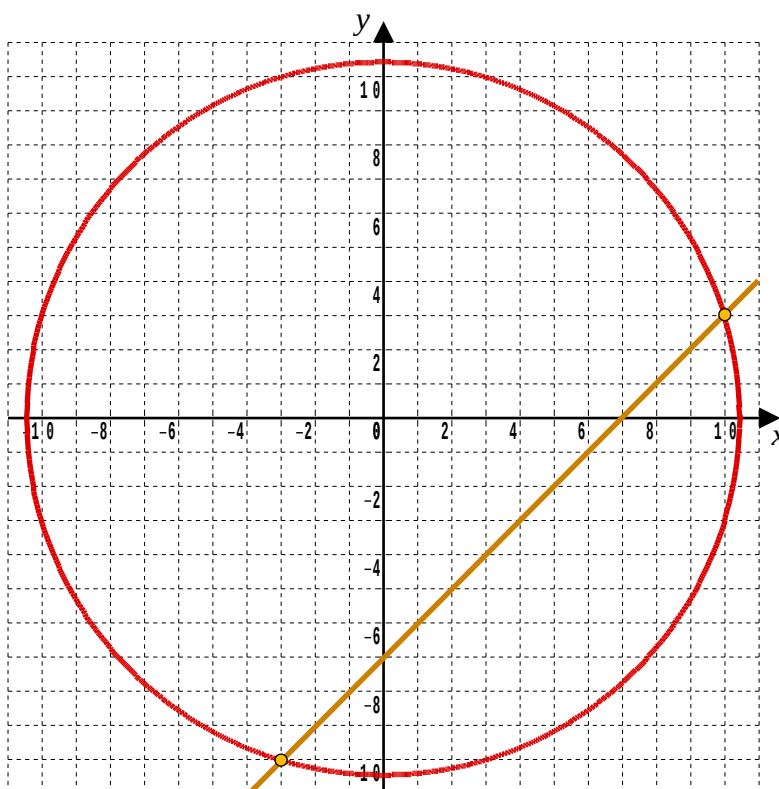
$$(5x + 2)(x - 1) = 0$$

$$\text{Either } 5x + 2 = 0 \quad \text{or} \quad x - 1 = 0$$

$$\text{Solutions : } x = -0.4 \text{ or } x = 1$$

$$\therefore \text{ Points of intersection are } (-0.4, -2.2) \text{ or } (1, 2)$$

(ii) The graph shows an intersection of the line and the curve at points that could be $(-0.4, -2.2)$ or $(1, 2)$ so there is nothing “obviously wrong” !

Answer 5

From the graph the solutions are $(-3, -10)$ or $(3, 10)$

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Teachers may obtain detailed worked solutions to the exercises by email from MHShrewsbury@Gmail.com