Solving Quadratics Ans

0 min
0 marks

1. (a) $(x + 8)^2 = (x + 7)^2 + x^2$ (A1)

Note: *Award (A1) for a correct equation.*

$x^2 + 16x + 64 = x^2 + 14x + 49 + x^2$ (A1)

Note: *Award (A1) for correctly removed parentheses.*

$x^2 – 2x –15 = 0$ (A1) (C3)

Note: *Accept any equivalent form.*

(b) $x = 5$, $x = –3$ (A1)(ft)(A1)(ft) (C2)

Notes: *Accept (A1)(ft) only from the candidate's* ***quadratic*** *equation.*

(c) 30 cm (A1)(ft) (C1)

Note: *Follow through from a positive answer found in part (b).*

[6]

2. (a) $(x – 3)(x + 1)$ (A1)(A1) (C2)

Note: *Award (A0)(A1) if the signs are reversed.*

(b) A(1, 0), B(3, 0) (A1)(A1) (C2)

(c) $x = 1$ or $x = \frac{(–1+3)}{2} = 1$ or $x = \frac{–(–2)}{2(1)} = 1$ (A1)(A1) (C2)

Note: *Award (A1) for x = and (A1) for 1.*

(d) C(1, –4) (A1)(A1) (C2)

[8]

3. (a) $(x – 5)(x + 5)$ (M1)(A1)(A1) (C3)

(b) $(x – 4)(x + 1)$ (M1)(A1)(A1) (C3)

(c) $x = 4$ (A1)

$x = – 1$ (A1) (C2)

[8]

4. (a) $(x – 2)(x – 4)$ (A1)(A1) (C2)

(b) $x = 2$, $x = 4$ (A1)(ft)(A1)(ft) (C2)

(c) $x = 0.807$, $x = 6.19$ (A1)(A1) (C2)

Note: *Award maximum of (A0)(A1) if coordinate pairs given.*

OR

(M1) for an attempt to solve $x^2 – 7x + 5 = 0$ via formula with correct values substituted. (M1)

$x = \dfrac{7 \pm \sqrt{29}}{2}$ (A1) (C2)

[6]

5. (a) $(3x – 2)(x + 5)$ (A1)(A1)

(b) $(3x – 2)(x + 5) = 0$

$x = \dfrac{2}{3}$ or $x = –5$ (A1)(ft)(A1)(ft)(G2)

(c) $x = \dfrac{-13}{6}\,(-2.17)$ (A1)(A1)(ft)(G2)

Note: *(A1) is for x =, (A1) for value. (ft) if value is half way between roots in (b).*

(d) Minimum $y = 3\left(\frac{-13}{6}\right)^2 + 13\left(\frac{-13}{6}\right) - 10$ (M1)

Note: *(M1) for substituting their value of x from (c) into f(x)*

$= -24.1$ (A1)(ft)(G2)

[8]

6. (a) $6x + 3 - 6 + 2x = 13$

$8x = 16$ (M1)

$x = 2$ (A1) (C2)

(b) $(x + 3)(x - 1)$ (A1)(A1) (C2)

(c) $x = 1.64575..$

$x = 1.65$ (A2) (C2)

Note: *If formula is used award (M1)(A1) for correct solution. If graph is sketched award (M1)(A1) for correct solution.*

[6]

7. (a) Put $x = 0$ to find $y = -2$ (M1)
Coordinates are $(0, -2)$ (A1) (C2)

Note: *Award (M1)(A0) for –2 if working is shown. If not, award (M0)(A0).*

(b) Factorise fully, $y = (x - 2)(x + 1)$. (A1)(A1)
$y = 0$ when $x = -1, 2$. (A1)(A1)
Coordinates are A(–1, 0), B(2, 0). (A1)(A1) (C6)

Note: *Award (C2) for each correct x value if no method shown and full coordinates not given. If the quadratic formula is used correctly award (M1)(A1)(A1)(A1)(A1)(A1). If the formula is incorrect award only the last (A1)(A1) as ft.*

[8]

8. (a) $(x - 8)(x + 3) = 0$ (M1)(M1)
$x = 8, x = -3$ (A1)(A1)(C2)(C2)

(b) **METHOD 1**

$(x - 5)(x + 2) = 0$ (M1)

$x^2 - 3x - 10 = 0$ (A1)

$\underline{3}x^2 - 9x - 30 = 0$ (A1)

$a = 3$ (A1) (C4)

METHOD 2

$a(5)^2 - 9(5) - 30 = 0$ (M1)

$25a - 75 = 0$ (A2)

$a = 3$ (A1) (C4)

METHOD 3

$a(-2)^2 - 9(-2) - 30 = 0$ (M1)

$4a - 12 = 0$ (A2)

$a = 3$ (A1) (C4)

[8]

9. (a) At $x = 0$ we have $y = 6 = c$, (M1)

so $c = 6$. (A1) (C2)

(b) At $x = 3$ we have $9a + 12 + c = 0$ (M2)

$a = -2$ (A1)

OR

at $x = -1$ we have $a - 4 + c = 0$ (M2)

$a = -2$ (A1) (C3)

(c) Factorisation is $y = -2(x - 3)(x + 1)$ (A1)(A1)(A1) (C3)

OR

can include 2 and/or sign in a factor. (A1)(A2) (C3)

[8]

10. (a) $A = 2(8x) + 2x(10 + 2x)$ ***or*** $2(10x) + 2x(8 + 2x)$

or $(10 + 2x)(8 + 2x) - 80$ (M1)

$= 4x(x + 9)$ (or equivalent) (A1)

(b) $A = 4x(x + 9) = 208$ (follow through from part (a)) (M1)

$\Rightarrow x = 4$ (***or*** Width = 4) (A1)

[4]