

Oxford Revise | AQA GCSE Maths Higher | Answers

Chapter 9 Factorising quadratic expressions and solving quadratic equations

Question	Answer	Extra information	Marks
9.1	$(x+1)^3 = (x+1)(x+1)(x+1)$ $= (x+1)(x^2 + 2x + 1)$ $= x^3 + 3x^2 + 3x + 1$	Expanding two sets of brackets Attempting to multiply this by the third set of brackets Correct answer	1 1 1
9.2 (a)	$(p-12)(p+3)$	Each correct bracket	2
9.2 (b)	$(x+10)(x-1)$	Each correct bracket	2
9.3	$x+9$ and $x-3$	Factorising correctly Giving the two sides	1 1
9.4 (a)	$(y+9)(y-9)$		1
9.4 (b)	$(2b+1)(2b-1)$		1
9.4 (c)	$4(2-y)(2+y)$		1
9.5 (a)	$(p-q)(p+q)$		1

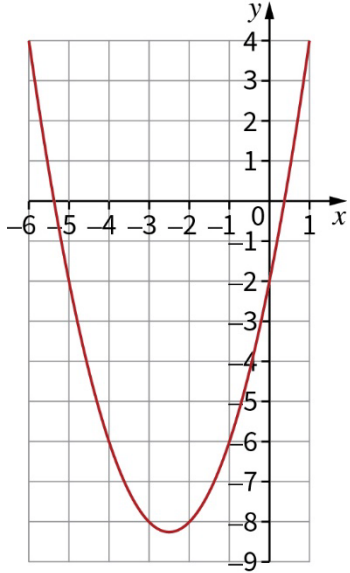
Question	Answer	Extra information	Marks
9.5 (b)	$(3-x)^2 - (3x+3)^2 = p^2 - q^2$ So: $(3-x)^2 - (3x+3)^2 = [(3-x) - (3x+3)][(3-x) + (3x+3)]$ $= (-4x)(6+2x)$ $= -24x - 8x^2$	Using part a to form a new expression Correct algebraic steps Correct answer	1 1 1
9.6 (a)	$(2x-1)(3x+4)$	Each correct bracket	2
9.6 (b)	$(6x+1)(2x+3)$	Each correct bracket	2
9.7	side length = $(3x+5)$ perimeter = $4(3x+5)$	Factorising correctly Multiplying the side length by 4	1 1
9.8 (a)	$(x-8)(x+1) = 0$ $x = 8$ or $x = -1$	Factorising Correct answer from the factorisation Both correct answers	1 1 1
9.8 (b)	$x(x+5) = 0$ $x = 0$ or $x = -5$	Factorising Correct answer from the factorisation Both correct answers	1 1 1
9.8 (c)	$(x+1)(x-1) = 0$ $x = -1$ or $x = 1$	Factorising Correct answer from the factorisation Both correct answers	1 1 1

Question	Answer	Extra information	Marks
9.9 (a)	$x^2 - 12x + 35 = 0$ $(x - 7)(x - 5) = 0$ $x = 7$ or $x = 5$	Rearranging to equal 0 Factorising 7 5	1 1 1 1
9.9 (b)	$x^2 + 3x - 10 = 0$ $(x - 2)(x + 5) = 0$ $x = 2$ or $x = -5$	Rearranging to equal 0 Factorising 2 -5	1 1 1 1
9.10 (a)	$(2x - 1)(x - 2) = 5$ $2x^2 - 5x + 2 = 5$ $2x^2 - 5x - 3 = 0$	Multiplying the two sides and equating to 5 Expanding the brackets Rearranging to find 0	1 1 1
9.10 (b)	$(2x + 1)(x - 3) = 0$ $x = -\frac{1}{2}$ or $x = 3$ $x = 3$ is the only realistic solution. Thus, the shorter side is $3 - 2 = 1$ cm	Factorising the quadratic Getting $x = 3$ Using this to get shorter side is 1 cm	1 1 1
9.11 (a)	$x = \frac{7 \pm \sqrt{(-7)^2 - 4 \times 3 \times (-10)}}{2 \times 3}$ $x = \frac{10}{3}$ or $x = -1$	Using the quadratic formula Getting one of the two solutions Getting both solutions	1 1 1

Question	Answer	Extra information	Marks
9.11 (b)	$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 5 \times (-20)}}{2 \times 5}$ $x = 1.64 \text{ or } x = -2.44$	Using the quadratic formula Getting one of the two solutions Getting both solutions	1 1 1
9.11 (c)	$x = \frac{-10 \pm \sqrt{10^2 - 4 \times (-2) \times (25)}}{2 \times (-2)}$ $x = -1.83 \text{ or } x = 6.83$	Using the quadratic formula Getting one of the two solutions Getting both solutions	1 1 1
9.12 (a)	$x = \frac{10 \pm \sqrt{(-10)^2 - 4 \times 1 \times 7}}{2}$ $= \frac{10 \pm 6\sqrt{2}}{2}$ $= 5 \pm 3\sqrt{2}$	Using the quadratic formula Getting one of the two solutions Getting both solutions	1 1 1
9.12 (b)	$x = \frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times (-11)}}{2}$ $= \frac{-2 \pm 4\sqrt{3}}{2}$ $= -1 \pm 2\sqrt{3}$	Using the quadratic formula Getting one of the two solutions Getting both solutions	1 1 1
9.13	Pavel neglected to notice the coefficient of the x^2 term The correct factorisation is $(2x+3)(x+2)$	Correct explanation of Pavel's mistake Correct factorisation	1 1
9.14 (a)	$(x+3)^2 - 4$	$(x+3)^2$ Correct answer	1 1

Question	Answer	Extra information	Marks
9.14 (b)	$(x-2)^2 + 6$	$(x-2)^2$ Correct answer	1 1
9.14 (c)	$(x-5)^2 - 25$	$(x-5)^2$ Correct answer	1 1
9.14 (d)	$\left(x + \frac{1}{2}\right)^2 + \frac{3}{4}$	$\left(x + \frac{1}{2}\right)^2$ Correct answer	1 1
9.15 (a)	$(x-1)^2 - 12$	$(x-1)^2$ Correct answer	1 1
9.15 (b)	$(x-1)^2 - 12 = 0$ $(x-1)^2 = 12$ $x-1 = \pm\sqrt{12}$ $x = 1 \pm \sqrt{12}$ $x = 1 \pm 2\sqrt{3}$	Attempt to make x the subject Correct answer	1 1
9.16 (a)	$2(x+2)^2 - 1$	Factorising out 2 $(x+2)^2$ Correct answer	1 1 1

Question	Answer	Extra information	Marks																				
9.16 (b)	$12 - (x^2 - 10x)$ $= 12 - [(x - 5)^2 - 25]$ $= 12 - (x - 5)^2 + 25$ $= 37 - (x - 5)^2$	Factorising out -1 $(x + 2)^2$ Correct answer	1 1 1																				
9.17 (a)	<table><tr><td>x</td><td>-6</td><td>-5</td><td>-4</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td></td></tr><tr><td>y</td><td>4</td><td>-2</td><td>-6</td><td>-8</td><td>-8</td><td>-6</td><td>-2</td><td>4</td><td></td></tr></table>	x	-6	-5	-4	-3	-2	-1	0	1		y	4	-2	-6	-8	-8	-6	-2	4		1 mark for each two correct values	1 1
x	-6	-5	-4	-3	-2	-1	0	1															
y	4	-2	-6	-8	-8	-6	-2	4															

Question	Answer	Extra information	Marks
9.17 (b)		Graph drawn correctly	2
9.17 (c)	$x = -5.4$ or $x = 0.4$		1

Question	Answer	Extra information	Marks
9.18	$2(x+1) - 4 \leq 3\left(x - \frac{4}{3}\right) < 3 + 2x$ $2x + 2 - 4 \leq 3x - 4 < 3 + 2x$ $2x - 2 \leq 3x - 4 < 3 + 2x$ $-2 \leq x - 4 < 3$ $2 \leq x < 7$	1 mark for each step of simplifying 3 marks if completely correct, including the correct inequality symbols	3
9.19	Correctly drawn lines, describing the isosceles triangle with vertices (4, 0), (7, 7) and (0, 4)	1 mark for each correctly drawn line: Graph showing solid line $7y - 3x = 28$ through (0, 4) and $(-9.\dot{3}, 0)$; dashed line $x + y = 4$ through (0, 4) and (4, 0); dashed line $3y - 7x = -28$ through (4, 0) and $(0, -9.\dot{3})$ Full marks for all three lines plus “isosceles triangle” mentioned	4