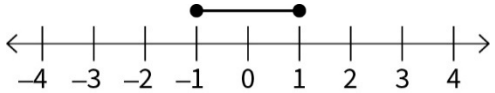
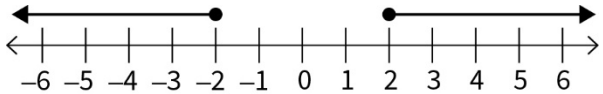
Oxford Revise | AQA GCSE Maths Higher | Answers

Chapter 10 Quadratic graphs, iterations, solving quadratic inequalities

Question	Answer	Extra information	Marks
10.1 (a)	$x^2 - 4 \leq -3$ $x^2 - 1 \leq 0$ Solution is $-1 \leq x \leq 0$ 	Finding -1 and 1 Correct solution Correct number line representation	1 1 1
10.1 (b)	$7x^2 \geq 28$ $x^2 \geq 4$ $x^2 - 4 \geq 0$ Solution is $x \leq -2$ or $x \geq 2$ 	Finding -2 and 2 Correct solution (using "or", not "and") Correct number line representation	1 1 1
10.2 (a)	$x^2 - 8x + 15 \leq 0$ $(x-5)(x-3) \leq 0$ Roots are 3 and 5 The quadratic is U shaped, so the solution is the set of numbers between 3 and 5, inclusive. In set notation, $\{x : 3 \leq x \leq 5\}$	Factorising or attempting to solve the quadratic Finding 3 and 5 Correct solution shown on a graph Correct solution in set notation	1 1 1 1

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Question	Answer	Extra information	Marks
10.2 (b)	$3x^2 - x - 4 > 0$ $(3x-4)(x+1) < 0$ Roots are $\frac{4}{3}$ and -1 The quadratic is U shaped, so the solution is the set of numbers less than -1 and greater than $\frac{4}{3}$ exclusive. In set notation, $\{x : x < -1\} \cup \left\{x : x > \frac{4}{3}\right\}$	Factorising or attempting to solve the quadratic Finding $\frac{4}{3}$ and -1 Correct solution shown on a graph Correct solution in set notation	1 1 1 1
10.2 (c)	$x^2 - 30 < -7x$ $x^2 + 7x - 30 < 0$ $(x+10)(x-3) < 0$ Roots are 3 and -10 The quadratic is U shaped, so the solution is the set of numbers between -10 and 3, exclusive. In set notation, $\{x : -10 < x < 3\}$	Factorising or attempting to solve the quadratic Finding 3 and -10 Correct solution shown on a graph Correct solution in set notation	1 1 1 1
10.3	$2n + 7 \geq 3$ $2n \geq -4$ $n \geq -2$ $\frac{12-n}{n^2} > 1$ $12 - n > n^2$ $n^2 + n - 12 < 0$ $(n+4)(n-3) < 0$ $-4 < n < 3$ Both are satisfied when $-2 \leq n < 3$	Correct method to solve $2n + 7 \geq 3$ Rearrange $\frac{12-n}{n^2} > 1$ to a suitable inequality Method to solve quadratic inequality $-4 < n < 3$ $-2 \leq n < 3$	1 1 1 1 1

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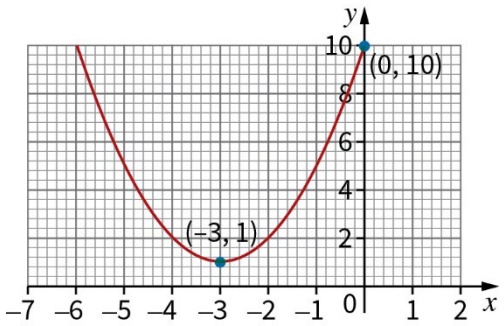
10.4	$14 < \frac{w^2 - 7}{3} < 31$ $42 < w^2 - 7 < 93$ $49 < w^2 < 100$ $w^2 < 100 \Rightarrow -10 < w < 10$ $w^2 > 49 \Rightarrow n < -7, n > 7$ Both are satisfied when $-10 < n < -7$ and also when $7 < n < 10$	Correct method to rearrange for w^2 $49 < w^2 < 100$ -10 and 10, or -7 and 7 $-10 < n < -7$ or $7 < n < 10$ Both inequality statements	1 1 1 1 1
10.5 (a)	When $x = 2, x^4 - 12x = -8$ When $x = 3, x^4 - 12x = 45$ As there is a change of sign, there is a root (solution) between 2 and 3	Substituting in 2 and 3 Correct conclusion	1 1
10.5 (b)	$x_0 = 2$ $x_1 = \sqrt[4]{12 \times 2} = 2.213...$ $x_2 = 2.270...$ $x_3 = 2.284...$ $x_4 = 2.288...$ $x_5 = 2.289...$ $x_6 = 2.289...$ The solution is 2.289, accurate to 3 dp	x_1 At least six iterations Correct answer with reason	1 1 1
10.6 (a)	The roots are where the curve crosses the x-axis, so they can be found where $y = 0$	Correct explanation	1

Question	Answer	Extra information	Marks
10.6 (b)	$x^3 + 5x^2 - 1 = 0$ $x^3 = 1 - 5x^2$ $x = \frac{1 - 5x^2}{x^2}$	Making x^3 the subject Correct answer	1 1
10.6 (c)	$x_0 = -4$ $x_1 = -4.937...$ $x_2 = -4.958...$ $x_3 = -4.959$ The solution is -4.96, to 2 dp	x_1 At least two further iterations Correct answer	1 1 1
10.6 (d)	$x^3 + 5x^2 - 1 = 0$ $5x^2 = 1 - x^3$ $x = \sqrt{\frac{1 - x^3}{5}}$	Making x^2 the subject Correct answer	1 1
10.6 (e)	$x_0 = 0$ $x_1 = 0.447...$ $x_2 = 0.426...$ $x_3 = 0.429...$ $x_4 = 0.429...$ The solution is 0.43, accurate to 2 dp	x_1 At least three further iterations Correct answer	1 1 1

Question	Answer	Extra information	Marks
10.6 (f)	$x_0 = -1$ $x_1 = -0.4$ $x_2 = -0.532...$ $x_3 = -0.432...$ $x_4 = -0.499...$ $x_5 = -0.450...$ $x_6 = -0.484...$ $x_7 = -0.459...$ The solution is -0.5, accurate to 1 dp	x_1 At least five further iterations Correct answer	1 1 1
10.7 (a)	$x^2 + 6x + 10 = (x+3)^2 + 1$ $a = 3,\ b = 1$	$a = 3$ $b = 1$	1 1
10.7 (b)	$(-3,\ 1)$		1

Question	Answer	Extra information	Marks
10.7 (c)		Shape correct with either *y*-intercept or turning point labelled. Shape correct with both *y*-intercept and turning point labelled.	1 1
10.8	$(x-1)(2-x)(x+4)$ $=(3x-2-x^2)(x+4)$ $=-x^3-x^2+10x-8$	Correct expansion of any two sets of brackets Attempt to multiply by the remaining set of brackets All terms correct, but unsimplified Fully correct and simplified	1 1 1 1
10.9	$x^2+25=6x$ $x^2-6x+25=0$ $x^2-6x+9-9+25=0$ $(x-3)(x-3)+16=0$ $(x-3)^2+16=0$	Rearrange to $x^2-6x+25=0$ Attempt to create $(x-3)^2$ Fully correct answer	1 1 1