Oxford Revise | Edexcel A Level Maths | Answers

- Method (**M**) marks are awarded for showing you know a method and have attempted to apply it.
- Accuracy (**A**) marks should only be awarded if the relevant M marks have been awarded.
- Unconditional accuracy (**B**) marks are awarded independently of M marks. They do not rely on method.
- The abbreviation **o.e.** means 'or equivalent (and appropriate)'.

Please note that:

- efficient use of advanced calculators is expected
- inexact numerical answers should be given to three significant figures unless the question states otherwise; values from statistical tables should be quoted in full
- when a value of g is required, it is taken as $g = 9.8 \, \text{m s}^{-2}$ unless stated otherwise in the question.
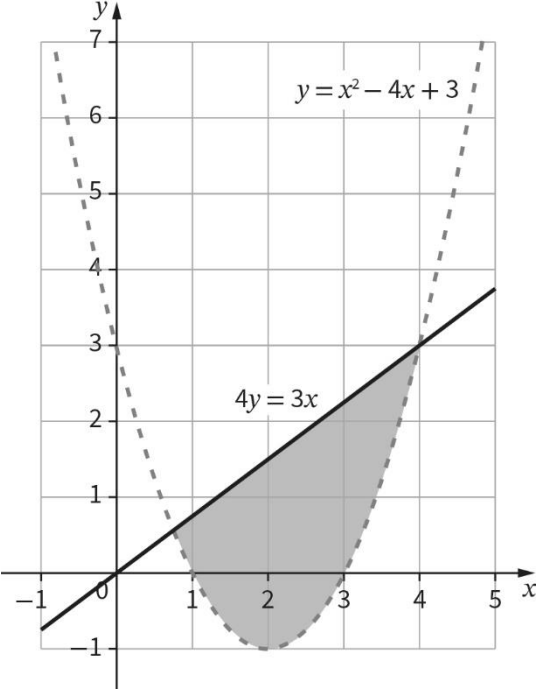
Chapter 4 Inequalities

Question	Answer	Extra information	Marks
4.1	$y \leq 5 + 2x - x^2$	Correct quadratic curve with correct inequality	B1
	$y > x - 1$	Correct line with correct inequality	B1
	$y \geq 2 - x$	Correct line with correct inequality	B1
	Total		**3 marks**
4.2 (a)	$1 - 2x > 4x + 4$ $6x < -3$ $x < -\dfrac{1}{2}$	Rearranging correctly Correct range	M1 A1

Question	Answer	Extra information	Marks
4.2 (b)	Critical values $\frac{2}{3}$ and -1	Identifying critical values	B1
	$-1 < x < \frac{2}{3}$	Correct range between critical values	B1
4.2 (c)	$-1 < x < -\frac{1}{2}$	Correct overlap of the two ranges	B1
	Total		**5 marks**
4.3 (a)	$b^2 - 4ac < 0$ $k^2 - 4 \times 1 \times 2 < 0$	Use of discriminant	M1
	$k^2 - 8 < 0$	Must see the calculation as this is a given answer	A1
4.3 (b)	$\left(k + \sqrt{8}\right)\left(k - \sqrt{8}\right) < 0$	Factorising using difference of two squares	M1
	$-\sqrt{8} < k < \sqrt{8}$	Correct range between critical values	A1
	Total		**4 marks**
4.4 (a)	$6k \le 48$ $k \le 8$	Use of constraint on perimeter	B1
	$2k^2 \ge 50$ $k^2 \ge 25$	Use of constraint on area	M1
	$k \le -5$ or $k \ge 5$	Area inequality solved	A1
	But $k \ge 0$ because it is the length of a real object. For both to be true $5 \le k \le 8$	Correct overlap of the two ranges	A1

Question	Answer	Extra information	Marks
4.4 (b)	Maximum area when $k = 8$ $8 \times 16 = 128 \text{ m}^2$	Use of the maximum value of k Correct maximum area	M1 A1
	Total		**6 marks**
4.5 (a)	$$b^2 - 4ac > 0$$ $$(-6)^2 - 4 \times k \times (10 - k) > 0$$ $$36 - 4k(10 - k) > 0$$ $$36 - 40k + 4k^2 > 0$$ $$4k^2 - 40k + 36 > 0$$ $$k^2 - 10k + 9 > 0$$	Use of discriminant Correctly deriving quadratic	M1 A1
4.5 (b)	$(k - 1)(k - 9) > 0$ $k < 1$ or $k > 9$	Attempting to solve quadratic. Can be implied from 1 and 9 seen. Correct range of values for k	M1 A1
	Total		**4 marks**
4.6	$10x^2 + 15x - 2x - 3 < 16x - 2$ $\quad\quad 10x^2 - 3x - 1 < 0$ $\quad (5x + 1)(2x - 1) < 0$ Critical values $x = -0.2$ and $x = 0.5$ $-0.2 < x < 0.5$ $\{x : -0.2 < x < 0.5\}$	Correctly expanding brackets and collecting terms on one side Solving to find both critical values Choosing the inside region Correct solution in set notation	M1 M1 M1 A1
	Total		**4 marks**

Question	Answer	Extra information	Marks
4.7	$(x-7)(x+2) > -20$ $x^2 - 7x + 2x - 14 + 20 > 0$ $x^2 - 5x + 6 > 0$ $(x-2)(x-3) > 0$	Expanding and collecting terms to correctly derive quadratic	M1
	Critical values are: $x = 2$ and $x = 3$	Solving to find both critical values	M1
	$x < 2$ or $x > 3$	Correct range of values for x	A1
	Total		**3 marks**
4.8	$x = 0$ is a critical value	Identifying one critical value	B1
	$x = 6$ is a critical value	Identifying second critical value	B1
	$x = \{x: x < 0\} \cup \{x: x > 6\}$	Correct range, written in set notation. 3 marks can be given for this set notation line.	B1
	Total		**3 marks**

Question	Answer	Extra information	Marks
4.9 (a) and (b)		Straight line drawn through $(0, 0)$ and $(4, 3)$	B1
		Quadratic curve with correct intercepts labelled	B1
		Solid line and dashed curve	B1
		Correct area shaded	B1
	Total		**4 marks**

Question	Answer	Extra information	Marks
4.10	$8 - x = 2x^2 + 2kx + 10$	Valid substitution	M1
	$2x^2 + (2k + 1)x + 2 = 0$	Correct quadratic	A1
	$b^2 - 4ac < 0$		
	$(2k + 1)^2 - 4 \times 2 \times 2 < 0$	Use of discriminant	M1
	$4k^2 + 4k + 1 - 16 < 0$		
	$4k^2 + 4k - 15 < 0$	Deriving correct quadratic	M1
	$(2x - 3)(2x + 5) < 0$	Attempting to solve quadratic	M1
	$x = 1.5$ and $x = -2.5$ are critical values	Solving to find both critical values	A1
	$\{x: -2.5 < x < 1.5\}$	Correct range, written in set notation	A1
	Total		**7 marks**
4.11 (a)	$2x^2 - 5x - 1 = 8 + x - x^2$	Equating the two expressions	M1
	$3x^2 - 6x - 9 = 0$	Deriving quadratic and attempting to solve	M1
	$x^2 - 2x - 3 = 0$		
	$(x - 3)(x + 1) = 0$		
	$x = 3$ and $x = -1$	Correct solutions	A1
	$(3, 2)$ and $(-1, 6)$	Both y coordinates identified	A1
4.11 (b)	$-1 < x < 3$		
	The g(x) curve is above the f(x) curve in this interval	Correct inequality and explanation	B1
	Total		**5 marks**

Question	Answer	Extra information	Marks
4.12	$$2x + 2 = \frac{2}{1+x}$$ $$(2x+2)(1+x) = 2$$ $$2x + 2x^2 + 2 + 2x - 2 = 0$$ $$2x^2 + 4x = 0$$ $$x^2 + 2x = 0$$ $$x(x+2) = 0$$ $x = 0$ or $x = -2$ When $x = 0$, $y = 2$ When $x = -2$, $y = -2$	Correct substitution Attempting to solve the equation Correct solutions Both y values identified	M1 M1 A1 A1
	Total		**4 marks**