

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 3 Simultaneous equations

Question	Answer	Extra information	Marks
3.1 (a)	$x^2 - 3x + 2 = x + 2$ $x^2 - 4x = 0$	Correct rearrangement	M1
3.1 (b)	$x^2 - 4x = 0$, therefore $x(x - 4) = 0$ and $x = 0$ or $x = 4$ When $x = 0$, $y = 2$ When $x = 4$, $y = 6$ Therefore, the coordinates are $(0, 2)$ and $(4, 6)$	For both x -intercepts Both pairs of coordinates correct	M1 A1
	Total		3 marks

Question	Answer	Extra information	Marks
3.2	$x^2 - 6x + 1 = x^2 - 4x - 2x + 2 - 1$ $x^2 - 4x - 2x + 2 - 1 = 0$ $x^2 - 4x + 2 = 2x + 1$ <p>Therefore, the student should draw the line $y = 2x + 1$</p>	<p>For any attempt to construct the required expression from the given one</p> <p>Correct rearrangement</p> <p>Correct line</p>	<p>M1</p> <p>M1</p> <p>A1</p>
	Total		3 marks
3.3 (a)	<p>When $y = 0$</p> $0 = 3x - 9$ $x = 3$ <p>Coordinates of point A are (3, 0)</p>	<p>Correct substitution</p> <p>Correct coordinates</p>	<p>M1</p> <p>A1</p>
3.3 (b)	$(6 - x)^2 = 3x - 9$ $36 - 12x + x^2 = 3x - 9$ $x^2 - 15x + 45 = 0$ $x = \frac{15 \pm \sqrt{225 - 4 \times 45}}{2}$ $= \frac{15 \pm \sqrt{45}}{2}$ <p>$x = 10.9, y = -4.85$ and $x = 4.15, y = 1.85$</p> <p>Coordinates of point B are (4.15, 1.85)</p> <p>Coordinates of point C are (10.9, -4.85)</p>	<p>Correct substitution</p> <p>For quadratic</p> <p>Attempting to solve quadratic. Can be implied by correct solutions.</p> <p>Correct coordinates</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>
	Total		6 marks

Question	Answer	Extra information	Marks
3.4	$28x + 126y = -7$ $28x - 60y = 4k$ $186y = -7 - 4k$ <p>Finding one variable in terms of k:</p> $y = \frac{-7 - 4k}{186}$ <p>Substituting the first variable back into one of the equations, or eliminating the other variable by adding or subtracting the equations:</p> $x = \frac{6k - 5}{62}$	<p>Valid first step. Allow any valid method.</p> <p>Correct expression for x or y in terms of k</p> <p>Any correct procedure to find the other variable</p> <p>Correct expression for the second variable</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>
	Total		4 marks
3.5	$x^2 + (x + 1)^2 = k$ $2x^2 + 2x + (1 - k) = 0$ $b^2 - 4ac = 4 - 8(1 - k) = -4 + 8k = 0$ $8k = 4$ $k = \frac{4}{8} = \frac{1}{2}$	<p>Substituting the linear equation into the circle</p> <p>Forming an equation in one variable</p> <p>The circle and line meet in only one place, so there are equal roots</p> <p>Correct value of k</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	Total		4 marks
3.6 (a)	<p>Line 3 should be $3x + 6 = 2y$ They forgot to multiply the 2 by 3</p> <p>Line 6 should contain $2x^2$ They forgot to multiply x^2 by 2</p>	<p>Correctly identifying a mistake</p> <p>Correctly identifying a second mistake</p>	<p>B1</p> <p>B1</p>

Question	Answer	Extra information	Marks
3.6 (b)	$8^{x+2} = 4^y$ $(2^3)^{x+2} = (2^2)^y$ $3x + 6 = 2y$ $y = \frac{3x + 6}{2}$ $x^2 + \left(\frac{3x + 6}{2}\right) = 4$ $(2x - 1)(x + 2) = 0$ $2x^2 + 3x + 6 = 8$ $2x^2 + 3x - 2 = 0$ $x = \frac{1}{2}, x = -2$ $y = 4 - x^2$ $x = \frac{1}{2}, y = \frac{15}{4}$ $x = -2, y = 0$	<p>Expressing both as a power of 2 and equating the indices</p> <p>Substituting for y</p> <p>Solving for x</p> <p>Find the corresponding values of y. Both pairs of solutions correct.</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	Total		6 marks

Question	Answer	Extra information	Marks
3.7	$x^2 - 4x + 8 = 2x + k$ $x^2 - 6x + 8 - k = 0$ $b^2 - 4ac > 0$ $36 - 4(8 - k) > 0$ $36 - 32 + 4k > 0$ $4k > -4$ $k > -1 \quad (\text{therefore } n = -1)$	<p>Correct first step</p> <p>For correct rearrangement</p> <p>Use of discriminant</p> <p>Correct substitution</p> <p>Correct range</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	Total		5 marks
3.8	$x(4 - x) + 1 = 2x^2$ $4x - x^2 + 1 = 2x^2$ $3x^2 - 4x - 1 = 0$ $x = \frac{4 \pm \sqrt{28}}{6}$ $x = \frac{2 \pm \sqrt{7}}{3}$	<p>Any valid substitution</p> <p>A quadratic in one variable</p> <p>Correct substitution into quadratic formula</p> <p>Correct simplification</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	Total		4 marks

Question	Answer	Extra information	Marks
3.9	$x^2 + (3 + 2x)^2 = 16$ $x^2 + 9 + 12x + 4x^2 - 16 = 0$ $5x^2 + 12x - 7 = 0$ $x = \frac{-12 \pm \sqrt{144 + 4 \times 35}}{10}$ $x = \frac{-6 \pm \sqrt{71}}{5}$	<p>A valid substitution</p> <p>A quadratic in one variable</p> <p>Correct substitution into quadratic formula</p> <p>Correct simplification</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>
	Total		4 marks
3.10 (a)	4.5 (m)	Correct value from equation	B1
3.10 (b)	$4 = 4.5 - 0.45(x - 2.5)^2$ $x = 1.4459 \text{ or } x = 3.5541$ <p>Time spent above 4 metres: $3.5541 - 1.4459 = 2.11$ seconds</p>	<p>Correct substitution and attempting to solve</p> <p>Two correct values of x</p> <p>Calculating difference</p>	<p>M1</p> <p>A1</p> <p>A1</p>
	Total		4 marks

Question	Answer	Extra information	Marks
3.11	$2x^2 + 3kx - 9k = 20 \Rightarrow 2x^2 + 3kx - (9k + 20) = 0$ $b^2 - 4ac = 9k^2 + 8(9k + 20) = 9k^2 + 72k + 160$ $= 9(k + 4)^2 - 144 + 160$ $= 9(k + 4)^2 + 16$ Since squares cannot be negative, $9(k + 4)^2 + 16 \geq 0$ for all values of k Therefore, $2x^2 + 3kx - 9k = 20$ will have two real roots for all values of k	Rearranging into quadratic equal to 0 Use of discriminant Completing the square Valid conclusion	M1 M1 M1 A1
	Total		4 marks
3.12 (a)	$3x^2 + 12x + 11$ $= 3(x^2 + 4x) + 11$ $= 3[(x + 2)^2 - 4] + 11$ $= 3(x + 2)^2 - 1$	Correct first step Completing the square Simplifying	M1 M1 A1
3.12 (b)	$(-2, -1)$	Identifying correct coordinates	B1
	Total		4 marks