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 2 Quadratics and their graphs

Question	Answer	Extra information	Marks
2.1	$x^2 - 2x + 6 = (x-1)^2 + 5$	Completing the square	M1
	Since square numbers are always ≥ 0, the expression will always be greater than or equal to 5, which is greater than 0	Correct conclusion	A1
	Total		**2 marks**
2.2 (a)	$2x^2 + 20x + 17 = 2(x^2 + 10x) + 17$	Correct factorisation	M1
	$= 2[(x + 5)^2 - 25] + 17$	Completing the square	M1
	$= 2(x + 5)^2 - 33$	Simplifying	A1
2.2 (b)	–33	Correct minimum	B1

Question	Answer	Extra information	Marks
2.2 (c)	–5	Correct value	B1
	Total		**5 marks**
2.3	Since the x-intercepts are 1 and 3, the equation will be of the form $y = a(x - 1)(x - 3)$ The y-intercept of this equation will be at $a \times (-1) \times (-3) = 3a$ Since the y-intercept is at 9, this means that $a = 3$ The equation of the curve is therefore $y = 3(x - 1)(x - 3)$, which expands to $y = 3x^2 - 12x + 9$	Use of general equation Correct equation for constant term Correct a value Correct equation	M1 M1 M1 A1
	Total		**4 marks**
2.4 (a)	$(a - 5)(a - 1) = 0$ $a = 5$ or $a = 1$	Attempting to solve. Can be implied from correct solutions. Correct solutions	M1 A1
2.4 (b)	$a = \sqrt{b}$ $b = a^2$, therefore b = ‘5’^{2} = 25 or b = ‘1’^{2} = 1	Correct substitution Use of their results from (a)	M1 A1
	Total		**4 marks**

Question	Answer	Extra information	Marks
2.5	One example where it is either true or false. For example: If $x = 5$, $(5 - 5)^2 + 10 = 10$; $4 \times 5 = 20$ 10 is not greater than 20, so the statement is false. One example where it is the opposite. For example: If $x = 12$, $(12 - 5)^2 + 10 = 49$; $4 \times 12 = 48$ 59 is greater than 48, so the statement is true. The student's claim is sometimes true.	One example showing claim is either true or false Second example to show opposite result Correct conclusion	M1A1 A1 A1
	Total		**4 marks**
2.6 (a)	$\sqrt{p}(3-81p\sqrt{p})$ Since $p \neq 0$ $3-81p\sqrt{p}=0$ $3=81p\sqrt{p}$ $1=27p\sqrt{p}$ $p^{\frac{3}{2}}=\frac{1}{27}$ $p^3=\frac{1}{729}$ $p=\frac{1}{9}$	Any correct first step Statement that expression inside brackets = 0 Correct solution	M1 M1 A1

Question	Answer	Extra information	Marks
2.6 (b)	$x^4 - 20x^2 + 64 = (x^2)^2 - 20(x^2) + 640$ $(x^2 - 4)(x^2 - 16) = 0$ $x^2 = 4$ or $x^2 = 16$ $x = 2, -2, 4$ or -4	Identifying quadratic in x^2 Correct values for x^2 All four solutions	M1 M1 A1
	Total		**6 marks**
2.7	$2\sin^2\theta + \sin\theta - 1 = 0$ $(2\sin\theta - 1)(\sin\theta + 1) = 0$ $\sin\theta = \frac{1}{2}$ or $\sin\theta = -1$ $\theta = 30°, \theta = -90°$	Identification of quadratic in sin θ Correct values for sin θ Both solutions correct	M1 M1 A1
	Total		**3 marks**
2.8 (a)	£350	Maximum point correctly identified	B1
2.8 (b)	$x - 8 = 0$ £8	 Correct value	 B1
2.8 (c)	$P = 350 - 14(15 - 8)^2$ $= -£336$ They would make a loss of £336	Correct substitution Correct conclusion	M1 A1

Question	Answer	Extra information	Marks
2.8 (d)	$350-14(x-8)^2=200$ $x-8=\pm3.27$ $x=11.27$ or $x=4.73$ £5	Correct substitution Sight of ±3.27 Both solutions, to at least 3 s.f. Correct conclusion	M1 M1 M1 A1
	Total		**8 marks**
2.9 (a)	$4x^3-37x^2+9x=0$ $x(4x^2-37x+9)=0$ $x(4x-1)(x-9)=0$ $x=0,\ x=\frac{1}{4},\ x=9$	Rearranging One factor found Fully factorising All three correct solutions	M1 M1 M1 A1
2.9 (b)	$x=(y+3)^2$ $(y+3)^2=0 \Rightarrow y=-3$ $(y+3)^2=\frac{1}{4} \Rightarrow y+3=\pm\frac{1}{2} \Rightarrow y=-2.5$ or $y=-3.5$ $(y+3)^2=9 \Rightarrow y+3=\pm3 \Rightarrow y=0$ or $y=-6$	Identifying substitution Correct solution Both solutions for second equation Both solutions for third equation	M1 A1 A1 A1
	Total		**8 marks**

Question	Answer	Extra information	Marks
2.10	$(-2)^2 - 4 \times 1 \times (k + 1) = 0$ $4 - 4(k + 1) = 0$ $4 = 4(k + 1)$ $1 = k + 1$ $k = 0$ So having exactly one real root implies that $k = 0$	Use of $b^2 - 4ac = 0$ seen or implied Correct solution	M1 A1
	Total		**2 marks**
2.11	The x-intercepts are 20 and 140, so the equation will be of the form $J = a(x - 20)(x - 140)$ The graph is symmetrical, so the maximum point will be at $x = 80$ When $x = 80$, $y = 360$, which is the maximum number of jackets sold. Substituting $x = 80$ into the equation and setting it equal to 360 gives: $360 = a(80 - 20)(80 - 140)$ $360 = a(60)(-60)$ $a = 360 \div -3600 = -0.1$ The equation of the curve is therefore $J = -\frac{1}{10}(x-20)(x-140)$ which, in the required form, expands to $J = -\frac{1}{10}x^2 + 16x - 280$	Expressing as general quadratic. Both x-intercepts must be identified for mark. Use of symmetrical property Coordinates of turning point identified Use of the constant term to find the value of a Correct equation in correct form	M1 M1 M1 M1 A1
	Total		**5 marks**

Question	Answer	Extra information	Marks
2.12 (a)	$-2x^2 + 12x - k = -2(x^2 - 6x) - k$ $= -2[(x-3)^2 - 9] - k$ $= -2(x-3)^2 + (18-k)$	Correct first step Completing the square Simplifying	M1 M1 A1
2.12 (b)	$18 - k$	Correct maximum	B1
2.12 (c)	When $x = -4$, $y = 0$ $0 = -2 \times (-4)^2 + 12 \times -4 - k$ $0 = -2 \times 16 - 48 - k$ $k = -32 - 48$ $k = -80$ or When $x = 10$ $y = -2 \times (10)^2 + 12 \times -10 - k$ $y = -2 \times 100 + 12 \times 10 - k$ $k = -200 + 120$ $k = -80$	Correct method using either intercept Correct value of k	M1 A1
	Total		**6 marks**
2.13	$2 \times 2^{2x} - 9 \times 2^x + 4 = 0$ $(2 \times 2^x - 1)(2^x - 4) = 0$ $2^x = \frac{1}{2}$ or $2^x = 4$ $x = -1$ or $x = 2$	Identifying quadratic in 2^x For both solutions of the quadratic Both solutions correct	M1 M1 A1
	Total		**3 marks**

OXFORD REVISE

Question	Answer	Extra information	Marks
2.14 (a)	To have one repeated root $b^2 - 4ac = 0$ $(-5k)^2 - 4 \times 1 \times (9k + 7) = 0$ $25k^2 - 36k - 28 = 0$ Using the quadratic equation: $k = \frac{36 \pm \sqrt{1296 - 4 \times 25 \times (-28)}}{50}$ $= \frac{36 \pm \sqrt{4096}}{50}$ $= \frac{36 \pm 64}{50}$ or by factorising: $(25k + 14)(k - 2) = 0$ $k = 2$ is the only valid solution	Statement of rule Correct method Any attempt to solve quadratic. Can be implied by sight of correct solutions. Correct conclusion	B1 M1 M1 A1
2.14 (b)	When $k = 2$ $f(x) = x^2 - 10x + 25$ $x^2 - 10x + 25 = 0$ $(x - 5)^2 = 0$ $x = 5$	Substituting their value for k from (a) Identification of perfect square. Can be implied by correct final answer. Correct solution	M1 M1 A1
	Total		**7 marks**

Question	Answer	Extra information	Marks
2.15	When n is even, $n = 2k$ $n^3 + 6 = (2k)^3 + 6$ $= 8k^3 + 6$ which is not divisible by 8	Correct proof for all even n	M1
	When n is odd, $n = 2k + 1$ $n^3 + 6 = (2k + 1)^3 + 6$ $= 8k^3 + 12k^2 + 6k + 1 + 6$ $= 2(4k^3 + 6k^2 + 3k + 3) + 1$	Correct proof for all odd n	M1
	Odd numbers are not divisible by 8 as all multiples of 8 are even.	Valid reasoning	M1
	Therefore, $n^3 + 6$ is never divisible by 8, for all $n \in \mathbb{N}$	Correct conclusion	A1
	Total		**4 marks**
2.16	$42^2 - 42 + 41 = 1763$, which is 41×43 and therefore not prime.	Any valid counter example	B1
	Total		**1 mark**

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