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 $g = 9.8\,\text{m}\,\text{s}^{-2}$ unless stated otherwise in the question.

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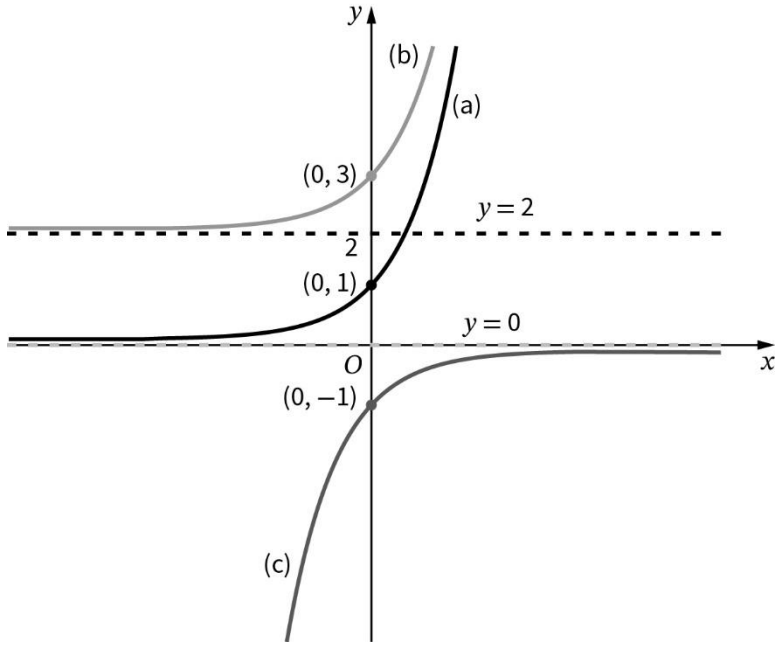
Chapter 16 Exponential functions

Question	Answer	Extra information	Marks
16.1 (a) (b) (c)		B1 for correct shape and B1 for correct location indicated by asymptote/*y*-intercept for each graph	B1B1 B1B1 B1B1
	Total		**6 marks**

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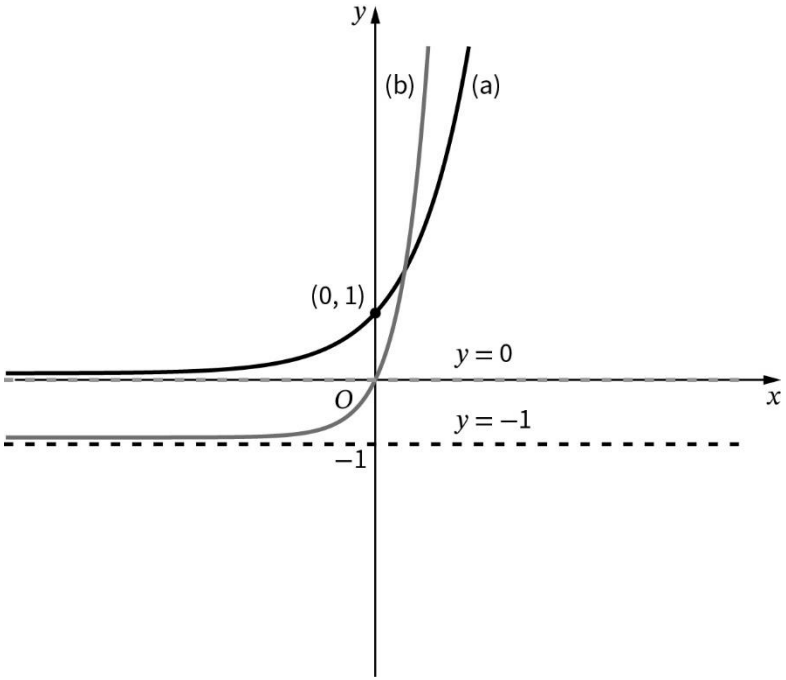
Question	Answer	Extra information	Marks
16.2 (a) (b)		(a) B1 for correct shape B1 for correct location indicated by asymptote/*y*-intercept (b) B1 for correct shape B1 for correct intercept B1 for correct asymptote	B1 B1 B1 B1 B1
	Total		**5 marks**
16.3 (a)	7		B1
16.3 (b)	$28 = 7 \times a^2$ $a = 2$	Attempting to solve with their k Correct a value	M1 A1
	Total		**3 marks**

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Question	Answer	Extra information	Marks
16.4 (a)	$c = 1$ $5 = A + 1$ $A = 4$	Correct c value Attempting to solve with their c Correct A value	B1 M1 A1
16.4 (b)	Negative: graph slopes downward from left to right.	Do not accept 'negative' only without explanation	B1
	Total		**4 marks**
16.5 (a)	£120 000 is the value of the house when purchased.	Correct answer	B1
16.5 (b)	$120\,000 \times e^{\frac{4}{6}}$ = £233 728	Correct substitution Correct value	M1 A1
16.5 (c)	The value will increase without limit.		B1
	Total		**4 marks**
16.6 (a)	300	Correct answer	B1
16.6 (b)	$100e^{\frac{8}{4}} + 200 = 938.9...$ so 939	Correct substitution Correct population. Accept 938	M1 A1

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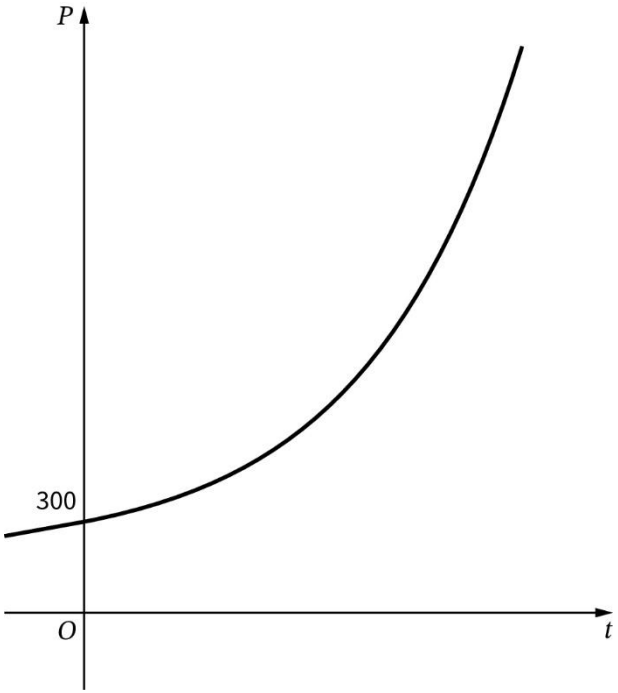
Question	Answer	Extra information	Marks
16.6 (c)		B1 for shape B1 for clear indication of *y*-intercept 300	B1 B1
16.6 (d)	The population will increase without limit, which is unlikely because of limited space and food supplies.	Any valid reason	B1
	Total		**6 marks**
16.7 (a)	$C = Ae^{kt}$ (o.e.) $95 = Ae^{0} \Rightarrow A = 95$ $92.5 = 95e^{k} \Rightarrow k = -0.02666\ldots = -0.0267$ Hence $C = 95e^{-0.0267t}$	Correct choice of model Substituting values Substituting values Correct answer	M1 M1 M1 A1

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Question	Answer	Extra information	Marks
16.7 (b)	$C = 95e^{-0.267} = 72.7\ldots$ The model is reliable since $72.7 \approx 70$	Correct substitution Correct conclusion	M1 A1
16.7 (c)	Make the –0.0267 less negative (o.e.)	Correct answer	B1
	Total		**7 marks**
16.8 (a)	$A + 100 = 3100 \Rightarrow A = 3000$ $100e^{15k} = 211.7$ $\Rightarrow k = 0.04999\ldots = 0.05$	Correct method Substituting values Correct value of k	B1 M1 A1
16.8 (b)	Rate of change $= 0.05 \times 100e^{0.05t}$ $= 5e^{0.05t}$ $8 = 5e^{0.05T} \Rightarrow T = 9.400\ldots$ $= 9$ days	Writing expression for rate of change Correct expression Substituting and solving for T Correct value of T	M1 A1 M1 A1
	Total		**7 marks**
16.9 (a)	$15\,000 \times e^{-0.3 \times 2}$ = £8232	Correct substitution Correct value	M1 A1

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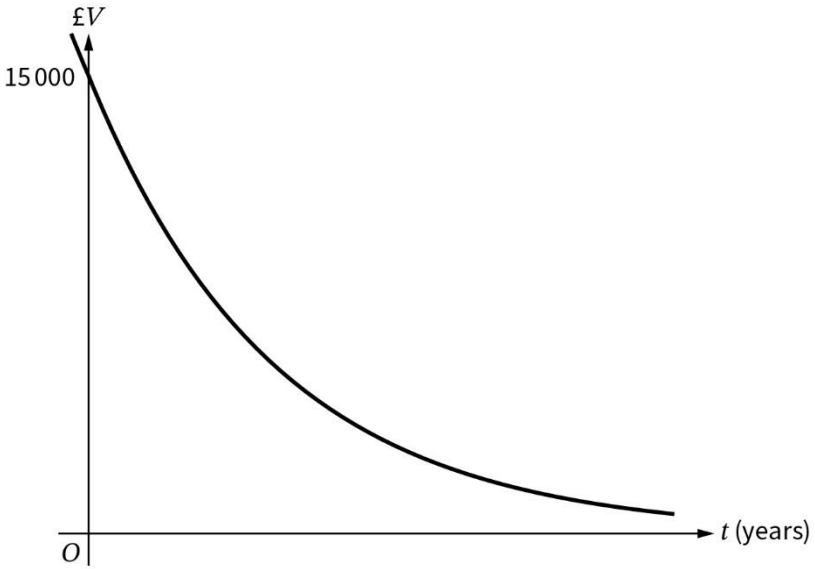
Question	Answer	Extra information	Marks
16.9 (b)		B1 for shape B1 for clear identification of 15 000 as the *y*-intercept	B1 B1
16.9 (c)	Value approaches zero	Correct answer	B1
16.9 (d)	1500 represents a minimum value of the car. This is more realistic since the value of the car is unlikely to ever reach zero.	Both meaning and explanation required for mark	B1
	Total		**6 marks**
16.10 (a)	g(2) = 7 f(7) = 351	Attempting to find g(2) Correct answer	M1 A1

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Question	Answer	Extra information	Marks
16.10 (b)	$y = x^3 + 8$ $\sqrt[3]{y-8} = x$ $f^{-1}(x) = \sqrt[3]{x-8}$	 Attempting to rearrange Correct inverse	 M1 A1
16.10 (c)	$g(x) \geq 3$	Accept $y \geq 3$	B1
16.10 (d)	$x^3 + 8 \geq 1$ $\Rightarrow x \geq \sqrt[3]{-7}$	Attempting to solve inequality Correct domain. Accept any domain where $x \geq \sqrt[3]{-7}$	M1 A1
	Total		**7 marks**
16.11 (a)	$f(1) = 1^3 + 1^2 + 3 \times 1 - 5$ $= 1 + 1 + 3 - 5$ $= 0$ Hence $(x - 1)$ is a factor	Correct substitution Correct conclusion	M1 A1
16.11 (b)	$x^3 + x^2 + 3x - 5 = (x - 1)(x^2 + bx + c)$ $x^3 + x^2 + 3x - 5 = x^3 + (b - 1)x^2 + \ldots - c$ $c = 5, b - 1 = 1 \Rightarrow b = 2$ $(x - 1)(x^2 + 2x + 5)$	Attempting to find quadratic through comparing coefficients or by division Correct factorisation	M1 A1
16.11 (c)	$2^2 - 4 \times 1 \times 5 = -16$ The quadratic factor has no real roots and hence the cubic has just one real root (at $x = 1$).	Attempting to find discriminant Correct explanation	M1 A1
	Total		**6 marks**

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