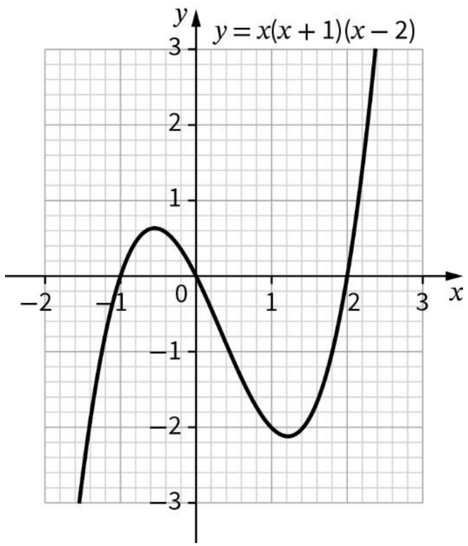
Oxford Revise | Edexcel A Level Maths | Answers

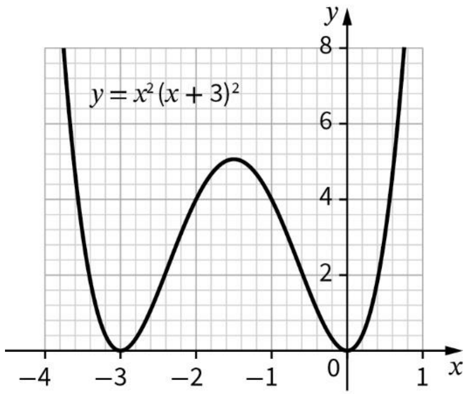
- Method (**M**) marks are awarded for showing you know a method and have attempted to apply it.
- Accuracy (**A**) marks should only be awarded if the relevant M marks have been awarded.
- Unconditional accuracy (**B**) marks are awarded independently of M marks. They do not rely on method.
- The abbreviation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

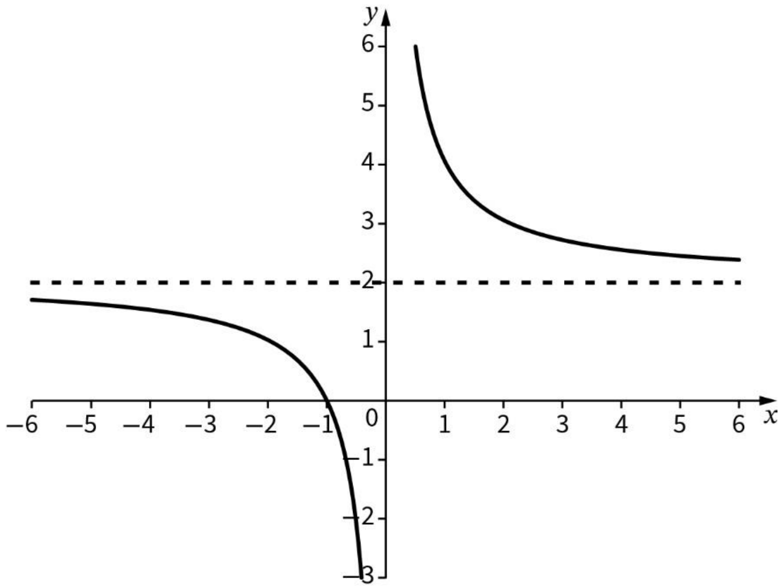
Please note that:

- 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 6 Graphs of functions

Question	Answer	Extra information	Marks
6.1		Correct shape of curve Correct x-intercepts	B1 B1
	Total		**2 marks**

Question	Answer	Extra information	Marks
6.2		Correct shape of curve Correct x-intercepts	B1 B1
	Total		**2 marks**
6.3 (a)	$0 = \dfrac{k}{x} + 2$ $-2 = \dfrac{k}{x} \Rightarrow x = -\dfrac{k}{2}, y = 0$	Setting $y = 0$ Solving to find x in terms of k	M1 A1

Question	Answer	Extra information	Marks
6.3 (b)	 $y = 2$	Correct shape of curve. Must have both branches. Horizontal asymptote shown Equation of asymptote	B1 B1 B1
	Total		**5 marks**
6.4 (a)	$f(x) = x(x^2 + x - 6)$ $f(x) = x(x + 3)(x - 2)$	Taking out x as a factor Fully correct factorisation	M1 A1
6.4 (b)	$x(x + 3)(x - 2) = 0$ $x = 0, x = -3, x = 2$	All three solutions correct	B1

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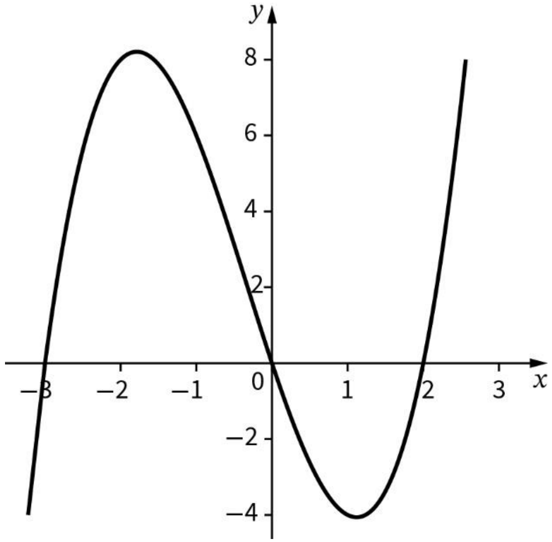
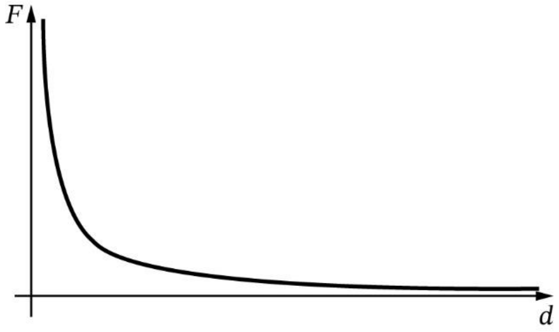
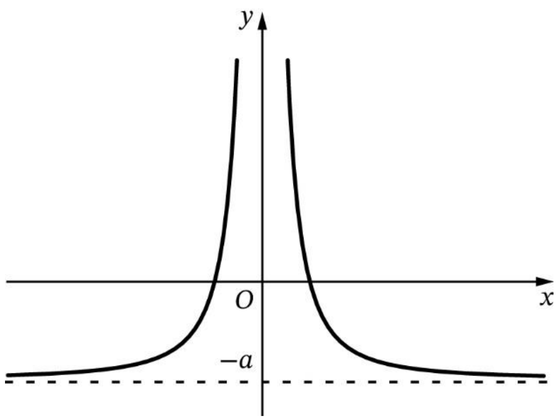
Question	Answer	Extra information	Marks
6.4 (c)		Correct shape of curve Correct x-intercepts at −3 and 2	B1 B1
6.4 (d)	$x^3+x^2-6x=9+3x$ $x^3+x^2-6x-9-3x=0$ $x^2(x+1)-9(x+1)=0$ $(x^2-9)(x+1)=0$ $(x+3)(x-3)(x+1)=0$ $x=-3,\ y=0 \Rightarrow\ (-3,\ 0)$ $x=3, y=18\ \Rightarrow\ (3,\ 18)$ $x=-1, y=6 \Rightarrow\ (-1,\ 6)$	Correctly equating expressions and moving terms to one side Fully factorising the expression Solving for x and finding the corresponding y-coordinates	M1 M1 A1
	Total		**8 marks**

Question	Answer	Extra information	Marks
6.5	$y = x$ and $2y - x = 6$ $2y - y = 6$ $y = 6$ When $y = 6$, $x = 6$, so the point is (6, 6) $y = -x$ and $2y - x = 6$ $2y + y = 6$ $3y = 6$ $y = 2$ When $y = 2$, $x = -2$, so the point is (–2, 2)	Attempting to solve 'positive' version of the modulus function Finding one variable Both coordinates correct Attempting to solve 'negative' version of the modulus function Finding one variable Both coordinates correct	M1 M1 A1 M1 M1 A1
	Total		**6 marks**
6.6	Because the graph does not pass through the origin	Correct explanation	B1
	Total		**1 mark**
6.7	Because the area of a circle is a multiple of the square of its radius, not of its radius	Correct explanation	B1
	Total		**1 mark**

Question	Answer	Extra information	Marks
6.8 (a)		For single curve with correct shape For the curve approaching both positive axes as asymptotes	B1 B1
6.8 (b)	$F = \dfrac{k}{d^2}$ $\dfrac{k}{(0.95d)^2} = \dfrac{1}{0.95^2} \times \dfrac{k}{d^2}$ $= 1.108033... \times \dfrac{k}{d^2}$, so an increase of 10.8%	Correct format for this type of proportionality Attempting to calculate the increase Correct interpretation of the calculation	M1 M1 A1
	Total		**5 marks**
6.9 (a)	$a = kb$ $b = jc$ where j, k are constants $a = k(jc)$ $a = (jk)c$ j, k are constants, so jk is also constant Therefore, a is directly proportional to c	Correct structure for direct proportion Substituting for b and correct conclusion	M1 A1

Question	Answer	Extra information	Marks
6.9 (b)	$8 = 2k$, so $k = 4$ $3 = 6j$, so $j = 0.5$ Therefore, $a = 4 \times 0.5 \times c$ So, $c = 0.5a$	Correctly substituting $a = 8$, $b = 2$ to find k Correctly substituting $b = 3$, $c = 6$ to find j Correct formula	M1 M1 A1
6.9 (c)	$5 = 0.5a$ $a = 10$	 Correct value for a	 B1
	Total		**6 marks**
6.10 (a)	 $y = -a$	Correct shape curve. Must have both branches. Horizontal asymptote shown, where $a > 0$ Equation of asymptote	B1 B1 B1

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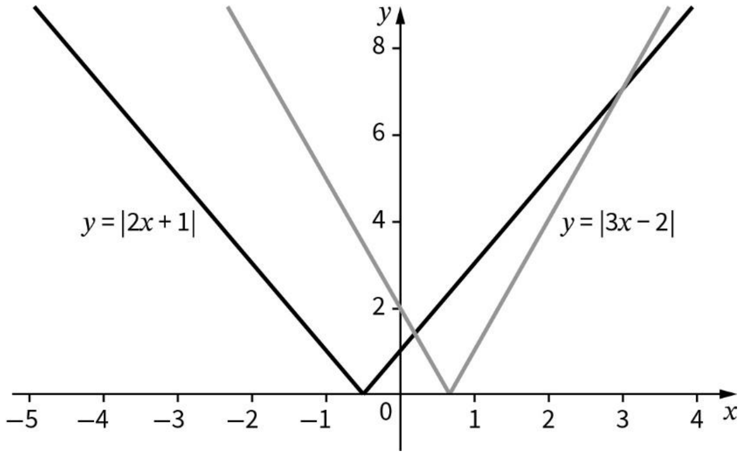
Question	Answer	Extra information	Marks
6.10 (b)	$0 = \frac{k}{x^2} - a$ $x^2 = \frac{k}{a} \Rightarrow x = \pm\sqrt{\frac{k}{a}}$ $\left(\sqrt{\frac{k}{a}}, 0\right)$ and $\left(-\sqrt{\frac{k}{a}}, 0\right)$	Setting $y = 0$ Correct positive x value Correct negative x value	M1 A1 A1
6.10 (c)	$\left(\sqrt{\frac{8}{2}}, 0\right)$ and $\left(-\sqrt{\frac{8}{2}}, 0\right)$ $x = 2$ or $x = -2$	Substituting $k = 8$ and $a = 2$ into expression from (b) Both values correct	M1 A1
	Total		**8 marks**

Question	Answer	Extra information	Marks
6.11 (a)		f(x) = |2x + 1| correct shape with point in the correct quadrant g(x) = |3x – 2| correct shape with point in the correct quadrant	B1 B1
	Points of intersection:		
	f(x) meets the x-axis at $-\frac{1}{2}$, and g(x) meets the x-axis at $\frac{2}{3}$	Two correct x-intercepts	B1
	f(x) meets the y-axis at 1, and g(x) meets the y-axis at 2	Two correct y-intercepts	B1

Question	Answer	Extra information	Marks
6.11 (b)	Point 1 $2x + 1 = 3x - 2$ $x = 3$ When $x = 3$, $y = 7$, so the point is (3, 7) Point 2 $2x + 1 = -(3x - 2)$ $2x + 1 = -3x + 2$ $5x = 1$ $x = 0.2$ When $x = 0.2$, $y = 1.4$, so the point is (0.2, 1.4)	For right-hand intersection point where both graphs are 'positive' Correct coordinates For left-hand intersection point where the first graph is 'positive' and the second graph is 'negative' Correct coordinates	M1 A1 M1 A1
6.11 (c)	$0.2 < x < 3$	Correct range	B1
	Total		**9 marks**

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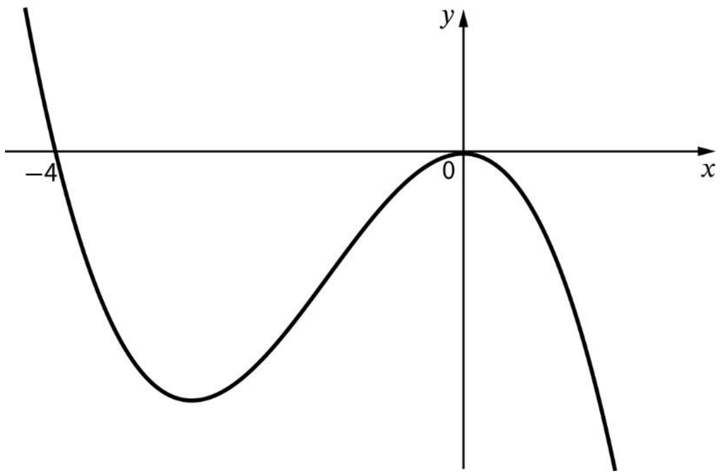
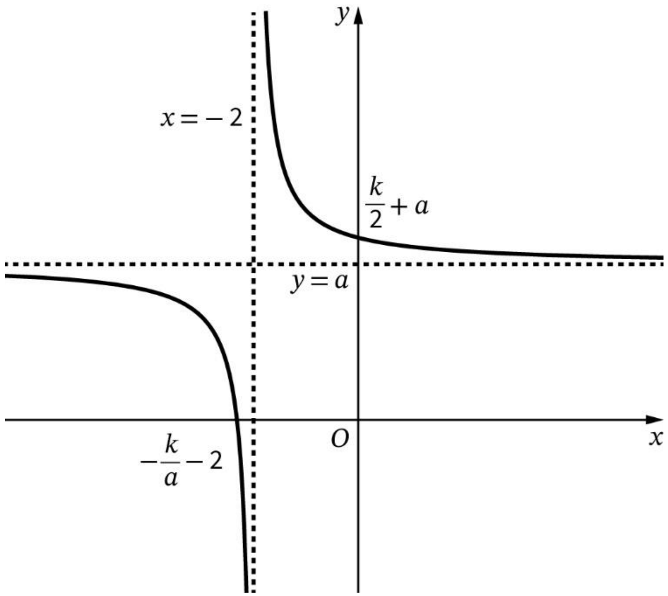
Question	Answer	Extra information	Marks
6.12 (a)		Correct shape of curve Correct x-intercepts at –4 and 0	B1 B1
6.12 (b)	$-x^2(x+4) = -x$ $x - 4x^2 - x^3 = 0$ $-x(x^2 + 4x - 1) = 0$ $b^2 - 4ac = 16 - (-4)$ $= 20 > 0$ The quadratic has two solutions and so the cubic has three solutions and the graph $y = \text{f}(x)$ will intersect $y = -x$ three times.	Correct first step For forming cubic equal to 0 For use of discriminant Correct conclusion	M1 M1 M1 A1
	Total		**6 marks**
6.13 (a)	(4, –1)	One mark per correct coordinate	B1B1

Question	Answer	Extra information	Marks
6.13 (b)	$2(x-4)-1=x-2$ $2x-8-1=x-2$ $x=7$ $-2(x-4)-1=x-2$ $-2x+8-1=x-2$ $3x=9$, therefore $x=3$	For 'positive' intersection Correct solution For 'negative' intersection Correct solution	M1 A1 M1 A1
6.13 (c)	$2\|x-4\|<x-1 \quad\rightarrow\quad 2\|x-4\|-1<x-2$ $\{x: 3<x<7\}$	Recognising that this is the same inequality Correct range of values	M1 A1
6.13 (d)	When the line touches the vertex of the graph $y=k-x$ passes through $(4,-1)$ $-1=k-4$ $k=3$ The line will intersect the graph more than once when $k>3$	 Correct substitution Correct range	 M1 A1
	Total		**10 marks**

Question	Answer	Extra information	Marks
6.14 (a)		Correct shape curve with two branches Asymptote drawn and labelled at $x = –2$ Asymptote drawn and labelled at $y = a$, where a is positive x-intercept labelled $-\frac{k}{a} - 2$ y-intercept labelled $\frac{k}{2} + a$	B1 B1 B1 B1 B1
6.14 (b)	$0 = \frac{k}{-2.6+2} + a$ and $6.5 = \frac{k}{0+2} + a$ $0.6a = k$ $13 - 2a = k$ $a = 5$ and $k = 3$	For both substitutions Two simplified equations in a and k Solving simultaneously to find both values	M1 M1 A1
	Total		**8 marks**

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Question	Answer	Extra information	Marks
6.15 (a)	Identifying either $(x + 1)$ or $(x - 1)$ as a factor $x^3 - x = x(x^2 - 1)$ $= x(x + 1)(x - 1)$	Finding the first factor Fully factorising the expression	M1 A1
6.15 (b)	$\frac{5x+1}{x^3-x} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-1}$ $5x+1 = A(x+1)(x-1) + Bx(x-1) + Cx(x+1)$ $A = -1$, $B = -2$, $C = 3$ $-\frac{1}{x} - \frac{2}{x+1} + \frac{3}{x-1}$	Correct structure and method One variable correct Fully correct partial fractions	M1 A1 A1
	Total		**5 marks**

Question	Answer	Extra information	Marks
6.16	$9^{x-1} = 27^y$ $\left(3^2\right)^{x-1} = \left(3^3\right)^y$ $2x - 2 = 3y$ $y = \frac{2x-2}{3}$ $\left(\frac{2x-2}{3}\right)^2 = 2x+2$ $(2x-2)^2 = 9(2x+2)$ $4x^2 - 8x + 4 = 18x + 18$ $4x^2 - 26x - 14 = 0$ $2x^2 - 13x - 7 = 0$ $(2x+1)(x-7) = 0$ $x = -\frac{1}{2}$ or $x = 7$ When $x = -\frac{1}{2}$, $y = -1$ When $x = 7$, $y = 4$	Writing both sides as powers of 3 Substituting for y and simplifying Solving the quadratic Both solutions needed for mark	M1 M1 A1 A1
	Total		**4 marks**

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