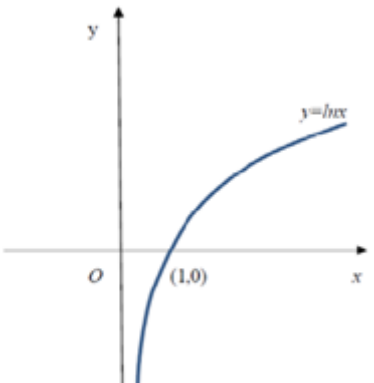
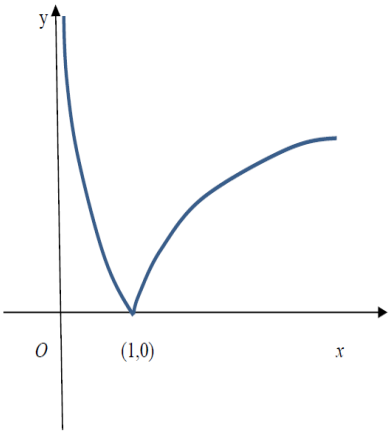
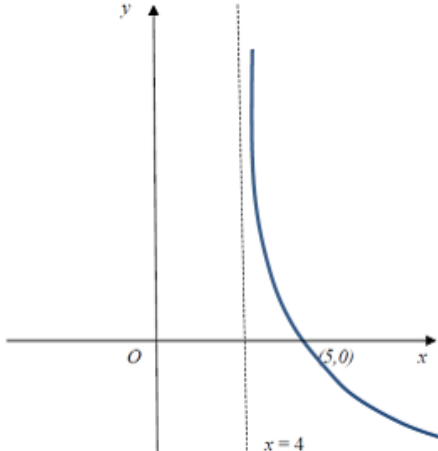


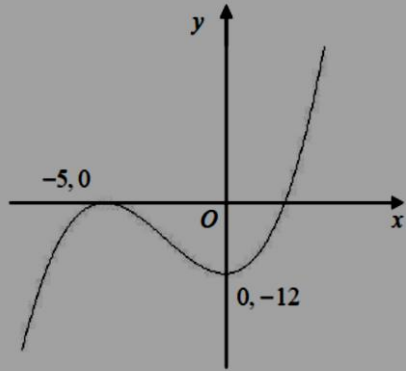
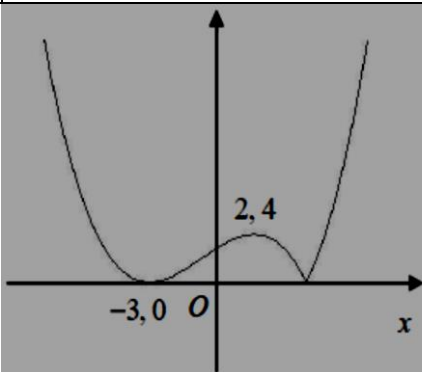
**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<b>1(a)</b>	$fg(x) = \frac{28}{x-2} - 1$	M1
	$\left( = \frac{30-x}{x-2} \right)$	
	Sets $fg(x) = x \Rightarrow \frac{28}{x-2} - 1 = x$	
	$\Rightarrow 28 = (x+1)(x-2)$	M1
	$\Rightarrow x^2 - x - 30 = 0$	
	$\Rightarrow (x-6)(x+5) = 0$	dM1
	$\Rightarrow x = 6, x = -5$	A1
		<b>(4)</b>
<b>1(b)</b>	$a = 6$	B1ft
		<b>(1)</b>
		<b>(5 marks)</b>

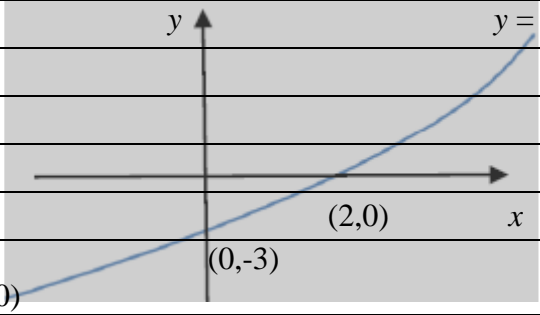
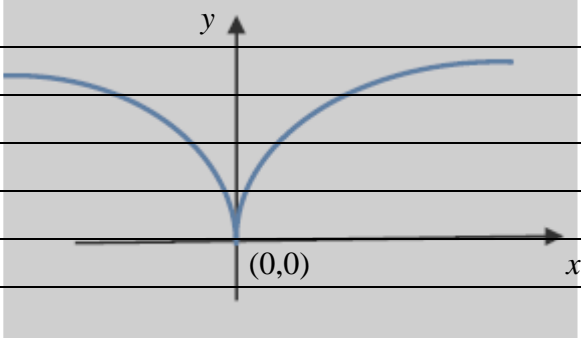
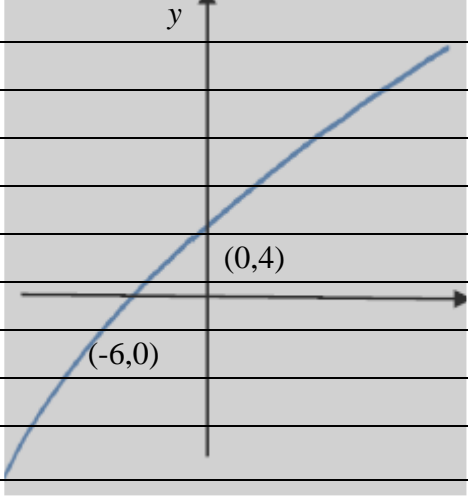
A level Mathematics Practice Paper – Algebra and functions – Mark scheme

<p>2</p>	 <p>A Cartesian coordinate system with x and y axes. The origin is labeled 'O'. A blue curve representing <math>y = \ln x</math> is shown. It starts from a vertical asymptote at <math>x = 0</math>, passes through the point <math>(1, 0)</math> on the x-axis, and continues to rise as <math>x</math> increases. The label <math>y = \ln x</math> is placed near the curve.</p>	<p><math>\ln</math> graph crossing <math>x</math> axis at <math>(1, 0)</math> and asymptote at <math>x = 0</math></p>	<p>B1</p>
	 <p>A Cartesian coordinate system with x and y axes. The origin is labeled 'O'. A blue curve starts from a vertical asymptote at <math>x = 0</math>, reaches a sharp cusp at the point <math>(1, 0)</math> on the x-axis, and then continues to rise as <math>x</math> increases.</p>	<p>Shape including cusp  Touches or crosses the <math>x</math> axis at <math>(1, 0)</math> Asymptote given as <math>x = 0</math></p>	<p>B1ft  B1ft B1</p>
	 <p>A Cartesian coordinate system with x and y axes. The origin is labeled 'O'. A blue curve starts from a vertical asymptote at <math>x = 4</math>, crosses the x-axis at the point <math>(5, 0)</math>, and continues to decrease as <math>x</math> increases. A vertical dashed line is drawn at <math>x = 4</math>.</p>	<p>Shape  Crosses at <math>(5, 0)</math>  Asymptote given as <math>x = 4</math></p>	<p>B1  B1ft  B1</p>
			<p><b>(7 marks)</b></p>

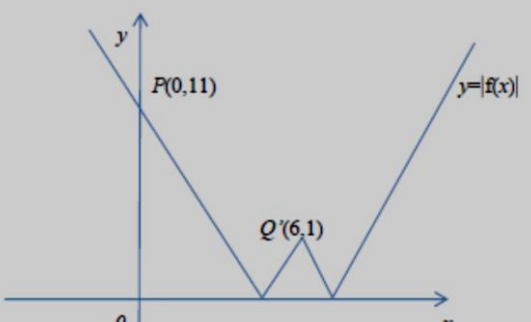
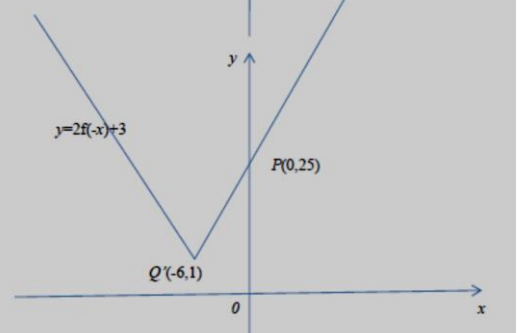
**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<b>3(a)</b>	$y \geq 3$	B1	
		<b>(1)</b>	
<b>3(b)</b>	$y = 3 + \sqrt{x+2} \Rightarrow y - 3 = \sqrt{x+2} \Rightarrow x = (y - 3)^2 - 2$	M1 A1	
	$\Rightarrow g^{-1}(x) = (x - 3)^2 - 2, \text{ with } x \geq 3$	A1	
		<b>(3)</b>	
<b>3(c)</b>	$g(x) = x \Rightarrow 3 + \sqrt{x+2} = x$		
	$\Rightarrow x + 2 = (x - 3)^2 \Rightarrow x^2 - 7x + 7 = 0$	M1 A1	
	$\Rightarrow x = \frac{7 \pm \sqrt{21}}{2} \Rightarrow x = \frac{7 + \sqrt{21}}{2} \text{ only}$	M1 A1	
		<b>(4)</b>	
<b>3(d)</b>	$a = \frac{7 + \sqrt{21}}{2}$	B1 ft	
		<b>(1)</b>	
		<b>(9 marks)</b>	
<b>4(a)</b>		Shape x coordinates correct y coordinates correct	B1 B1 B1
			<b>(3)</b>
<b>4(b)</b>		Shape Max at (2,4) Min at (-3,0)	B1 B1 B1
			<b>(3)</b>
			<b>(6 marks)</b>

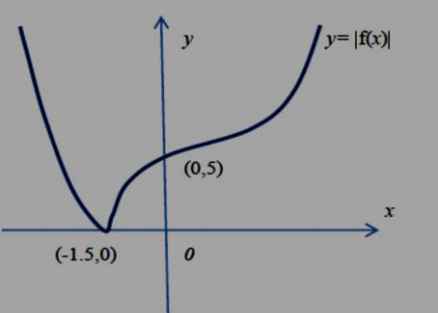
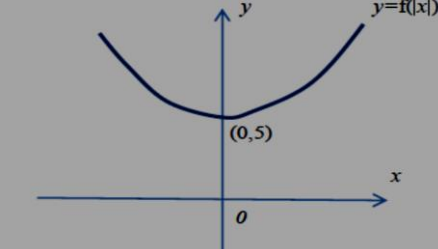
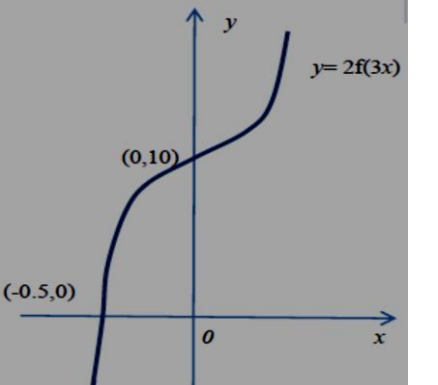
**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<b>5(a)</b>	$ff(-3) = f(0) = 2$	M1 A1
		<b>(2)</b>
<b>5(b)</b>		
		Shape B1
		(0,-3) and
		B1
		<b>(2)</b>
<b>5(c)</b>		
		Shape B1
		(0,0) B1
		<b>(2)</b>
<b>5(d)</b>		
		Shape B1
		(-6,0) or (0,4) B1
		(-6,0) and (0,4) B1
		<b>(3)</b>
		<b>(9 marks)</b>

**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<p><b>6(a)</b></p>		<p>'W' Shape (0, 11) and (6, 1)</p>	<p>B1 B1</p>
		<p><b>(2)</b></p>	
<p><b>6(b)</b></p>		<p>'V' shape (-6,1) (0,25)</p>	<p>B1 B1 B1</p>
		<p><b>(3)</b></p>	
<p><b>6(c)</b></p>	<p>One of <math>a = 2</math> or <math>b = 6</math></p>	<p>B1</p>	
	<p><math>a = 2</math> and <math>b = 6</math></p>	<p>B1</p>	
		<p><b>(2)</b></p>	
		<p><b>(7 marks)</b></p>	

**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<p><b>7(a)</b></p>		<p>Shape including cusp  <math>(-1.5, 0)</math> <b>and</b> <math>(0, 5)</math></p>	<p>B1                      B1</p>
			<p><b>(2)</b></p>
<p><b>7(b)</b></p>		<p>Shape  <math>(0, 5)</math></p>	<p>B1                      B1</p>
			<p><b>(2)</b></p>
<p><b>7(c)</b></p>		<p>Shape  <math>(0, 10)</math>  <math>(-0.5, 0)</math></p>	<p>B1                      B1                      B1</p>
			<p><b>(3)</b></p>
			<p><b>(7 marks)</b></p>

**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

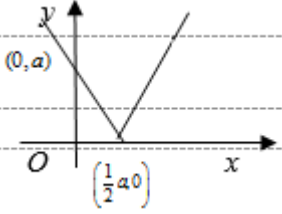
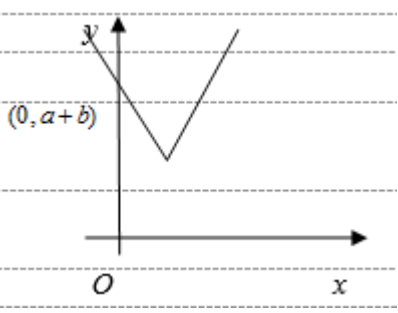
<p><b>8(a)</b></p>		<p>V shaped graph</p> <p>Touches <math>x</math> axis at <math>\frac{3}{4}</math> and cuts <math>y</math> axis at 3</p>	<p>B1</p> <p>B1</p>
			<p><b>(2)</b></p>
<p><b>8(b)</b></p>		<p>Solves <math>4x - 3 = 2 - 2x</math> or <math>3 - 4x = 2 - 2x</math> to give either value of <math>x</math></p> <p>Both <math>x = \frac{5}{6}</math> and</p> <p><math>x = \frac{1}{2}</math> or <math>x &gt; \frac{5}{6}</math> or</p> <p><math>x &lt; \frac{1}{2}</math></p>	<p>M1</p> <p>A1</p>
			<p><math>x &lt; \frac{1}{2}</math> or <math>x &gt; \frac{5}{6}</math></p>
			<p><b>(4)</b></p>
<p><b>8(c)</b></p>		<p>Draws graph Or solves <math> 4x - 3  = 1\frac{1}{2} - 2x</math> to give one soln <math>x = \frac{3}{4}</math></p>	<p>M1</p>
<p>Accept for all values of <math>x</math> except <math>x = \frac{3}{4}</math> Or <math>(x \in \square, ) x \neq \frac{3}{4}</math>, or <math>x &lt; \frac{3}{4}</math>, <math>x &gt; \frac{3}{4}</math></p>			<p>A1</p>
			<p><b>(2)</b></p>
			<p><b>(8 marks)</b></p>

**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<b>9(a)</b>	$x^2 + x - 6 = (x+3)(x-2)$		B1
	$\frac{x}{x+3} + \frac{3(2x+1)}{(x+3)(x-2)} = \frac{x(x-2) + 3(2x+1)}{(x+3)(x-2)}$		M1
	$= \frac{x^2 + 4x + 3}{(x+3)(x-2)}$		A1
	$= \frac{\cancel{(x+3)}(x+1)}{\cancel{(x+3)}(x-2)}$		
	$= \frac{(x+1)}{(x-2)}$	cs0	A1*
			<b>(4)</b>
<b>9(b)</b>	One end either $(y) > 1, (y) \geq 1$ or $(y) < 4, (y) \leq 4$		B1
	$1 < y < 4$		B1
			<b>(2)</b>
<b>9(c)</b>	Attempt to set		
	Either $g(x) = x$ or $g(x) = g^{-1}(x)$ or $g^{-1}(x) = x$ or $g^2(x) = x$		
	$\frac{(x+1)}{(x-2)} = x$ $\frac{x+1}{x-2} = \frac{2x+1}{x-1}$ $\frac{2x+1}{x-1} = x$ $\frac{\frac{x+1}{x-2} + 1}{\frac{x+1}{x-2} - 2} = x$		M1
	$x^2 - 3x - 1 = 0 \Rightarrow x = \dots$		A1, dM1
	$a = \frac{3 + \sqrt{13}}{2}$ oe $(1.5 + \sqrt{3.25})$	cs0	A1
			<b>(4)</b>
			<b>(10 marks)</b>



**A level Mathematics Practice Paper – Algebra and functions – Mark scheme**

<p><b>10(a)(i)</b></p>		<p>V shape on <math>x</math> - axis <b>or</b> coordinates <math>(\frac{1}{2}a, 0)</math> <b>and</b>  <math>(0, a)</math>                      Correct shape, position and coordinates</p>	<p>B1  B1</p>
<p><b>10(a)(ii)</b></p>		<p>Their "V" shape translated up or  <math>(0, a + b)</math>                      Correct shape, position and <math>(0, a + b)</math></p>	<p>B1ft  B1</p>
			<p align="right"><b>(4)</b></p>
<p><b>10(b)</b></p>	<p>States or uses <math>a + b = 8</math></p>		<p>B1</p>
	<p>Attempts to solve <math> 2x - a  + b = \frac{3}{2}x + 8</math> in either <math>x</math> or with <math>x = c</math></p>		
	$2c - a + b = \frac{3}{2}c + 8 \Rightarrow kc = f(a, b)$		<p>M1</p>
	<p>Combines <math>kc = f(a, b)</math> with <math>a + b = 8 \Rightarrow c = 4a</math></p>		<p>dM1 A1</p>
			<p align="right"><b>(4)</b></p>
			<p align="right"><b>(8 marks)</b></p>

