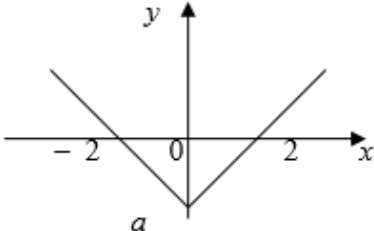
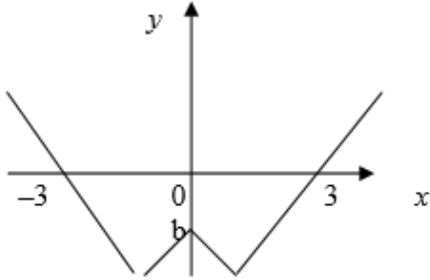
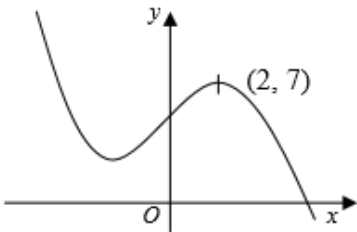
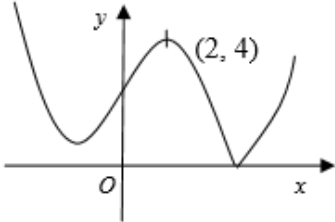
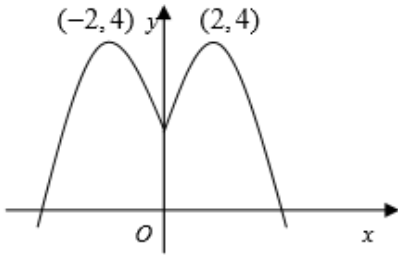


Transformations of Graphs - Edexcel Past Exam Questions **MARK SCHEME**

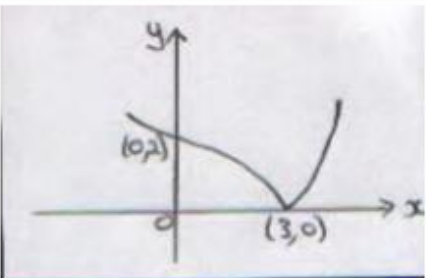
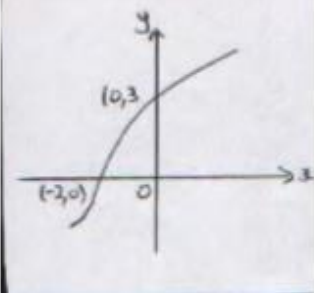
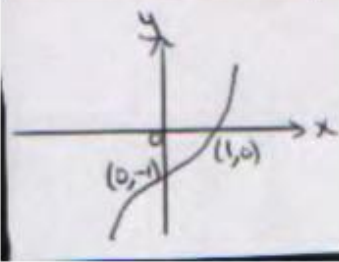
## Question 1: June 05 Q6

Question Number	Scheme	Marks
(a)	 <p style="text-align: center;"><math>a</math></p>	Translation $\leftarrow$ by 1 Intercepts correct M1 A1 (2)
(b)	 <p style="text-align: center;"><math>b</math></p>	$x \geq 0$ , correct "shape" provided graph is not original graph Reflection in $y$ -axis Intercepts correct B1 B1√ B1 (3)
(c)	$a = -2, b = -1$	B1B1 (2)
(d)	Intersection of $y = 5x$ with $y = -x - 1$ Solving to give $x = -\frac{1}{6}$	M1A1 M1A1 (4)
(d)	Intersection of $y = 5x$ with $y = -x - 1$ Solving to give $x = -\frac{1}{6}$	M1A1 M1A1 (4)
<p>[Notes:</p> <p>(i) If both values found for <math>5x = -x - 1</math> and <math>5x = x - 3</math>, or solved algebraically, can score 3 out of 4 for <math>x = -\frac{1}{6}</math> and <math>x = -\frac{3}{4}</math>; required to eliminate <math>x = -\frac{3}{4}</math> for final mark.</p> <p>(ii) Squaring approach: M1 correct method, <math>24x^2 + 22x + 3 = 0</math> (correct 3 term quadratic, any form) A1 Solving M1, Final correct answer A1.]</p> <p style="text-align: right;"><b>[11]</b></p>		

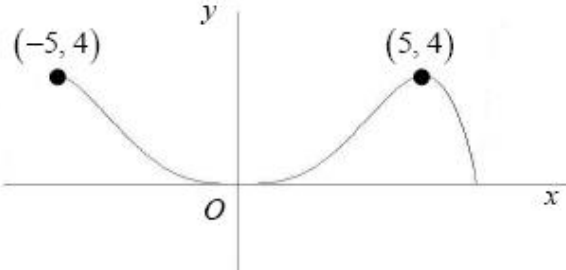
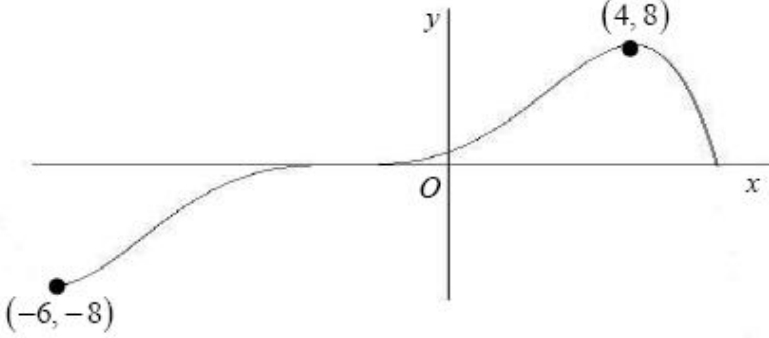
Question 2: Jan 06 Q1

Question Number	Scheme	Marks
(a)		Shape unchanged Point B1 B1 <b>(2)</b>
(b)		Shape Point B1 B1 <b>(2)</b>
(c)		Shape (2, 4) (-2, 4) B1 B1 B1 <b>(3)</b> <b>[7]</b>

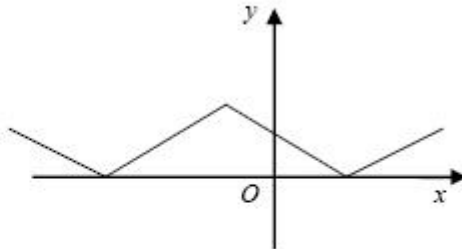
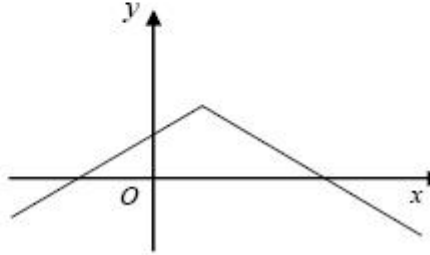
Question 3: June 06 Q3

Question Number	Scheme	Marks
(a)	 <p>Mod graph, reflect for <math>y &lt; 0</math></p> <p><math>(0, 2), (3, 0)</math> or marked on axes</p> <p>Correct shape, including cusp</p>	<p>M1</p> <p>A1</p> <p>A1 (3)</p>
(b)	 <p>Attempt at reflection in <math>y = x</math></p> <p>Curvature correct</p> <p><math>(-2, 0), (0, 3)</math> or equiv.</p>	<p>M1</p> <p>A1</p> <p>B1 (3)</p>
(c)	 <p>Attempt at 'stretches'</p> <p><math>(0, -1)</math> or equiv.</p> <p><math>(1, 0)</math></p>	<p>M1</p> <p>B1</p> <p>B1 (3)</p> <p><b>(9 marks)</b></p>

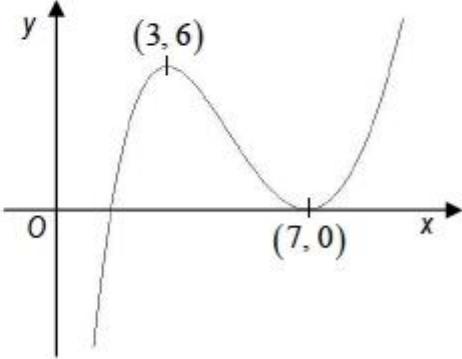
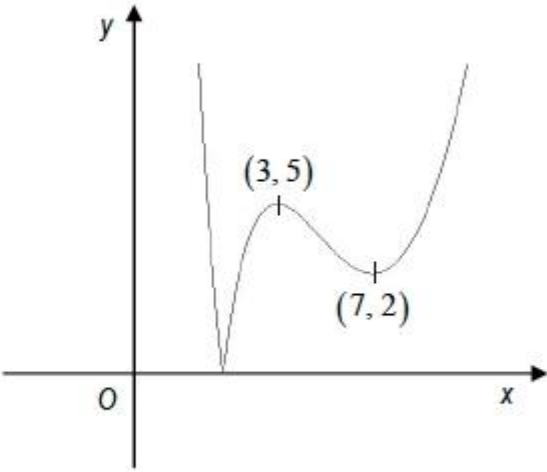
Question 4: Jan 08 Q4

Question Number	Scheme	Marks
(a)		<p>Shape B1  <math>(5, 4)</math> B1  <math>(-5, 4)</math> B1 (3)</p>
(b)	<p>For the purpose of marking this paper, the graph is identical to (a)</p>	<p>Shape B1  <math>(5, 4)</math> B1  <math>(-5, 4)</math> B1 (3)</p>
(c)		<p>General shape – unchanged B1            Translation to left B1  <math>(4, 8)</math> B1  <math>(-6, -8)</math> B1 (4)</p> <p>In all parts of this question ignore any drawing outside the domains shown in the diagrams above. [10]</p>

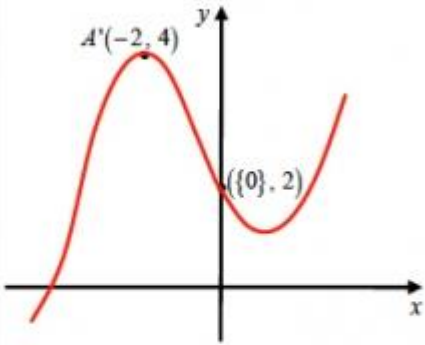

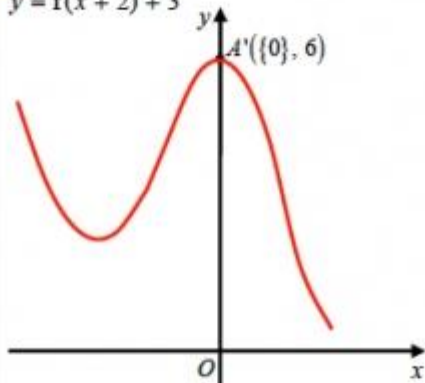

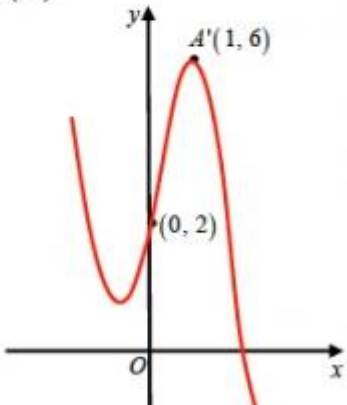

## Question 5: June 08 Q3

Question Number	Scheme	Marks
(a)	 <p style="text-align: right;">shape Vertices correctly placed</p>	B1 B1 (2)
(b)	 <p style="text-align: right;">shape Vertex and intersections with axes correctly placed</p>	B1 B1 (2)
(c)	$P: (-1, 2)$ $Q: (0, 1)$ $R: (1, 0)$	B1 B1 B1 (3)
(d)	$x > -1; \quad 2 - x - 1 = \frac{1}{2}x$  Leading to $x = \frac{2}{3}$  $x < -1; \quad 2 + x + 1 = \frac{1}{2}x$  Leading to $x = -6$	M1 A1  A1  M1  A1 (5) <b>(12 marks)</b>

Question 6: Jan 09 Q3

Question Number	Scheme	Marks
(a)		<p>Shape (3, 6) (7, 0)</p> <p>B1 B1 B1</p> <p>(3)</p>
(b)		<p>Shape (3, 5) (7, 2)</p> <p>B1 B1 B1</p> <p>(3) [6]</p>

Question 7: Jan 10 Q6

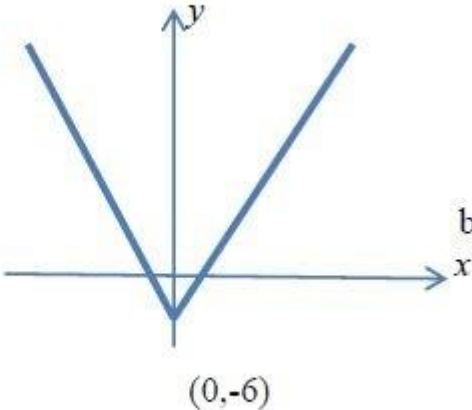
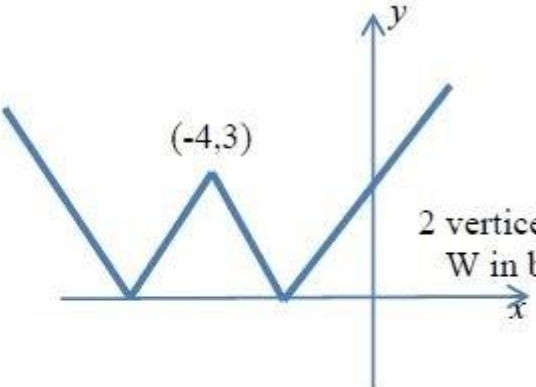
Question Number	Scheme	Marks
<p>(i) <math>y = f(-x) + 1</math></p> 	<p>Shape of </p> <p>and must have a maximum in quadrant 2 and a minimum in quadrant 1 or on the positive y-axis.</p> <p>Either <math>(\{0\}, 2)</math> or <math>A'(-2, 4)</math></p> <p>Both <math>(\{0\}, 2)</math> and <math>A'(-2, 4)</math></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p>
<p>(ii) <math>y = f(x + 2) + 3</math></p> 	<p>Any translation of the original curve. </p> <p>The translated maximum has either x-coordinate of 0 (can be implied) or y-coordinate of 6.</p> <p>The translated curve has maximum <math>(\{0\}, 6)</math> and is in the correct position on the Cartesian axes.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p>
<p>(iii) <math>y = 2f(2x)</math></p> 	<p>Shape of </p> <p>with a minimum in quadrant 2 and a maximum in quadrant 1.</p> <p>Either <math>(\{0\}, 2)</math> or <math>A'(1, 6)</math></p> <p>Both <math>(\{0\}, 2)</math> and <math>A'(1, 6)</math></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p> <p>[9]</p>

Question 8: June 10 Q6

Question Number	Scheme	Marks
<p>(a) (i) (3, 4) (ii) (6, -8)</p> <p>(b)</p> <p>(c) <math>f(x) = (x - 3)^2 - 4</math> or <math>f(x) = x^2 - 6x + 5</math></p> <p>(d) Either: The function <math>f</math> is a many-one {mapping}. Or: The function <math>f</math> is not a one-one {mapping}.</p>	<p>B1 B1 B1 B1 (4)</p> <p>B1 B1 B1</p> <p>(3) M1A1 (2) B1 (1) [10]</p>	
	<p>(b) B1: Correct shape for <math>x \geq 0</math>, with the curve meeting the positive <math>y</math>-axis and the turning point is found below the <math>x</math>-axis. (providing candidate does not copy the whole of the original curve and adds nothing else to their sketch.) B1: Curve is symmetrical about the <math>y</math>-axis or correct shape of curve for <math>x &lt; 0</math>. Note: The first two B1B1 can only be awarded if the curve has the correct shape, with a cusp on the positive <math>y</math>-axis and with both turning points located in the correct quadrants. Otherwise award B1B0. B1: Correct turning points of <math>(-3, -4)</math> and <math>(3, -4)</math>. Also, <math>(\{0\}, 5)</math> is marked where the graph cuts through the <math>y</math>-axis. Allow <math>(5, 0)</math> rather than <math>(0, 5)</math> if marked in the "correct" place on the <math>y</math>-axis.</p> <p>(c) M1: Either states <math>f(x)</math> in the form <math>(x \pm \alpha)^2 \pm \beta</math>; <math>\alpha, \beta \neq 0</math> Or uses a complete method on <math>f(x) = x^2 + ax + b</math>, with <math>f(0) = 5</math> and <math>f(3) = -4</math> to find both <math>a</math> and <math>b</math>. A1: Either <math>(x - 3)^2 - 4</math> or <math>x^2 - 6x + 5</math></p> <p>(d) B1: Or: The inverse is a one-many {mapping and not a function}. Or: Because <math>f(0) = 5</math> and also <math>f(6) = 5</math>. Or: One <math>y</math>-coordinate has 2 corresponding <math>x</math>-coordinates {and therefore cannot have an inverse}.</p>	



Question 9: June 11 Q3

Question Number	Scheme	Marks
(a)	 <p style="text-align: center;">(0,-6)</p>	<p>V shape B1</p> <p>vertex on y axis &amp; both branches of graph cross x axis B1</p> <p>'y' co-ordinate of R is -6 B1</p> <p style="text-align: right;">(3)</p>
(b)	 <p style="text-align: center;">(-4,3)</p>	<p>W shape B1</p> <p>2 vertices on the negative x axis. W in both quad 1 &amp; quad 2. B1dep</p> <p><math>R' = (-4, 3)</math> B1</p> <p style="text-align: right;">(3)</p> <p style="text-align: right;">6 Marks</p>