

TRANSFORMATION AND SKETCHING THE GRAPHS ANSWERS
EDEXCEL A LEVEL YEAR 1

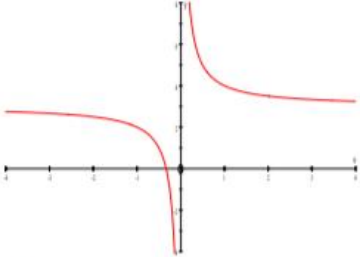
1.

(a)		<p>Reflection in x-axis 2 and 4 labelled (or (2, 0) and (4, 0) seen) Image of $P(3, 2)$</p>	<p>B1 B1 B1 (3)</p>
(b)		<p>Stretch parallel to x-axis 1 and 2 labelled (or (1, 0) and (2, 0) seen) Image of $P(1\frac{1}{2}, -2)$</p>	<p>M1 A1 A1 (3) 6</p>

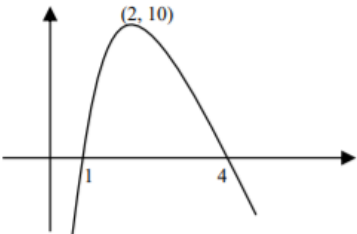
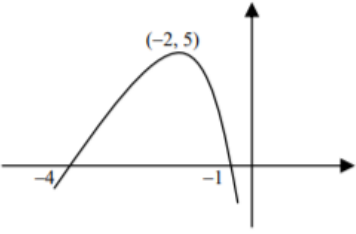
2.

(a)		<p>(See below) Clearly through origin (or (0, 0) seen) 3 labelled (or (3, 0) seen)</p>	<p>M1 A1 A1 (3)</p>
(b)		<p>Stretch parallel to y-axis 1 and 4 labelled (or (1, 0) and (4, 0) seen) 6 labelled (or (0, 6) seen)</p>	<p>M1 A1 A1 (3)</p>
(c)		<p>Stretch parallel to x-axis 2 and 8 labelled (or (2, 0) and (8, 0) seen) 3 labelled (or (0, 3) seen)</p>	<p>M1 A1 A1 (3)</p>
<p>Total 9 marks</p>			

3.

(a)		Shape of $f(x)$ Moved up \uparrow Asymptotes: $y = 3$ $x = 0$ (Allow "y-axis") ($y \neq 3$ is B0, $x \neq 0$ is B0).	B1 M1 B1 B1 (4)
(b)	$\frac{1}{x} + 3 = 0$ $x = -\frac{1}{3}$ (or $-0.33 \dots$)	No variations accepted. Decimal answer requires at least 2 d.p.	M1 A1 (2)
			6

4.

(a)		Shape: Max in 1 st quadrant and 2 intersections on positive x -axis 1 and 4 labelled (in correct place) or clearly stated as coordinates (2, 10) labelled or clearly stated	B1 B1 B1 (3)
(b)		Shape: Max in 2nd quadrant and 2 intersections on negative x -axis -1 and -4 labelled (in correct place) or clearly stated as coordinates (-2, 5) labelled or clearly stated	B1 B1 B1 (3)
(c)	$(a =) 2$	May be implicit, i.e. $f(x + 2)$	B1 (1)
Beware: The answer to part (c) may be seen on the first page.			7

5.

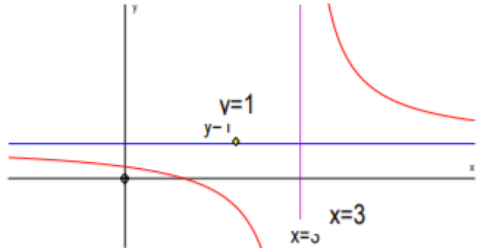
(a)		<p>Shape , touching the x-axis at its maximum.</p> <p>Through $(0,0)$ & -3 marked on x-axis, or $(-3,0)$ seen.</p> <p>Allow $(0,-3)$ if marked on the x-axis.</p> <p>Marked in the correct place, but 3, is A0.</p> <p>Min at $(-1,-1)$</p>	<p>M1</p> <p>A1</p> <p>A1</p>	(3)
(b)		<p>Correct shape (top left - bottom right)</p> <p>Through -3 and max at $(0, 0)$.</p> <p>Marked in the correct place, but 3, is B0.</p> <p>Min at $(-2,-1)$</p>	<p>B1</p> <p>B1</p> <p>B1</p>	(3)

[6]



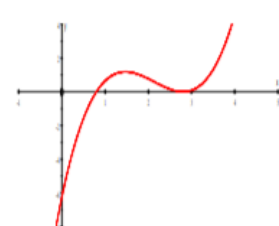
6.

(a)		(b)		(c)		
(a)	$(-2, 7), y = 3$	(b)	$(-2, 20), y = 4$	(c)	Sketch: Horizontal translation (either way)... (There must be evidence that $y = 5$ at the max and that the asymptote is still $y = 1$)	B1, B1
					$(-3, 5), y = 1$	B1, B1
						(3)
						[7]

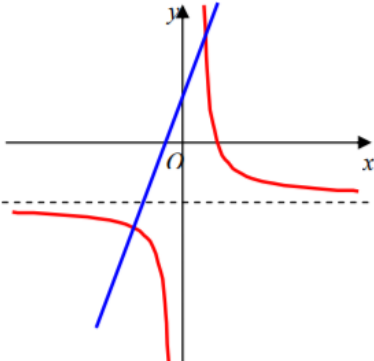
7.

(a)		<p>Correct shape with a single crossing of each axis</p> <p>$y = 1$ labelled or stated</p> <p>$x = 3$ labelled or stated</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p>
(b)	<p>Horizontal translation so crosses the x-axis at $(1, 0)$</p> <p>New equation is $(y =) \frac{x \pm 1}{(x \pm 1) - 2}$</p> <p>When $x = 0$ $y =$</p> $= \frac{1}{3}$	<p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>(4)</p> <p>7</p>	

8.

(a)	<p>$[y = x^3 + 2x^2]$ so $\frac{dy}{dx} = 3x^2 + 4x$</p>	<p>M1A1 (2)</p>
(b)	 <p>Shape </p> <p>Touching x-axis at origin</p> <p>Through and not touching or stopping at -2 on x-axis. Ignore extra intersections.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p>
(c)	<p>At $x = -2$: $\frac{dy}{dx} = 3(-2)^2 + 4(-2) = 4$</p> <p>At $x = 0$: $\frac{dy}{dx} = 0$ (Both values correct)</p>	<p>M1</p> <p>A1 (2)</p>
(d)	 <p>Horizontal translation (touches x-axis still)</p> <p>$k - 2$ and k marked on positive x-axis</p> <p>$k^2(2 - k)$ (o.e) marked on negative y-axis</p>	<p>M1</p> <p>B1</p> <p>B1</p> <p>(3)</p> <p>10 marks</p>

9.

<p>(a)</p>  <p>Check graph in question for possible answers and space below graph for answers to part (b)</p> <p>b) Asymptotes : $x = 0$ (or y-axis) and $y = -5$. (Lose second B mark for extra asymptotes)</p> <p>c) Method 1: $\frac{2}{x} - 5 = 4x + 2$</p> <p>$4x^2 + 7x - 2 = 0 \Rightarrow x =$ $x = -2, \frac{1}{4}$</p> <p>When $x = -2, y = -6$, When $x = \frac{1}{4}, y = 3$</p>	<p>$y = \frac{2}{x}$ is translated up or down. M1</p> <p>$y = \frac{2}{x} - 5$ is in the correct position. A1</p> <p>Intersection with x-axis at $(\frac{2}{5}, \{0\})$ only B1 Independent mark.</p> <p>$y = 4x + 2$: attempt at straight line, with positive gradient with positive y intercept. B1</p> <p>Intersection with x-axis at $(-\frac{1}{2}, \{0\})$ and y-axis at $(\{0\}, 2)$. B1</p> <p>An asymptote stated correctly. Independent of (a) B1 These two lines only. Not fit their graph. B1 [2]</p> <p>Method 2: $\frac{y-2}{4} = \frac{2}{y+5}$ M1</p> <p>$y^2 + 3y - 18 = 0 \rightarrow y =$ dM1 $y = -6, 3$ A1</p> <p>When $y = -6, x = -2$ When $y = 3, x = \frac{1}{4}$. M1A1</p>	<p>[5]</p> <p>[2]</p> <p>[5]</p> <p>12 marks</p>
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