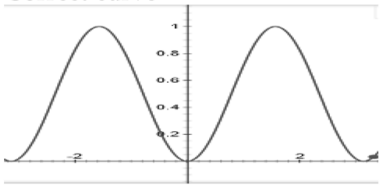
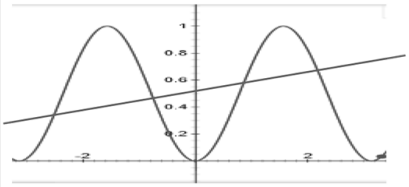
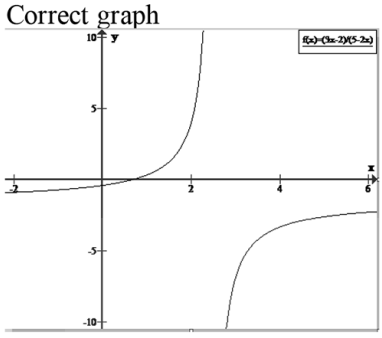
01. 0607_m24_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	Correct curve 	2	**B1** if cusp at (0, 0) or 'correct curve' but height clearly incorrect.
(b)	0.5 180	2	**B1** for each
(c)(i)	Correct sketch 	2	maximum of 1 mark if it does not intersect curve 4 times **B1** for positive gradient and positive y-intercept
(c)(ii)	–154 or –154.0... –40.4 or –40.36 to –40.35 50.9 or 50.87... 121 or 120.5 to 120.6	4	**B1** for each Max 3 if y coordinates included.
(c)(iii)	$-154 < x < -40.4$ $50.9 < x < 121$	2	**FT** from (c)(ii) **B1** for each Same accuracy as (ii)

02. 0607_m24_ms_42 Q: 10

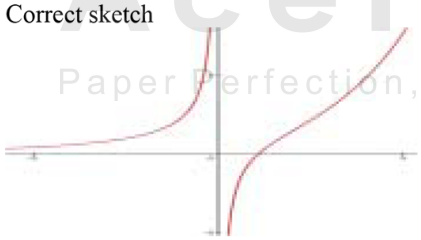
Question	Answer	Marks	Partial Marks
(a)(i)	9	**1**	
(a)(ii)	$4x^2 - 20x + 25$ final answer	**3**	**M1** for $(5 - 2x)^2$ **B1** for 3 terms correct in $25 - 10x - 10x + 4x^2$
(a)(iii)	$\frac{5-x}{2}$ oe final answer	**2**	**M1** for $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$ or $y - 5 = -2x$
(b)(i)	Correct graph 	**3**	**B2** for correct but some 'curl back' or overlap or too wide a gap. **B1** for one branch correct.
(b)(ii)	$x = 2.5$ oe	**1**	
(b)(iii)	1.67 or 1.670 to 1.671 3.31 or 3.307 to 3.308	**3**	**B2** for one solution Max 1 if y coordinates included. or **M1** for sketch of $y = 5 - 2^x$ If 0 scored, **SC1** for only y values seen in answer space, with correct x values seen in working.

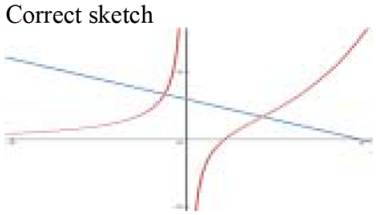
03. 0607_s24_ms_41 Q: 11

Question	Answer	Marks	Partial Marks
(a)	11	**1**	
(b)	–2	**2**	**M1** for $3x = -7 + 1$
(c)	$\frac{5-x}{2}$ oe final answer	**2**	**M1** for $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$ or $2x = 5 - y$

Question	Answer	Marks	Partial Marks
(d)	$[h(f(x))] = \frac{1}{2(3x-1)-3}$	**M1**	
	$(5-2x)(6x-5)=7$	**A1**	All further FTs dep on second stage in correct form $(5-2x)(ax+b)=k$ where a, and b are integers or sketch of rectangular hyperbola
	Correct expansion of brackets	**M1**	$30x-25-12x^2+10x$ [= 7] or sketch of straight line with negative gradient
	Correct rearrangement to 3 term quadratic on one side	**M1**	$12x^2-40x+32=0$ oe or graphs intersecting twice in 1st quadrant
	Correct factorisation	**M1**	$(6x-8)(2x-4)=0$ oe or correct use of formula or correct sketch of the quadratic or solutions indicated at points of intersection
	$2, \frac{4}{3}$ oe	**B1**	Both answers correct

04. 0607_s24_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	2.1 oe	**1**	
(a)(ii)	2.5 oe	**1**	
(a)(iii)	10	**1**	
(a)(iv)	4.47 to 4.48	**2**	**B1** for 7.24 or 7.236... or for 2.76 or 2.763 to 2.764 or $5+\sqrt{5}$ or $5-\sqrt{5}$ seen
(b)(i)	Correct sketch 	**3**	**B2** for both branches correct but joined or with excessive feathering or curl-backs or **B1** for one correct branch

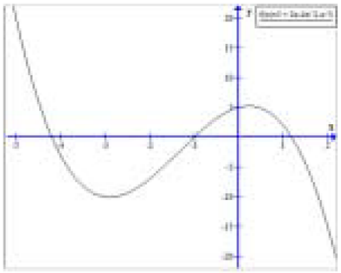
Question	Answer	Marks	Partial Marks
(b)(ii)	$x = 0$ $y = 0$	**2**	**B1** for each
(b)(iii)	$k > 0$ cao	**1**	
(b)(iv)(a)	Correct sketch 	**2**	**B1** for negative gradient and positive y-intercept or **B1** for passing through (3, 0)
(b)(iv)(b)	–0.382 or –0.3824 to –0.3823 1.3[0] or 1.302...	**2**	**B1** for each or **B1** for both correct values used in an inequality in x only

05. 0607_s24_ms_42 Q: 9

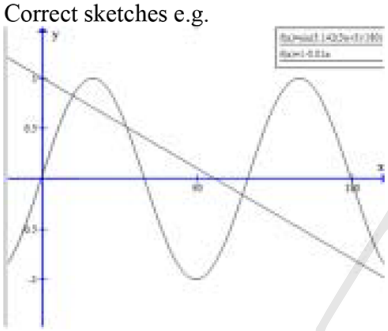
Question	Answer	Marks	Partial Marks
(a)(i)	–7	**1**	
(a)(ii)	4.084×10^6 cao	**3**	**B2** for 4 084 101 or $4.084\,101 \times 10^6$ or $4.0841[0] \times 10^6$ or answer 4.08×10^6 or **M1** for $(3 + 2 \times 9)^5$ If 0 scored, **SC1** for *their* 5 or more figure answer in standard form and corrected to 4 sf. or for 4 084 000 seen
(a)(iii)	$4x^2 + 12x + 10$ final answer	**3**	**M1** for $(3 + 2x)^2 + 1$ **B1** for $[(3 + 2x)^2 =]\ 9 + 6x + 6x + 4x^2$

Question	Answer	Marks	Partial Marks
(a)(iv)	$\frac{x-3}{2}$ oe final answer	**2**	**M1** for $x = 3 + 2y$ or $y - 3 = 2x$ or $\frac{y}{2} = \frac{3}{2} - x$
(a)(v)	$-1 \leqslant h(x) \leqslant 32$	**2**	**B1** for $-1 \leqslant h(x) \leqslant k$ or $k \leqslant h(x) \leqslant 32$ or –1 and 32 evaluated
(b)(i)	500	**2**	**M1** for $2x = 10^3$
(b)(ii)	$\frac{10^x}{2}$ oe final answer	**2**	**M1** for $2x = 10^y$ or $x = \log(2y)$
(b)(iii)	$4x^3$ final answer	**2**	**M1** for $[3\log(2x) =]\ \log(2x)^3$ oe

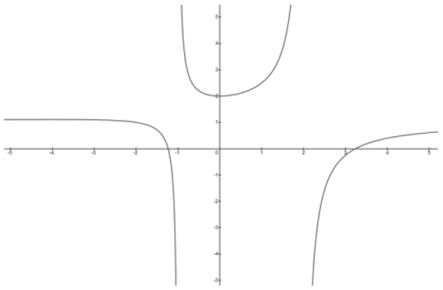
06. 0607_s24_ms_43 Q: 5

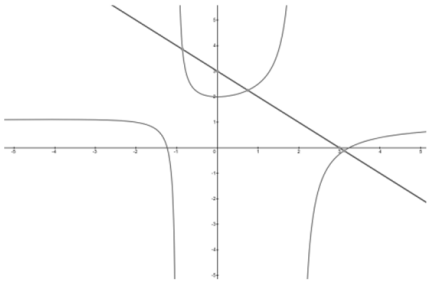
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**2**	With minimum in 3rd quadrant and maximum in 1st quadrant **B1** for any cubic with negative x^3
(b)	–4.19 or –4.193 to –4.192 –1 1.19 or 1.192 to 1.193	**3**	**B1** for each or **B1** for –1 and **B1** for –4.2 and 1.2
(c)	(–2.9[0], –10.1) or (–2.897 to –2.896, –10.05...)	**2**	**B1** for each coordinate
(d)	*their* –2.9[0] < a < 0.23[0]	**2**	–2.896 to 2.897 , 0.2301... **B1** for 0.23[0] seen or *their* –2.9[0] < a < k
(e)	Integer $\leqslant$ –11 or $\geqslant$ 6	**1**	

07. 0607_s24_ms_43 Q: 10

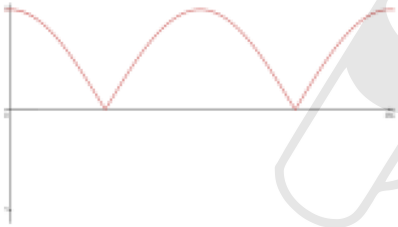
Question	Answer	Marks	Partial Marks
(a)	$3\frac{1}{2}$ oe	1	
(b)	6	2	**M1** for $5-\frac{1}{2}x=2$
(c)	$3\frac{1}{2}-1\frac{1}{2}x$ or $\frac{7-3x}{2}$ oe Final answer	2	**M1** for $5-\frac{1}{2}(3(x+1))$ oe
(d)	$\frac{x-3}{3}$ oe Final answer	2	**M1** for $x=3(y+1)$ or $x+1=\frac{y}{3}$ or $y-3=3x$
(e)	1	2	**B1** for h(90) or **M1** for sin(3(x + 1)) oe
(f)	sin(3(x + 1)) soi	1	
	Correct sketches e.g. 	2	or a single graph of h(g(x)) – 1 + 0.01x **B1** for each graph
	17.5 or 17.52... 48.7 or 48.71... 115.9 or 115.94...	2	**B1** for 1 correct.

08. 0607_m23_ms_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)		4	**B4** for fully correct curve or **B3** for 'correct' curve with overlaps. or **B2** for 2 sections correct or **B1** for 1 section correct
(b)	$x=-1, x=2$	2	**B1** for each
(c)	(0, 2)	1	

Question	Answer	Marks	Partial Marks
(d)		**1**	Must intersect curve 3 times
(e)(i)	$x = -0.861$ or $-0.8608\ldots$ $x = 0.746$ or $0.7458\ldots$ $x = 3.11$ or 3.114 to 3.115	**2**	**B1** for one correct If 0 scored **SC1** for –0.86, 0.75, 3.1
(e)(ii)	$-1 < x < -0.861$ $0.746 < x < 2$ $x > 3.11$	**3**	**FT** *their* **(i)** **B1** for each

09. 0607_s23_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**2**	**B1** for correct shape but inaccurate or different domain
(b)	90, 270	**2**	**B1** for each –1 if y cords (0) included
(c)(i)	60, 120, 240, 300	**2**	**B1** for two or three correct with no extras or four correct with extras –1 if y cords (0.5) included
(c)(ii)	$60 < x < 120$, $240 < x < 300$	**2**	**B1** for each
(c)(iii)	Correct areas shaded, i.e. below $y = 0.5$ and above $y = f(x)$	**1**	
(d)	0 [$< k <$] 1	**1**	

10. 0607_s23_ms_41 Q: 6

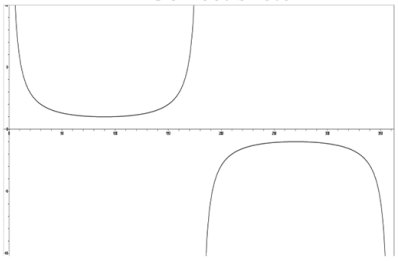
Question	Answer	Marks	Partial Marks
(a)	6	**1**	
(b)	100	**2**	**M1** for h$((2 + 1)^2)$ oe or $((x + 1)^2 + 1)^2$
(c)	$4 - 2x$ or $2(2 - x)$ final answer	**2**	**M1** for $3 - 2x + 1$
(d)	$\frac{3-x}{2}$ oe final answer	**2**	**M1** for $y + 2x = 3$ or for $\frac{y}{2} = \frac{3}{2} - x$ or for $x = 3 - 2y$ or $y - 3 = -2x$ or $\frac{3-y}{2}$ oe
(e)	3.73 or 3.732… or $2 + \sqrt{3}$	**2**	**M1** j(75) oe

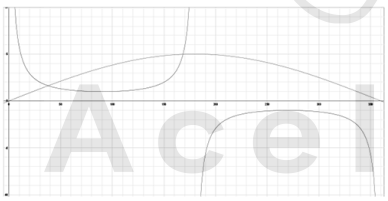
11. 0607_s23_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)	1	**1**	
(b)	–2	**3**	**B2** for $–6x = 12$ oe or better or **M1** for $2(1 – 3x) + 5 = 19$
(c)	$\frac{1-x}{3}$ oe Final answer	**2**	**M1** for $x = 1 – 3y$ or $y + 3x = 1$ or $\frac{y}{3} = \frac{1}{3} - x$ or $y – 1 = –3x$

Question	Answer	Marks	Partial Marks
(d)	$\frac{1-5y}{2y+3}$ oe Final answer	**3**	**M1** for $y(2x + 5) = 1 – 3x$ oe **M1FT dep** for $2xy + 3x = 1 – 5y$ dependent on 4 term equation with 2 terms in x. **M1FT** for factorising and dividing to form $\frac{a+by}{c+dy}$ Max 2 marks if final answer is incorrect.

12. 0607_w23_ms_41 Q: 2

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	Two branches with small gap at approx $x = 180$ **B2** for two correct shaped branches but with large gap or too much overlap or **B1** for one correct branch
(b)	(90, 1)	1	
(c)	$x = 180$ $x = 0$ and x = 360	2	**B1** **B1** If 0 scored, **SC1** for all 3 values seen
(d)	$-1 < k < 1$	2	**B1** for each If 0 scored, **SC1** for $-1 \leqslant k \leqslant 1$

Question	Answer	Marks	Partial Marks
(e)	38[.0] or 37.95... AND 168 or 168.4... 	3	**B1** for either solution correct or **B1** for both solutions expressed in coordinate form AND **B1** Correct sine curve through (0, 0), (360, 0) and with amplitude approximately 5

13. 0607_w23_ms_41 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	$\begin{pmatrix}-7\\0\end{pmatrix}$	2	**B1** for each or for $\begin{pmatrix}-10\\2\end{pmatrix}$ seen
(a)(ii)	(5, 4)	1	
(a)(iii)	5.1[0] or 5.099...	2	**M1** for $(-5)^2 + 1^2$ oe
(b)	$\begin{pmatrix}-2\\2\end{pmatrix}$	2	**B1** for each
(c)(i)	Translation $\begin{pmatrix}2\\-5\end{pmatrix}$	2	**B1** for each
(c)(ii)	Rotation 90° [anticlockwise] oe (0, 2)	3	**B1** for each
(c)(iii)	Image at (–1, 1) (–3, 1), (–1, 2)	1	
(c)(iv)	Image at (1, 0), (1, –3), (3, –3)	2	**B1** for stretch factor 3 in $y = k$ or in $x = 3$

14. 0607_w23_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)	$-5 \leqslant f(x) \leqslant 15$	2	**B1** for each If 0 scored, **SC1** for -5 and 15 seen
(b)(i)	1.5 oe	2	**M1** for $2x = -2 + 5$

Question	Answer	Marks	Partial Marks
(b)(ii)	–2 and 0	3	**B2** for $x^2 + 2x = 0$ oe or **M1** for $x^2 + x + 3 = 3 - x$
(c)	15	2	**B1** for f(4) = 3 stated or used twice or **M1** for $(2x - 5)^2 + (2x - 5) + 3$ oe
(d)	–1	2	**M1** for $2^3 - 3^2$ oe
(e)	$\sqrt[3]{x}$ oe	1	
(f)	$\log_3 x$ or $\frac{\log x}{\log 3}$	2	**M1** for $x = \log_3 y$ or $x = \frac{\log y}{\log 3}$ or for $x = 3^y$

15. 0607_w23_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	8	**3**	**B2** for $x + 2x = 10 + 14$ or better or **M1** for $x + 2(x – 5) = 14$ oe
(b)(i)	$\frac{5}{y}+\frac{7}{y-7}=2$ oe	**M1**	
	$5(y – 7) + 7y = 2y(y – 7)$	**M1**	**dep** fractions correctly cleared dependent on equation with two different linear denominators
	leading to $2y^2 – 26y + 35 = 0$	**A1**	No errors or omissions

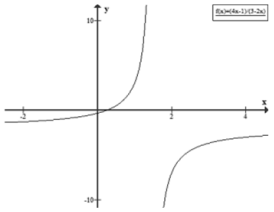
Question	Answer	Marks	Partial Marks
(b)(ii)	1.53 or 1.525... AND 11.5 or 11.47...	**3**	**M2** for $\frac{26 \pm \sqrt{(-26^2) - 4(2)(35)}}{2(2)}$ or correct shaped graph with 2 intersections on the positive x-axis or **M1** for $\sqrt{(-26)^2 - 4(2)(35)}$ or for $\frac{26 + (\text{or } -)\sqrt{p}}{2(2)}$ If 0 scored, **SC2** for 2 correct solutions given in surd form or **SC1** for 1 correct solution
(b)(iii)	4.5 or 4.47...	**1**	**FT** *their* positive solution – 7, provided final answer positive

16. 0607_w23_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)(i)	10	1	
(a)(ii)	28	1	
(b)	−5	1	
(c)	$\frac{x-4}{2}$ oe	2	**M1** for $2x = y - 4$ or $x = 2y + 4$ or $\frac{y}{2} = x + \frac{4}{2}$
(d)	$2x^2 + 2x - 3$	2	**M1** for $2x^2 + 4x - 2x - 4$ [+1]
(e)	$[x =]1$ and $[x =]4$	3	**M1** for $(x-1)^2 - 3(x-1)$ or better **M1** for $(x-1)(x-4) = 0$ or **dep M1** for correct use of formula on *their* quadratic equation or **dep M1** for sketch of their quadratic equation clearly showing 2 intersections with x-axis

17. 0607_w23_ms_43 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)	9	1	
(a)(ii)	–33	2	**B1** for [h(4)] = –8 or **M1** for 4 × 4(2 – 4) – 1
(a)(iii)	5 – 8x final answer	2	**M1** for 3 – 2(4x – 1) or better
(a)(iv)	$2 - \frac{x}{4}$ oe final answer	2	**M1** for $x = 4(2 - y)$ or $\frac{y}{4} = 2 - x$ or $y - 8 = -4x$

Question	Answer	Marks	Partial Marks
(b)(i)	Correct sketch 	3	**B2** for correct left-hand branch or **B1** for left-hand branch with a positive y-intercept or passing through origin AND **B1** for correct right-hand branch
(b)(ii)	$x = 1.5$ oe	1	
(b)(iii)	1.06 or 1.064 to 1.065 2.94 or 2.935...	3	**B2** for one correct or **M1** for sketch of $y = 4(2 - x)$
(b)(iv)	8, –32, 25	3	**B2** for 2 correct OR **M1** for $4(2-x)(3-2x) = 4x - 1$ **B1** for $6 - 7x + 2x^2$ or $24 - 28x + 8x^2$

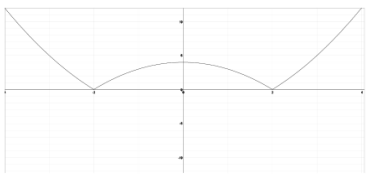
18. 0607_w21_ms_43 Q: 12

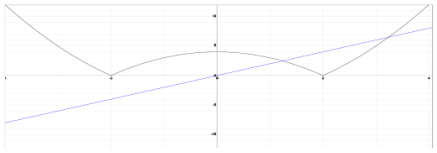
Question	Answer	Marks	Partial Marks
(a)(i)	–0.5 oe	3	**M2** for $\frac{x}{2} = -\frac{1}{4}$ or $4x = -2$ or **M1** for $\frac{2}{x} = 5 - 9$ oe or $9x = 5x - 2$ oe
(a)(ii)	$4 < x < 6$	3	**B2** for $x < 6$ seen and not spoiled or **B1** for $[x =] 6$ seen OR **M2** for $\frac{6 - 3x + 12}{x - 4}[> 0]$ or **M1** for $\frac{3(x-4)}{x-4}$ soi OR **M2** for correct graph showing answers or **M1** for appropriate graph
(b)(i)	0.219 2.28	3	**B2** for 0.2192... or 0.22 and 2.280 to 2.281 or **M1** for correct curve or correct use of formula
(b)(ii)	12.4 or 12.35 to 12.36... 66.3 or 66.31 to 66.33	2	**B1** for each **FT** *their* **(b)(i)**

19. 0607_s15_ms_41 Q: 5

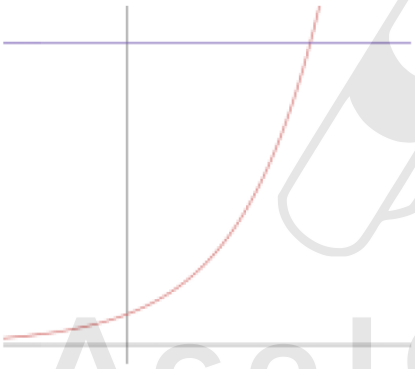
Qu.	Answer	Mark	Part Marks
(a) (i)	3	2	**M1** for $y = \frac{k}{\sqrt{x}}$ or $\frac{y}{5} = \frac{\frac{1}{\sqrt{25}}}{\frac{1}{\sqrt{9}}}$ oe If 0 scored, **SC1** for 0.648 oe or $\frac{25}{3}$ oe
(ii)	0.36 oe	2FT	**FT** $\left(\frac{their\ k}{25}\right)^2$ only from correct variation, $k \neq 1$ **B1** for $\left(\frac{their\ k}{25}\right)$ oe soi $k \neq 1$ If 0 scored, **SC1** for 4.02 or 4.024 to 4.025 or 225
(iii)	$x = \frac{225}{y^2}$ or $\left(\frac{15}{y}\right)^2$	2	**M1** for $x = \frac{c}{y^2}$ or $\sqrt{x} = \frac{their\ k}{y}$ oe $k \neq 1$ If 0 scored, **SC1** for $\sqrt{\frac{405}{y}}$ or $\frac{9y^2}{25}$
(b)	$y = -3(x-2)(x+4)$ or $-3x^2 - 6x + 24$	3	**M2** for [$y =$] $k(x-2)(x+4)$, $k \neq 1$ soi or **M1** for $(x-2)(x+4)$ seen OR **M1** for $k(x+1)^2 + c$, $k \neq 1$ and **M1** for substituting two points to get $24 = k + c$ and $0 = 9k + c$ OR **M1** for 3 correct equations in $y = ax^2 + bx + c$ and **M1** for eliminating one variable from all three equations. If 0 scored, **SC1** for $ax^2 + bx + 24$ soi

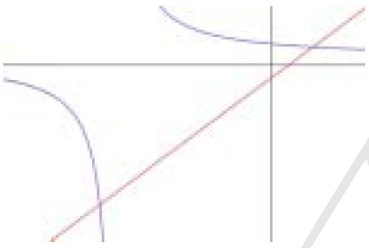
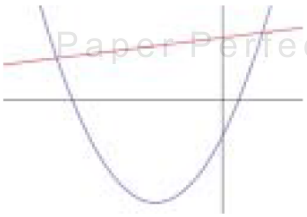
20. 0607_m22_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**M1** for a modulus graph or for graph of $y = 4 - x^2$
(b)	–2, 2	2	**B1** for each If 0 scored, **SC1** for (2, 0) and (–2, 0)

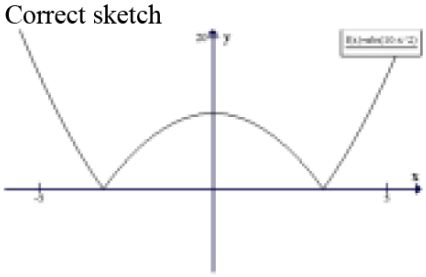
Question	Answer	Marks	Partial Marks
(c)	(0, 4)	**1**	
(d)	1 or 2 or 3	**1**	
(e)(i)	Correct sketch 	**1**	
(e)(ii)	1.24 or 1.236..., 3.24 or 3.236...	**2**	**B1** for each or **B1** for both seen e.g. $1.24 \leqslant x \leqslant 3.24$ or with y coords included or for 1.23 and 3.23
(e)(iii)	Two correct regions above x-axis and below both graphs	**2**	**B1** for one correct and no wrong or for one correct and one incomplete

21. 0607_s21_ms_41 Q: 11

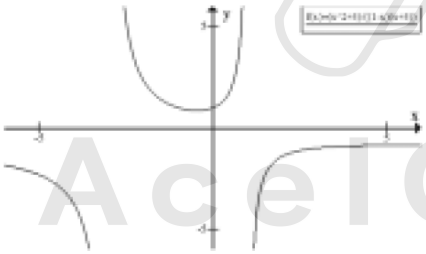
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**M2**	or **M1** for exponential graph
	1.43 or 1.430 to 1.431	**B1**	

Question	Answer	Marks	Partial Marks
(b)	Algebraic method		
	$(6x-1)(2x+3)=[5+x]$ or better	**M1**	
	$12x^2+15x-8=0$	**A1**	
	$x=\dfrac{-15\pm\sqrt{15^2-4\times12\times-8}}{2\times12}$	**M1**	Correct use of formula or correct sketch of parabola
	0.403 or 0.4032…	**B1**	
	–1.65 or –1.653…	**B1**	
(b)	Graphical method (1)		
	Correct sketch of $y = 6x - 1$	**M1**	
	Correct sketch of $y=\dfrac{5+x}{2x+3}$ 	**M2**	or **M1** for hyperbolic graph
	0.403 or 0.4032…	**B1**	
	–1.65 or –1.653…	**B1**	
(b)	Graphical method (2)		
	Correct sketch 	**M3**	**M2** for parabola $y = (6x –1)(2x + 3)$ oe or **M1** for parabola and **M1** for $y = 5 + x$
	0.403 or 0.4032...	**B1**	
	–1.65 or –1.653...	**B1**	

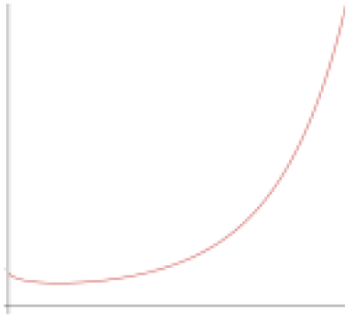
22. 0607_s21_ms_42 Q: 4

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for correct middle section
(b)	± 4 ± 2	2	**B1** for 2 correct solutions
(c)	$x < -4$ $-2 < x < 2$ $x > 4$	3	**B1** for each
(d)	0 $[k] > 10$	2	**B1** for each

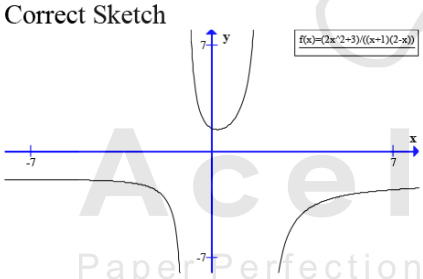
23. 0607_s21_ms_42 Q: 13

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B1** for each branch
(b)	$x = 1$, $x = -3$	2	**B1** for each
(c)	–3.79 or –3.791... –1 0.791 or 0.7912 to 0.7913	3	**B1** for each If 0 scored **SC1** for $y = 2x + 3$ sketched and cutting both axes

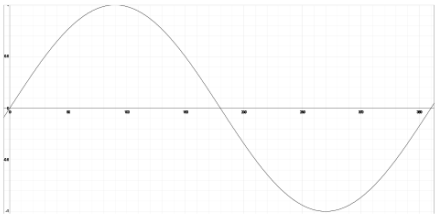
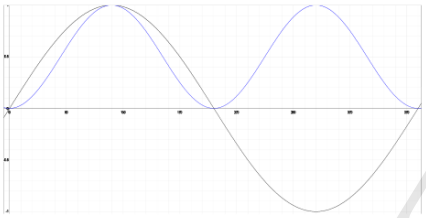
24. 0607_s21_ms_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for correct shape but cutting either axis or without minimum
(b)	(0.368, 0.692) or (0.3678 to 0.3679, 0.6922...)	2	**B1** for each
(c)(i)	0.237 or 0.2369 to 0.2370 2.31 or 2.311....	3	**M1** for correct line sketched **B1** for one correct
(c)(ii)	[0 <] $x \leqslant$ 0.237 or 0.2369 to 0.2370 $x \geqslant$ 2.31 or 2.311…	2	**B1** for each

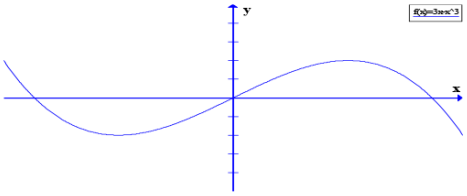
25. 0607_w21_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)	Correct Sketch 	3	**B1** for each branch
(b)	$x = -1, x = 2$	2	**B1** for each
(c)	(0.208, 1.43)	2	0.2080 to 0.2081, 1.425 to 1.426 **B1** for each coordinate
(d)	$-1 < x < 0.208$	B2	**FT** *their* **5(c)** **B1** for $-1 < x$ or $x < 0.208$
	$x < -1$ oe	B1	
(e)	3.75 or 3.747...	1	

26. 0607_w21_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**2**	**B1** for sine curve but different period and/or different amplitude
(b)	(270, –1)	**1**	
(c)	360 1	**2**	**B1** for each
(d)	Correct sketch 	**2**	**B1** for $(\text{sine})^2$ curve but different period and/or different amplitude
(e)(i)	$-1 \leqslant f(x) \leqslant 1$	**1**	
(e)(ii)	$0 \leqslant g(x) \leqslant 1$	**1**	
(f)	Correct shading	**1**	

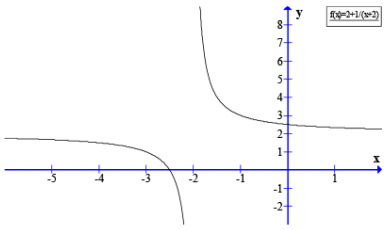
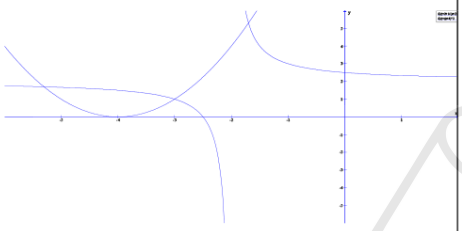
27. 0607_w21_ms_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for negative cubic graph with 2 turning points
(b)	(1, 2)	1	
(c)	–1.73 or –1.732… oe 0 1.73 or 1.732… oe	2	**B1** for two correct
(d)(i)	Translation $\begin{pmatrix}-1\\0\end{pmatrix}$	2	**B1** for each
(d)(ii)	–1.46 or –1.457… 0.457 or 0.4574…	2	**B1** for each but without y-coords. or **M1** for graph of $y=3(x+1)-(x+1)^3$ oe
(d)(iii)	[–2 ⩽] x ⩽ –1.46 0.457 ⩽ x [⩽ 2]	2	**B1** for each or for x ⩽ –1.46 and 0.457 ⩽ x

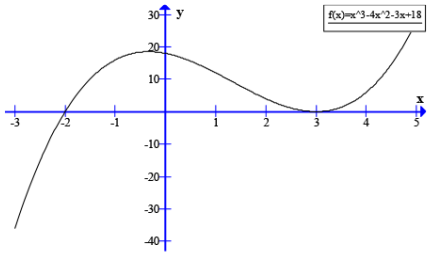
28. 0607_s20_ms_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	Correct curve 	2	**B1** for correct shape but inaccurate x intercepts
(b)	[–0.5 <] x < 0	1	
	2 < x < 4	2	**B1** for 2 < x oe or for x < 4 oe
(c)	3.08 or 3.079...	2	**M1** for identifying local maximum point

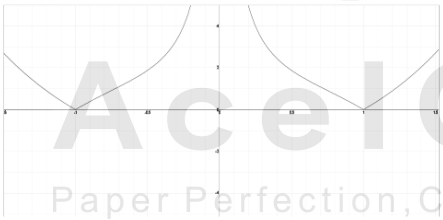
29. 0607_s20_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)		2	**B1** for correct 'hyperbolic shape' **B1** for intersects with axes correct (approx.)
(a)(ii)	(–2.5, 0) (0, 2.5)	2	**B1** for each
(a)(iii)	$x = -2$ $y = 2$	2	**B1** for each
(b)		2	**B1** for correct 'quadratic shape' **B1** for min point at (–4, 0) (approx.)
(c)	$[x =] -5.30$ $[x =] -3$ $[x =] -1.70$	3	**B1** for each correct answer
(d)	$-5.30 \leq x \leq -3$ and $-2 < x \leq -1.70$	2	**B1** for each

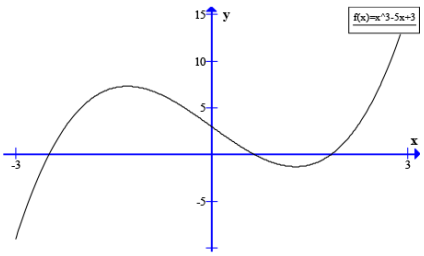
30. 0607_s20_ms_43 Q: 4

Question	Answer	Marks	Partial Marks
(a)	Correct Sketch 	**2**	With maximum in second quadrant and minimum on positive x-axis **B1** for cubic graph for +ve x^3
(b)	–1.51 or –1.508 to –1.507 1.24 or 1.244... 4.26 or 4.263 to 4.264	**3**	**B1** for each
(c)(i)	(–0.333, 18.5) or (–0.3333..., 18.51 to 18.52)	**2**	**B1** for each coordinate
(c)(ii)	(3, 0)	**1**	
(d)	$k < 0$, $k > 18.5$	**2**	**B1FT** for each

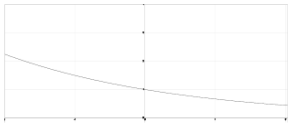
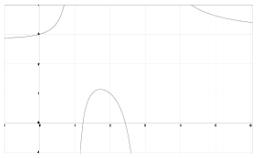
31. 0607_w20_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**3**	**B1** for modulus graph **B1** for correct for $x > 1$, or $-1 < x < 0$ **B1** for $x = -1$ and 1 when $y = 0$ plotted correctly. Maximum 2 marks if sketch not fully correct
(b)	$x = 0$	**1**	
(c)	–1.4[0] or –1.395… –0.475 or –0.4746…	**2**	**B1** for each
(d)	$-1.15 \leqslant x \leqslant -0.536$ or —1.154 to –1.153...$\leqslant x \leqslant$ –0.5357 to –0.5356 AND $0.536 \leqslant x \leqslant 1.15$ or 0.5356 to 0.5357 $\leqslant x \leqslant$ 1.153 to 1.154	**3**	**B2** for one fully correct inequality or **B1** for $-1.15 \leqslant x \leqslant -k$ $-k \leqslant x \leqslant -0.536$ or $0.536 \leqslant x \leqslant k$ $k \leqslant x \leqslant 1.15$ or **M1** for suitable sketch, e.g. $f(x) + x^2 \leqslant 2$ or **B1** for 4 correct solutions seen

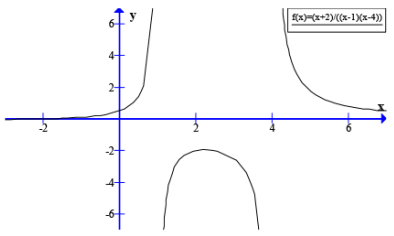
32. 0607_w20_ms_42 Q: 4

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**2**	Cubic curve, crossing x-axis three times, with maximum in 2nd quadrant and minimum, in 4th quadrant **B1** for any cubic (positive x^3)
(b)	(1.29, –1.3[0])	**2**	1.290 to 1.291, –1.303... **B1** for each coordinate
(c)	Rotation [Order] 2 [centre] (0, 3)	**3**	**B1** for each
(d)(i)	–2.9[0] or –2.895... 0.603 or 0.6027... 2.29 or 2.292...	**3**	**B1** for each If three correct but seen in coordinate form, **SC1**. If 0 scored, **SC1** for correct sketch of line (may be freehand but negative intersection with y-axis and crosses curve three times)
(d)(ii)	$-2.9[0] < x < 0.603$ $x > 2.29$	**2**	**FT** *their* **(i)** **B1** for each

33. 0607_w20_ms_43 Q: 8

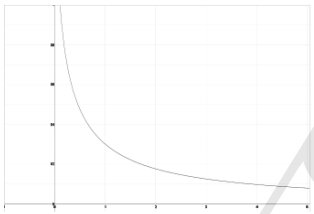
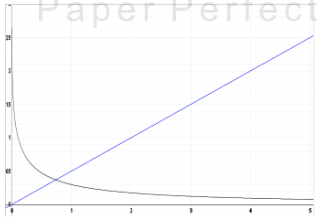
Question	Answer	Marks	Partial Marks
(a)(i)	Correct sketch 	2	**B1** for exponential shape
(a)(ii)	$0 \leqslant x \leqslant 1.71$ or 1.709 to 1.710	3	**B2** for either correct or **B1** for 0 and 1.71 or 1.709 to 1.710 seen
(a)(iii)	–1.3[0] or –1.302... 0.843 or 0.8429...	3	**B2** for one correct or **B1** for sketch of $y = x^2$ added to diagram 
(a)(iv)	Two areas shaded which are above $y = 1.5^{-x}$ and below $y = x^2$	1	
(b)	$[a =] -2$ $[b =] -4$	3	**B1** for $a = -2$ **M1** for $\frac{b}{a} = 2$ oe
(c)	Correct sketch 	3	**B1** for each branch

34. 0607_s19_ms_41 Q: 11

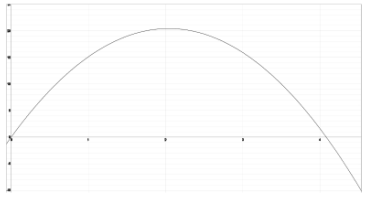
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B1** for each branch

Question	Answer	Marks	Partial Marks
(b)	(2.24, –1.94)	**2**	or (2.242 to 2.243, –1.943 to –1.942) **B1** for each co-ordinate
(c)	$x = 1$, $x = 4$, $y = 0$	**3**	**B1** for each
(d)(i)	1.34 or 1.344 to 1.345 2.79 or 2.789... 5.87 or 5.866...	**3**	**B1** for each If 0 scored, **SC1** for 1.3, 2.8 and 5.9
(d)(ii)	$x < 1$ $1.34 < x < 2.79$ $4 < x < 5.87$	**3**	**B1** for each **FT** dep on two solutions to **(i)** between 1 and 4. **FT** dep on solution to **(i)** > 4

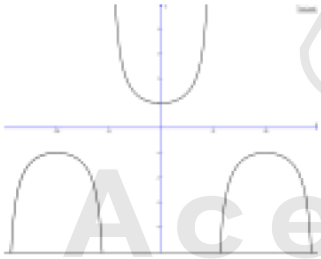
35. 0607_s19_ms_42 Q: 2

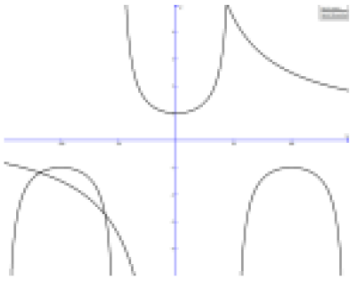
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**2**	Must not cross axes **B1** for correct shape
(b)	$y = 0$, $x = 0$	**2**	**B1** for each If 0 scored, **SC1** for answers x-axis and y-axis
(c)	0.462 or 0.4624 to 0.4625	**1**	
(d)	Correct sketch 	**1**	
(e)	0.742 or 0.7415 to 0.7416	**1**	
(f)	Region that is below $y = 0.5$ and above other two graphs.	**1**	

36. 0607_s19_ms_42 Q: 7

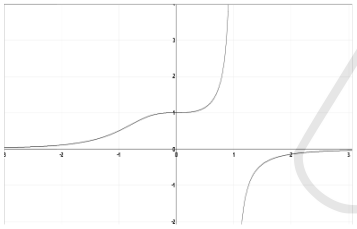
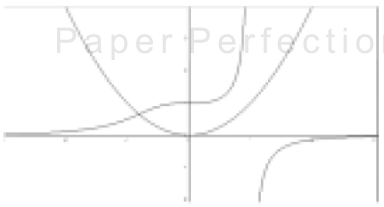
Question	Answer	Marks	Partial Marks
(a)	15.1	**1**	
(b)(i)	Correct sketch 	**2**	Must pass through origin and cross x-axis reasonably close to $x = 4$, not 4.5. **B1** for correct shape
(b)(ii)	[h =]20.4 or 20.40 to 20.41 [t =] 2.04 or 2.040 to 2.041	**2**	**B1** for each or both correct reversed answers
(b)(iii)	4.08 or 4.081 to 4.082	**1**	
(b)(iv)	1.4[0] or 1.401 to 1.403	**3**	**B1** for 2.74 or 2.741 to 2.742 **B1** for 1.34 or 1.339 to 1.340

37. 0607_s19_ms_43 Q: 4

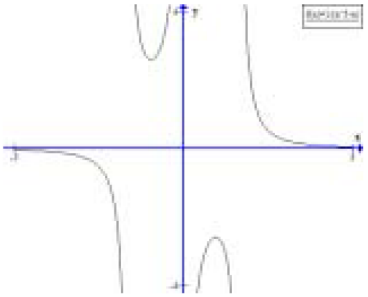
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**3**	**B1** for correct shape **B1** for max and min approx. correct **B1** for asymptotes approx. correct
(b)	$f(x) \leqslant -1$ and $f(x) \geqslant 1$	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
(c)(i)	Correct sketch 	2	**B1** for each branch
(c)(ii)	–213 or –212.9 to –212.8 –111 or –111.5 to –111.4 78.6[…]	3	**B1** for each
(c)(iii)	$x = 0$ $y = 0.5$	2	**B1** for each

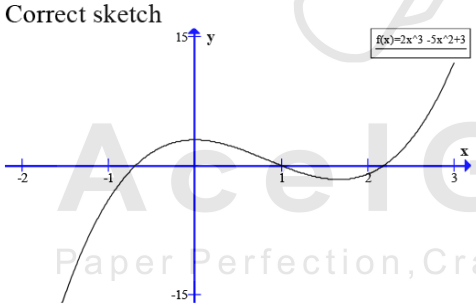
38. 0607_w19_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B2** for first branch correct, including gradient zero at y-intercept or **B1** for first branch above x-axis, increasing and crossing y-axis **B1** for second branch correct
(b)	0.0357 or $0.03571... \leqslant f(x) \leqslant 1$ oe	2	**B1** for $0 < f(x)$ or $f(x) \leqslant 1$
(c)	Correct sketch 	1	Vertex at origin
(d)(i)	–[0].809 or –[0].8087...	1	
(d)(ii)	[u =] 5 [w =] 2	2	**B1** for each or **SC1** for answers reversed

39. 0607_w19_ms_42 Q: 12

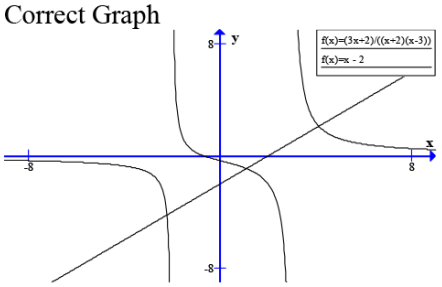
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	4	**B1** for each branch
(b)	$x = 0$ $x = 1$ $x = -1$ $y = 0$	3	**B2** for three correct or **B1** for one correct
(c)	(0.577, –2.6[0]) or (0.5773 to 0.5774, –2.598…)	2	**B1** for each
(d)	[x =] –1.24 or –1.242 to –1.241 [x =] 1.13 or 1.127 to 1.128	2	**B1** for each

40. 0607_w19_ms_43 Q: 3

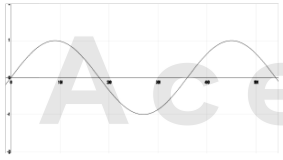
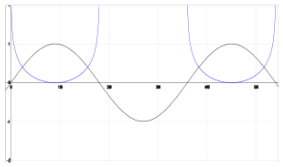
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for cubic curve (+ x^3) with 2 turning points
(b)	–0.686 or –0.6861..., 1, 2.19 or 2.186...	3	**B1** for each If 0 scored, **SC1** for three correct but in coordinate form (…, 0)
(c)	(0, 3)	1	

Question	Answer	Marks	Partial Marks
(d)	(1.67, –1.63) or (1.666 to 1.667, –1.630 to –1.629)	2	**B1** for each co-ordinate
(e)	$-1.63 < k < 3$	2	**FT** *their y* co-ords from **(c)** and **(d)** **B1** for each

41. 0607_w19_ms_43 Q: 12

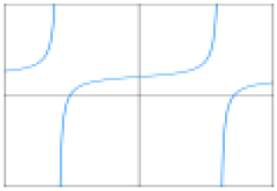
Question	Answer	Marks	Partial Marks
(a)	Correct Graph 	3	**B1** for each branch
(b)	$x = -2$ $x = 3$ $y = 0$	3	**B1** for each
(c)(i)	Correct line , See **(a)**	1	
(c)(ii)	–2.21 or –2.211... 1.1[0] or 1.100... 4.11 or 4.111...	3	**B1** for each
(c)(iii)	$x < -2.21$ $-2 < x < 1.1[0]$ $3 < x < 4.11$	3	**FT** from **(ii)** if graphs are correct **B1** for each

42. 0607_s18_ms_41 Q: 5

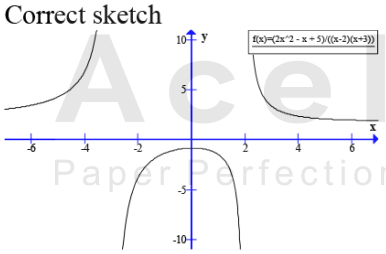
Question	Answer	Marks	Partial Marks
(a)(i)	Correct sketch 	2	**B1** for sine graph with different amplitude and/or period but must go through (0, 0) or for correct sine graph but only one cycle
(a)(ii)	$-1 \leqslant f(x) \leqslant 1$	1	
(b)(i)	Correct sketch 	2	i.e. Correct shape with 2 branches above x-axis and gap of at least 120 between the branches and only slightly crossing either axis. **B1** for 2 branches above x-axis but gap less than 120 between the branches and only slightly crossing either axis or one branch correct
(b)(ii)	logarithms of negative numbers do not exist oe	1	
(b)(iii)	(90, 0), (450, 0)	2	**B1** for each
(b)(iv)	$x = 0$, $x = 180$, $x = 360$, $x = 540$	2	**B1** for 2 or 3 correct

Question	Answer	Marks	Partial Marks
(c)(i)	23.5 or 23.51 to 23.52	**1**	
(c)(ii)	$23.5 < x < 156.5$ $383.5 < x < 516.5$	**2**	**B1** for each Allow 23.51 to 23.52, 156.48 to 156.49 Allow 383.51 to 383.52, 516.48 to 516.49
(c)(iii)	Any integer less than – 1	**1**	

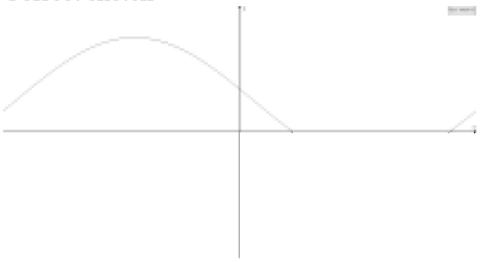
43. 0607_s18_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**3**	**B1** for each branch
(b)	$y = 1, \quad x = 3, \quad x = -3$	**3**	**B1** for each
(c)	–2.87 or –2.874 to –2.873 1.15 or 1.149 to 1.150 2.72 or 2.723 to 2.724	**3**	**B1** for each If 0 scored **SC1** for –2.9, 1.1 and 2.7

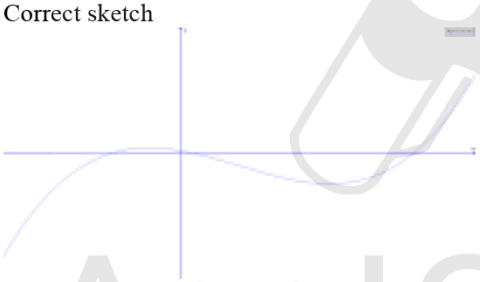
44. 0607_s18_ms_43 Q: 5

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**3**	**B1** for each branch
(b)	(0.0295, – 0.833)	**2**	or (0.02948 to 0.02949, –0.8329...) **B1** for each
(c)	$x = -3, x = 2, y = 2$	**3**	**B1** for each
(d)	$-0.833 < k \leqslant 2$	**2**	**FT** *their* **(b)** **B1** for each inequality
(e)(i)	–5.13, 2.81	**2**	–5.131..., 2.812 to 2.813 **B1** for each
(e)(ii)	$-5.13 < x < -3$, $2 < x < 2.81$	**2**	–5.131..., 2.812 to 2.813 **B1** for each **FT** *their* **(c)** and **(e)(i)**

45. 0607_w18_ms_41 Q: 3

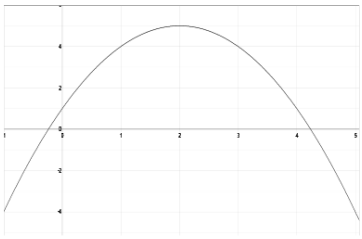
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	Intersections with x-axis both positive and not 90 and maximum below 4 **B1** correct sine graph shape **B1** max and min in correct quadrant
(b)	(20, 0) (80, 0)	2	**B1** for each
(c)	(–40, 3)	1	
(d)	–80.2 or –80.16… 28.9 or 28.90… 56.7 or 56.71 to 56.72	3	**B1** for each

46. 0607_w18_ms_41 Q: 9

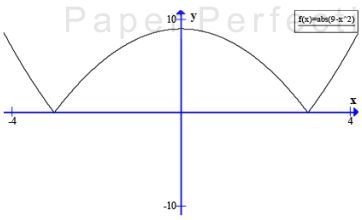
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for cubic graph with max/min incorrect
(b)	(2.53, –12.1)	2	**B1** for each co-ordinate
(c)	$k < -12.1$ $k > 2.13$	2	**B1** for each **FT** *their* –12.1

Question	Answer	Marks	Partial Marks
(d)	$-0.726 < x < 1.26$	2	**B1** for both critical values seen or for $[k <] x < 1.26$ or for $-0.726 < x [< k]$

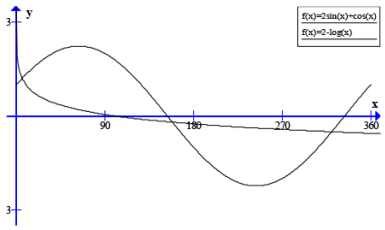
47. 0607_w18_ms_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for parabola vertex upwards but incorrect intersections with axes
(b)	$x = 2$ oe	1	
(c)(i)	– 0.236 or – 0.2361 to – 0.2360 4.24 or 4.236…	2	**B1** for each
(c)(ii)	– 0.236 or – 0.2361 to – 0.2360 < x < 4.24 or 4.236…	1	**FT** *their* **(b)(i)**
(d)	– 0.449 or – 0.4495 to – 0.4494 4.45 or 4.449…	2	**B1** for each If 0 scored, **B1** for $y = -1$ sketched
(e)	Correct line sketched, passing through (5, 0)	2	**B1** for line with negative gradient or with y-intercept reasonably close to 5 but not through (0, 6)
(f)	Region below curve **and** below line shaded, **continuing** below x-axis	1	

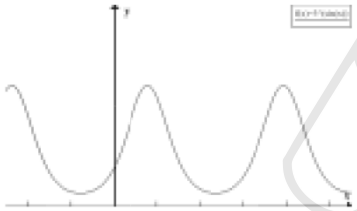
48. 0607_s17_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Correct Graph 	4	**B1** for maximum point on or close to y-axis **B1** for correct shape between *their* –3 and 3 **B1** for mod graph
(b)	[x =] ±4, ± $\sqrt{2}$ or ± 1.41 or ± 1.414...	2	**B1** for any 2 correct answers
(c)	$k > 9$ $k = 0$	2	**B1** for each

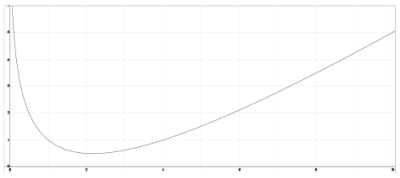
49. 0607_s17_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)	Correct Graph 	3	**M1** for sine graph with one max and one min **A1** for x-intercepts at 150 and 330 (approx.) **A1** for positive y-intercept
(b)	Correct Graph with second intersection with other graph (if correct) below x-axis	2	**M1** for correct shape
(c)	6.18 or 6.175... 159 or 158.5 to 158.6 320 or 320.3 to 320.4	3	**B1** for each

50. 0607_s17_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	 Correct sketch	3	With correct shape with two max on right of y-axis and one on left, all above x-axis and reasonable quality or **B2** for correct shape and all above x-axis or **B1** for correct shape
(b)	–270, 90, 450	3	**B1** for each **SC2** for all correct but with y co-ords or **SC1** for two correct with y co-ords
(c)	750, 870	2	**B1** for each
(d)	$x < 54.7$	1	54.74 to 54.75
	$164 < x < 267$	2	163.5 to 163.6 , 266.6... **B1** for one inequality or **B1** for both values seen If 0 scored, **B1** for straight line with negative gradient crossing curve three times between $x = 0$ and $x = 400$. May be freehand.

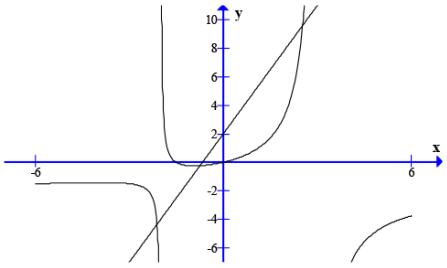
51. 0607_s17_ms_43 Q: 6

Question	Answer	Marks	Part Marks
(a)	Correct sketch 	2	**B1** for correct shape
(b)	(2.17, 0.488) or (2.171…, 0.4877…)	2	**B1** for each
(c)	$0.488 \leqslant f(x) \leqslant 1.51$ or $0.4877... \leqslant f(x) \leqslant 1.505...$	2	**FT** *their* 0.488 **B1** for $0.488 \leqslant f(x)$ oe or $f(x) \leqslant 1.51$ oe
(d)	0.502 or 0.5015… 5.83 or 5.827…	2	**B1** for each
(e)	$0.502 < x < 5.83$ or $0.5015... < x < 5.827...$	1	**FT** *their* (d)
(f)(i)	15.[0] or 15.00… 25.[0] or 25.00… 35. [0] or 35.00…	1	
(f)(ii)	[an] asymptote oe	1	

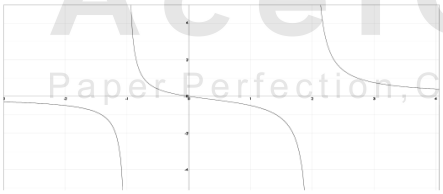
52. 0607_w17_ms_41 Q: 10

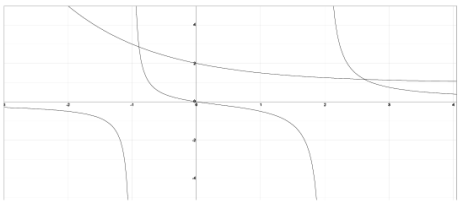
Question	Answer	Marks	Partial Marks
(a)	$8 - 3x$ final answer	1	
(b)(i)	$x^2 + (\textit{their}\ (8 - 3x))^2 = 25$	M1	
	$64 - 24x - 24x + 9x^2$	B1	or *their* $(8 - 3x)^2$ expanded correctly
	Completion to $10x^2 - 48x + 39 = 0$	A1	
(b)(ii)	(1.04 or 1.036... , 4.88 to 4.89...) with working (3.76 or 3.763 to 3.764 ,–3.29.. to –3.28) with working	5	**M1** for $\frac{48 \pm \sqrt{(-48)^2 - 4(10)(39)}}{2 \times 10}$ or sketch of parabola with both zeros > 0 or sketch of circle centre O with straight line **B1** for each x co-ordinate **B1** for each y co-ordinate or **B1** , **B1** for correct pairs reversed

53. 0607_w17_ms_41 Q: 11

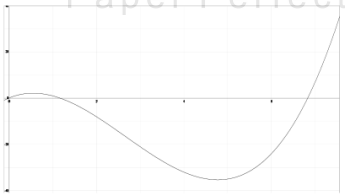
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B1** for each branch
(b)	(–0.93[0], –0.252) or (–0.9303..., 0.2521...)	2	**B1** for each co-ordinate
(c)	$x = -2$ final answer $x = 3$ final answer	2	**B1** for each
(d)(i)	–2.12 or –2.117... –0.747 or –0.7465... 2.53 or 2.530 to 2.531	3	**B1** for each
(d)(ii)	$x < -2.12$ $-2 < x < -0.747$ $2.53 < x < 3$	3	**FT B1** for each only if three answers in (i) and asymptotes used

54. 0607_w17_ms_42 Q: 4

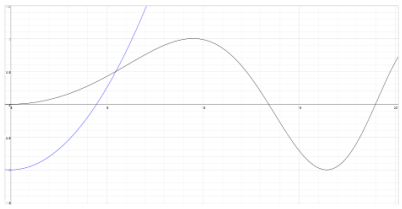
Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B1** for correct middle branch **B1** for correct left hand branch **B1** for correct right hand branch

Question	Answer	Marks	Partial Marks
(b)	-1 2	**2**	**B1** for each
(c)	2	**1**	
(d)(i)	Correct sketch 	**2**	Must intersect y-axis and be above x-axis **B1** for decreasing exponential graph
(d)(ii)	$y = 1$ oe	**1**	
(e)	-0.892 or -0.8919 to -0.892[0] 2.62 or 2.622 to 2.623	**2**	**B1** for each

55. 0607_w17_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	$x + 2\left(x + \frac{1}{4}\right) = 8$ oe	**M2**	**M1** for $2\left(x + \frac{1}{4}\right)$ oe seen
	2.5	**B1**	
(b)(i)	$x^3 = 2x(x-2)(x-2)$ oe	**M1**	
	$[(x-2)^2 =]\ x^2 - 2x - 2x + 4$ or $2x^3 - 4x^2 - 4x^2 + 8x$	**B1**	Allow $-4x$ for $-2x - 2x$ Allow $-8x^2$ for $-4x^2 - 4x^2$
	leading to $x^3 - 8x^2 + 8x = 0$	**A1**	Final equation reached without any errors or omissions
(b)(ii)	Correct sketch 	**2**	**B1** for correct shaped cubic with max before min
(b)(iii)	318 or 319 or 318.3 to 318.7	**2**	**B1** for 6.83 or 6.828… seen isw use of other values (1.1715…)

56. 0607_s16_ms_42 Q: 6

Question	Answer	Mark	Part Marks
(a)	Correct sketch 	2	**M1** for shape i.e. starting at origin then one maximum then one minimum **A1** for two zeros to right of $x = 10$ and to the left of $x = 20$
(b)	13.4 or 13.41 to 13.42 19[.0] or 18.97…	1 1	
(c)	(9.49, 1) or (9.486 to 9.487, 1)	B1 B1	
(d)	(16.4, –1) or (16.43…, –1)	B1 B1	
(e)	$-1 \leqslant f(x) \leqslant 1$	1	
(f)	Correct sketch of parabola shape from approximately $y = -1$ 5.48 or 5.477…	B1 B1	

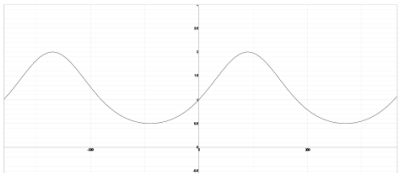
57. 0607_s16_ms_42 Q: 8

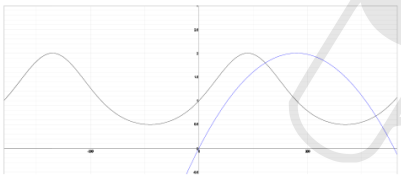
Question	Answer	Mark	Part Marks
(a)	[a, b, c =] –2, 1, 2	1, 1, 1	In any order
	[d =] 0	1	
(b)	– 1	1	
(c)	– 1	1	
(d)	Parabola vertex downwards and vertex below x-axis	M1	
	Cuts given graph in 5 places	A1	

58. 0607_s16_ms_43 Q: 11

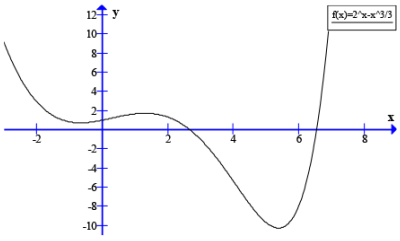
Question	Answer	Mark	Part Marks
(a)	Correct sketch	4	**B1** Correct graph for $x > 3$ **B1** Correct graph for $x < 1$ **B1** Correct graph for $1 < x < 3$ **B1** Approximately correct intercepts
(b)	$x = 1$ $x = 3$ $y = 3$	1 1 1	
(c)	(2, 2)	1	
(d)	1.38, 2, 3.62	3	**B1** for each

59. 0607_w16_ms_41 Q: 3

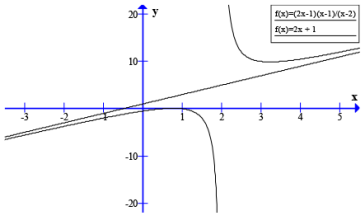
Qu.	Answer	Mark	Part Marks
(a)	Correct sketch 	3	**B1** for shape including 2 minimum points and 2 maximum points **B1** for all above x-axis
(b)	$0.5 \leqslant f(x) \leqslant 2$	2	Allow written separately or in words **B1** for each **SC1** for $0.5 \leqslant x \leqslant 2$

Qu.	Answer	Mark	Part Marks
(c) (i)	1	1	
(ii)	2	1	
(d) (i)	–90, 270, 630, 990	2	**B1** for –90 and 270 with no others from –360 to 360
(ii)	$360n - 450$ oe	2FT	**FT** only if clear linear sequence **B1FT** for $360n + k$ or $kn - 450$
(e) (i)	Correct sketch 	2	**B1** for parabola vertex upwards
(ii)	122.4 or 122 or 122.4… 326.2 or 326 or 326.2…	1 1	

60. 0607_w16_ms_42 Q: 14

Question	Answer	Mark	Part Marks
(a)	Fully correct curve  	**4**	**B1** for correct graph for $x < 0$, minimum point seen above x-axis **B1** for correct graph for $0 < x < 2$, maximum point seen higher than minimum point **B1** for minimum point seen below x-axis, $2 < x < 8$ If 0 or 1 scored, **SC2** instead for 'correct curve' except stationary point of inflexion instead of LH minimum and maximum
(b)	0.729 or 0.7287... –10.3 or –10.26...	**2**	**B1** for each
(c)	(1.31 or 1.311 to 1.312, 1.73[0])	**2**	**B1** for each co-ordinate
(d)	–2.82, 0.364, 4.23, 5.76 or –2.824 to –2.823 0.3643 to 0.3644 4.228 to 4.229 5.758…	**4**	**B1** for each If 0 scored **SC2** for –2.8, 0.36, 4.2, 5.8 or **SC1** for three of these.

61. 0607_w16_ms_43 Q: 10

Question	Answer	Mark	Part Marks
(a) (i)	$(2x - 1)(x - 1)$	**2**	**SC1** for $(2x + a)(x + b)$ where $ab = 1$ and $a + 2b = -3$
(ii)	$\frac{(2x+1)(x-2)+3}{x-2}$ oe	**M1**	
	$\frac{2x^2-4x+x-2+3}{x-2}$	**A1**	Allow $-3x$ for $-4x + x$
	$\frac{2x^2-3x+1}{x-2}$	**A1**	
(b) (i)	Correct sketch  	**2**	With no undue overlap at $x = 2$ or serious curving back **B1** for either branch correct

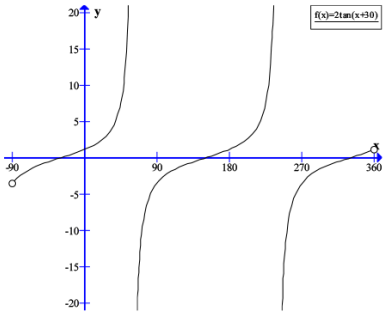
Question	Answer	Mark	Part Marks
(ii)	Correct line	**2**	Not intersecting either branch **B1** for line with positive gradient and positive y intercept
(iii)	$y = 2x + 1$ $x = 2$	**1** **1**	
(iv)	0.5 1	**1** **1**	

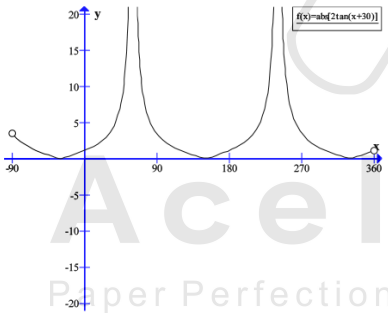
62. 0607_s15_ms_41 Q: 15

Qu.	Answer	Mark	Part Marks
(a) (i)	$y = 1$ $x = 1$ $x = 3$	**1** **1** **1**	
(ii)	(1.73, –13.9) or (1.732... , –13.93 to –13.92)	**2**	**B1** for each
(iii)	(–1.73, –0.07 18) or (–1.732... , –0.07180 to –0.07179...)	**2**	**B1** for each

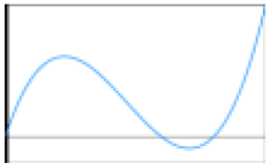
Qu.	Answer	Mark	Part Marks
(b) (i)	$-13.9 < k < -0.0718$	**2FT**	**FT** y coordinates from **(ii)** and **(iii)** **B1** for one inequality correct or **SC1** for $-13.9 \leqslant k \leqslant -0.0718$ or for $-13.9 < x < -0.0718$
(ii)	–13.9, –0.0718	**1FT**	**FT** y coordinates from **(a)(ii)** and **(a)(iii)**
(c)	$x < -3$ $-1 < x < 1$ $x > 3$	**1** **1** **1**	Not f(x)

63. 0607_s15_ms_42 Q: 10

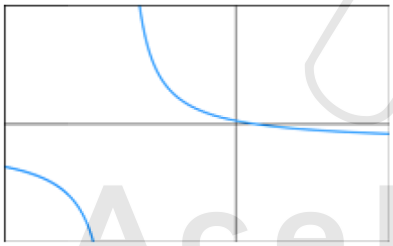
Qu.	Answer	Mark	Part Marks
(a)	Correct curve with no overlaps at 60 and 240, x intercepts at approximately –30, 150, 330 	3	**B2** for 'correct' but with overlaps and/or inaccurate intercepts **B1** for 1 branch correct
(b)	38.2 or 38.19 to 38.2 218 or 218.1 to 218.2	1 1	
(c)	$x = 60$ $x = 240$	1 1	

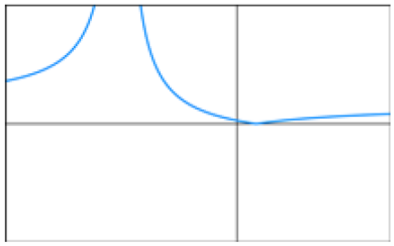
Qu.	Answer	Mark	Part Marks
(d)	*their* **(a)** with negative y parts reflected in x-axis 	2FT	**B1FT** for 1 branch correct

64. 0607_s15_ms_43 Q: 5

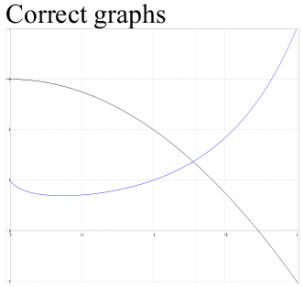
Qu.	Answer	Mark	Part Marks
(a)	$x(40 - 2x)(30 - 2x)$ $1200 - 80x - 60x + 4x^2$	2 1	or **B1** for $40 - 2x$ or $30 - 2x$ indep
(b)		2	**B1** for any cubic curve ($+x^3$) with max & min
(c)	2.19 or 2.192... 10 22.8 or 22.80 to 22.81	1 1 1	
(d)	22.8 would produce negative width/length	1	oe
(e)	3030 or 3032 to 3032.3... 28.7 or 28.68 to 28.69 or 18.7 or 18.68 to 18.69	1 1	

65. 0607_s15_ms_43 Q: 11

Qu.	Answer	Mark	Part Marks
(a)		3	**M1** Basic shape **A1** RH branch cuts both +ve axes **A1** asymptotes approximately right with no overlap
(b)	$x = -3$ $y = -2$	1 1	
(c)	$-2 < y \leq \frac{1}{3}$	2	May be separate, **B1** for either

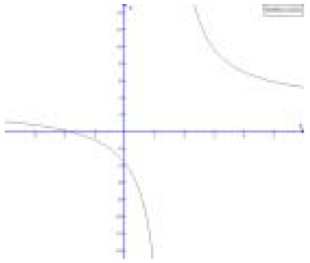
Qu.	Answer	Mark	Part Marks
(d)		2	Correct shape **B1** for reflection of any part of **(a)** in x-axis
(e)	–4.75 –2.125 or –2.12 or –2.13	1 1	

66. 0607_w15_ms_41 Q: 8

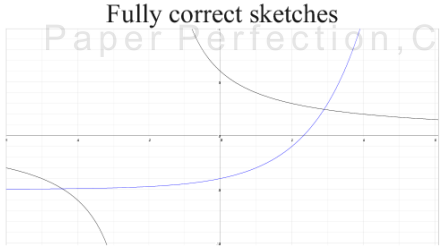
Question	Answer	Mark	Part Marks
(a)	Correct graphs 	2 2	**B1** for inaccurate parabola **B1** for correct shape but inaccurate
(b)	1.28 or 1.277 to 1.278	1	

Question	Answer	Mark	Part Marks
(c)	1.73 or 1.732…	1	
(d) (i)	0.368 or 0.3678 to 0.3679 0.692 or 0.6922…	1 1	 **SC1** for (0.37, 0.69)
(ii)	$0.692 \leqslant y \leqslant 4$ oe	2FT	**B1FT** for $0.692 \leqslant y$ oe or **B1** for $y \leqslant 4$ oe or **B1FT** for 0.692 and 4 **SC1FT** for $0.692 < y < 4$
(e) (i)	0.794 or 0.7943… 0.955 or 0.9549 to 0.9550 0.993 or 0.9931…	1 1 1	
(ii)	1	1	

67. 0607_w15_ms_42 Q: 7

Question	Answer	Mark	Part Marks
(a) (i)	Correct graph 	2	**M1** for graph in 2 sections, with each section approximately correct.
(ii)	$x = 1.5$ oe $y = 3$	1 1	
(iii)	(0, –3.67) or (0, –3.667 to –3.666) or $\left(0, -\frac{11}{3}\right)$	1	
	(–1.83, 0) or (–1.833…, 0) or $\left(-\frac{11}{6}, 0\right)$	1	
(b)	$1.5 < x < 5.5$ oe and	3	**B2** for $1.5 \leqslant x \leqslant 5.5$ oe or **B1** for 1.5 and 5.5 seen or for $x \leqslant 5.5$ or $1.5 \leqslant x$
	$x < -1$	1	Condone $\leqslant$ Ignore inclusion of –4 or 6 throughout

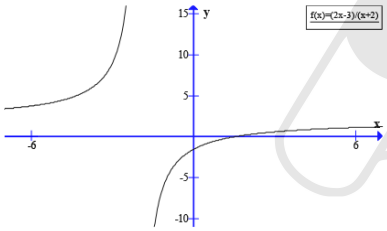
68. 0607_w15_ms_43 Q: 12

Question	Answer	Mark	Part Marks
(a)	Fully correct sketches 	2	**B1** for rectangular hyperbola with correct orientation but inaccurate
		2	Correct curve crossing positive x-axis and negative y-axis **B1** for exponential curve with correct orientation but inaccurate
(b) (i)	$x = -2$ $y = 0$	1 1	
(ii)	$y = -5$	1	
(c)	$x > 2.9[0]$ or 2.897…	2	**B1** for 2.9[0] or 2.897… seen

69. 0607_s20_ms_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	–2	**1**	
(a)(ii)	3	**2**	**M1** for $f\left(\frac{1}{3}\right)$ oe
(b)	$-\frac{2}{3}$ oe	**2**	**M1** for $g\left(-\frac{1}{2}\right)$ oe
(c)	$\frac{1}{3}$ and $\frac{7}{3}$	**3**	**M2** for $4-3x=\pm 7$ or **M1** for $f(x)=\pm 3$ If 0 scored **B1** for each answer
(d)	$3(3x-5)(x-1)$	**3**	**B2** for $9x^2-12x-12x+15$ or **M1** for $(4-3x)^2-1$

70. 0607_w18_ms_42 Q: 12

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	**3**	**B1** for correct left hand branch without serious curl back **B2** for correct right-hand branch or **B1** for correct shape right-hand branch but with clear intercepts but serious overlap or curl back
(b)	$x=-2$ oe $y=2$ oe	**2**	**B1** for each
(c)(i)	–2.81 or –2.812 to –2.811 2.31 or 2.311 to 2.312	**2**	**B1** for each or for $2x^2+x-13=0$
(c)(ii)	$\frac{x+16}{x+2}$	**3**	**M2** for $\frac{5(x+2)-2(2x-3)}{x+2}$ or **M1** for $5-2\left(\frac{2x-3}{x+2}\right)$ oe

71. 0607_w17_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	10	1	
(a)(ii)	0.1	1	
(b)	5	2	**M1** for g(5) = 0.2 oe
(c)	0 and –4 nfww	3	**M1** for h(x) = 4 or $3(x+2)^2 - 2[=10]$ **B1** for $(x+2)^2 = 4$ oe or $3x^2 + 12x = 0$ oe
(d)	$\frac{1}{9x^2}$ or $\frac{1}{(3x)^2}$ oe final answer	2	**M1** for $(3x - 2 + 2)^2$

72. 0607_w17_ms_43 Q: 9

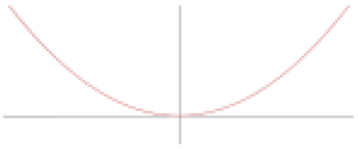
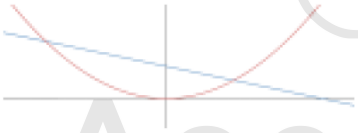
Question	Answer	Marks	Partial Marks
(a)(i)	Correct graph	2	**B1** for correct shape with a max

Question	Answer	Marks	Partial Marks
(a)(ii)	(0, 10) (3.7[0], 0) or (3.701 to 3.702, 0)	2	**B1** for each
(a)(iii)	3.54 or 3.541…	1	
(b)(i)	Correct graph	2	**B1** for correct shape with a min
(b)(ii)	(1.47, 0.488) or (1.473 to 1.474, 0.4877…)	2	**B1** for each
(b)(iii)	0.0982 or 0.09819 to 0.09820 and 2.98 or 2.975 or 2.976	2	**B1** for each
(b)(iv)	1.1[0] or 1.098… 3.98 or 3.975 to 3.976	2	**FT** *their* (iii) + 1 **B1** for each

73. 0607_m21_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)	4	**1**	
(b)	28	**2**	**B1** for f(3^2) seen or **M1** for $3 \times 3^{x+1}$ oe
(c)	$-\frac{1}{2}$ oe	**2**	**M1** for $3r + 1 = r$
(d)	$\frac{4}{3}$ oe , -2	**3**	**M1** for $(3x + 1)^2 - 5$ **M1** for $(3x + 1) = \pm 5$ or $[3](x + 2)(3x - 4) = 0$ oe or correct substitution in formula for $3x^2 + 2x - 8$ or $9x^2 + 6x - 24$ or correct and suitable sketch
(e)	$\log_3 x$ or $\frac{\log x}{\log 3}$ final answer	**2**	**M1** for $\log y = \log 3^x$ oe or correct answer seen or $x = 3^y$ or $\log_3 y = x$

74. 0607_s21_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	–5	1	
(a)(ii)	25	2	**M1** for g(–2) = 5 or $(3-x)^2$ soi
(b)	4	2	**M1** for $2x - 1 = 7$
(c)	$5 - 2x$ oe Final answer	1	
(d)	$\frac{3}{7}$ oe	3	**B2** for $6x-3+x-2x^2+2x^2$ [=0] or better or **B1** for $6x-3+x-2x^2$ or **M1** for $(2x-1)(3-x)+2x^2$ [=0]
(e)	$3-x$ Final answer	2	**M1** for $x = 3 - y$ or $y + x = 3$
(f)(i)	Correct sketch 	2	**B1** for any quadratic graph
(f)(ii)	$x = 0$ cao	1	
(f)(iii)	Correct sketch 	1	
(f)(iv)	–2.3[0] < x < 1.3[0] or –2.303 to –2.302 < x < 1.302 to 1.303	2	For x, do not allow f(x) or y for full marks **B1** for either inequality or for 1.3[0] and –2.3[0] y range included scores 0

75. 0607_s21_ms_42 Q: 12

Question	Answer	Marks	Partial Marks
(a)	–10	1	
(b)	$\frac{1}{4}$ oe	3	**M2** for $5 = 8 - 12x$ oe or **M1** for $\frac{5}{2-3x} = 4$

Question	Answer	Marks	Partial Marks
(c)	$\frac{2-x}{3}$ oe	2	**M1** for $3x + y = 2$ or $x = 2 - 3y$ or $\frac{y}{3} = \frac{2}{3} - x$ or better
(d)	$\frac{5}{-4+9x}$ oe final answer	2	**M1** for $\frac{5}{2-3(2-3x)}$
(e)	$\frac{9x^2-12x-1}{2-3x}$ oe final answer	3	**M1** for $\frac{(2-3x)(2-3x)-5}{2-3x}$ **B1** for $4 - 6x - 6x + 9x^2$

76. 0607_w21_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)	10	2	**B1** for g(1) = 4 soi
(b)	8, –2	2	**B1** for each
(c)	2	2	**B1** for $3x - 2 = 4$ or $\frac{x+2}{3}$
(d)	x cao	1	

77. 0607_s20_ms_43 Q: 12

Question	Answer	Marks	Partial Marks
(a)	11	1	
(b)	1.4 oe	2	**M1** for $2x + 3x = 5 - 3 + 5$
(c)	$\frac{5-x}{3}$ oe	2	**M1** for $x = 5 - 3y$ or $y - 5 = -3x$ oe or $\frac{y}{3} = \frac{5}{3} - x$ oe
(d)	$13 - 6x$	2	**M1** for $2(5 - 3x) + 3$
(e)	$\frac{19}{(2x+3)(5-3x)}$ final answer	3	**M1** for $2(5 - 3x) + 3(2x + 3)$ **M1** for common denominator $(2x + 3)(5 - 3x)$

78. 0607_w20_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)	$-\frac{2}{5}$ oe	2	**M1** for $5 - 7 = 2x + 3x$ oe or better
(b)	$17 - 6x$ Final answer	2	**M1** for $2(5 - 3x) + 7$ seen
(c)(i)	$12 - x^2$ Final answer	2	**M1** for $5 - 3x^2 + 2x^2 + 7$
(c)(ii)	$x^2 - 24x + 144$ Final answer	3	**M1** for $(5 - 3x + 2x + 7)^2$ oe **B1** for three terms of $144 - 12x - 12x + x^2$ correct
(d)	$\frac{5-x}{3}$ oe Final answer	2	**M1** for $x = 5 - 3y$ or $y + 3x = 5$ or $y - 5 = -3x$ or $\frac{y}{3} = \frac{5}{3} - x$
(e)	$\frac{13x-1}{(5-3x)(2x+7)}$ Final answer	3	**M1** for $2(2x + 7) - 3(5 - 3x)$ or better seen **M1** for common denominator $(5 - 3x)(2x + 7)$

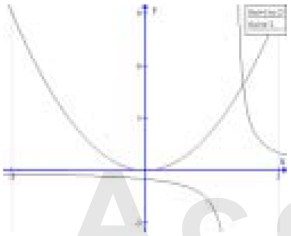
79. 0607_w20_ms_43 Q: 11

Question	Answer	Marks	Partial Marks
(a)	1	2	**B1** for 3^2 or 2^3
(b)	–2	1	
(c)	$\frac{x^4-1}{x^3}$ final answer	2	**M1** for $x - \frac{1}{x^3}$
(d)	$\sqrt[3]{x}$ oe final answer	1	

80. 0607_s19_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)	11	**1**	
(a)(ii)	–23	**2**	**M1** for $5 - 2(3 \times 4 + 2)$ soi or $5 - 2(3x + 2)$
(a)(iii)	$\frac{1}{8}$ oe	**3**	**M1** for $5 - 2x = 2(3x + 2)$ oe **M1FT** for $5 - 4 = 6x + 2x$ or better
(a)(iv)	$\frac{5-x}{2}$ oe final answer	**2**	**M1** for $2x + y = 5$ or better or $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$
(a)(v)	$17 - 6x$ oe final answer	**2**	**M1** for $3(5 - 2x) + 2$
(a)(vi)	$\frac{5x+16}{(5-2x)(3x+2)}$ or $\frac{5x+16}{10+11x-6x^2}$ final answer	**3**	**M1** for common denominator $(5 - 2x)(3x + 2)$ oe **M1** for $3(3x + 2) + 2(5 - 2x)$ oe
(b)	x	**1**	

81. 0607_w19_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)	0.25 oe	**1**	
(b)	1.5	**2**	**M1** for $1 = -2(x-2)$ or $\frac{1}{-2} = x-2$
(c)	$(x+2)^2$	**1**	
(d)	–0.5 or $-\frac{1}{2}$	**4**	**B1** for x^2+4x+4 **M2** for $4x+4=2$ or **M1** for $their(c) = x^2+2$ or **M2** for correct sketch or **M1** for any U-shaped parabola
(e)	$\frac{1}{x}+2$ oe final answer	**3**	**M2** for $x=\frac{1}{y}+2$ or $xy=1+2y$ or $y-2=\frac{1}{x}$ or **M1** for $x-2=\frac{1}{y}$ or $y(x-2)=1$ or $x=\frac{1}{y-2}$
(f)(i)	Correct sketches 	**3**	**B1** for correct quadratic shape through origin **B2** for correct rectangular hyperbola shape or **B1** for one branch

Question	Answer	Marks	Partial Marks
(f)(ii)	$x=0$	**1**	
(f)(iii)	$2 < x < 2.21$ or 2.205 to 2.206	**2**	**B1** for each part or 2 and 2.21 or 2.205 to 2.206 seen

82. 0607_w19_ms_43 Q: 13

Question	Answer	Marks	Partial Marks
(a)	9	1	
(b)	–6	2	**M1** for $f(x) = -7$ or for $f^{-1}(x) = \frac{x-5}{2}$
(c)	–21	2	**B1** for 11 seen or **M1** for $1 - 2(2x + 5)$
(d)	$7 - 4x$	2	**M1** for $2(1 - 2x) + 5$
(e)	$\frac{1-x}{2}$ oe	2	**M1** for $2x = 1 - y$ or $x = 1 - 2y$ or $\frac{y}{2} = \frac{1}{2} - x$
(f)	$\frac{4x+13}{2x+5}$ final answer	2	**M1** for $\frac{2(2x+5)+3}{2x+5}$

83. 0607_s18_ms_41 Q: 11

Question	Answer	Marks	Partial Marks
(a)	5	1	
(b)	0.1oe , 1, 10, 100	2	**B1** for 3 correct or all correct seen and spoilt.
(c)	6.5 oe	2	**M1** for $2x - 1 = 12$
(d)	$2x - 2$ or $2(x - 1)$	3	**B2** for correct unsimplified answer OR **M1** for substituting $x - 2$ for x **M1** for adding 3 to a function in x oe OR **M1** for $y = 2x + c$ ($c \neq -1$) leading to answer with gradient 2 **M1** for substituting coords of valid point into $y = 2x + c$
(e)	$\log x$	2	**M1** for $\log y = x$ or $x = 10^y$
(f)	23, 113	3	**B2** for 23 or **B1** for [g(x) =] 45 soi

84. 0607_s18_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	–1	**1**	
(a)(ii)	4	**2**	**M1** for $2x - 7 = 1$ or better
(b)	$\frac{x+7}{2}$ oe	**2**	**M1** for $y + 7 = 2x$ or $\frac{y}{2} = x - \frac{7}{2}$ or $x = 2y - 7$ Allow f(x) for y

Question	Answer	Marks	Partial Marks
(c)(i)	$2\sqrt{x} - 7$ final answer	**1**	Allow $x^{\frac{1}{2}}$ for $\sqrt{x}$
(c)(ii)	36	**3**	**M2 for** $\sqrt{x} = \frac{5+7}{2}$ or better e.g. $\sqrt{x} = 6$ or **M1** for $2\sqrt{x} - 7 = 5$ or *their* **(c)(i)** = 5
(d)(i)	$\frac{1}{\sqrt{2x-7}}$ oe final answer	**2**	**M1** for $\sqrt{2x-7}$ If 0 scored **SC1** for answer $\frac{1}{\textit{their}\textbf{(c)(i)}}$
(d)(ii)	$x > 3.5$	**2**	**M1** for $2x - 7 > 0$

85. 0607_s18_ms_43 Q: 12

Question	Answer	Marks	Partial Marks
(a)	$-\frac{3}{4}$ or – 0.75	**1**	
(b)	$\frac{4-x}{3}$ oe final answer	**2**	**M1** for $x = 4 - 3y$ or $y + 3x = 4$ or $y - 4 = -3x$ or $\frac{y}{3} = \frac{4}{3} - x$
(c)	–17	**2**	**B1** for [f(3)] = 7 or **M1** for $4 - 3(2x + 1)$ soi

Question	Answer	Marks	Partial Marks
(d)	$9x - 8$ final answer	**2**	**M1** for $4 - 3(4 - 3x)$
(e)	3	**2**	**M1** for $2^x - 1 = 7$ or $\log_2(x + 1)$ oe
(f)	$\frac{5 - x}{(2x + 1)(4 - 3x)}$ oe final answer	**3**	**M1** for $4 - 3x + 2x + 1$ **M1** for common denominator $(2x + 1)(4 - 3x)$

86. 0607_w18_ms_43 Q: 13

Question	Answer	Marks	Partial Marks
(a)	4	**1**	
(b)(i)	$1 - 3x$ oe	**2**	**M1** for $3(1-x) - 2$
(b)(ii)	$5x$	**3**	**B2** for $-3x^2 + 3x + 2x - 2$ or **M1** for $(3x-2)(1-x) + 3x^2 + 2$
(c)	$1 - x$ oe	**1**	
(d)(i)	$\frac{4}{3}$ oe	**2**	**M1** for $3x - 2 = 2$
(d)(ii)	± 1, $\pm\sqrt{7}$ nfww	**3**	**M1** for $x^2 - 4 = \pm 3$ oe (implied by 1 and $\sqrt{7}$) **A1 dep** on **M1** for two correct answers If 0 scored, **SC1** for $\pm\sqrt{7}$ or for ± 1

87. 0607_s17_ms_43 Q: 8

Question	Answer	Marks	Part Marks
(a)	10	**1**	
(b)	4	**2**	**M1** for [h(1) =] $\frac{1}{2}$ or for [gh(x) =] $3 + 2\left(\frac{1}{x+1}\right)$
(c)	$5x^2 + 12x + 11$	**3**	**M1** for $(3+2x)^2 + 1 + x^2 + 1$ **B1** for $9 + 6x + 6x + 4x^2$ or better for $(3+2x)^2$
(d)	$\frac{1}{x} - 1$ or $\frac{1-x}{x}$ oe final answer	**3**	**M1** correct first step **M1** correct second step
(e)(i)	-1	**2**	**M1** for $3 + 2x = 1$
(e)(ii)	5	**1**	

88. 0607_w17_ms_41 Q: 12

Question	Answer	Marks	Partial Marks
(a)	-2	**2**	**M1** for $-3x = 11 - 5$ oe
(b)	$\frac{5-x}{3}$ oe final answer	**2**	**M1** for $3x = 5 - y$ or $x = 5 - 3y$ or $y - 5 = -3x$ or $\frac{y}{5} = \frac{5}{3} - x$ or better
(c)	$\frac{5}{3}$ oe $\quad -\frac{3}{2}$ oe final answers	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
(d)(i)	x	**1**	
(d)(ii)	$11x - 7$	**3**	**M2** for $5 - 3(5 - 3x) + 2x + 3$ or **M1** for $5 - 3(5 - 3x)$
(d)(iii)	$\frac{26-8x}{(5-3x)(2x+3)}$ final answer	**3**	**M1** for $2(2x+3) + 4(5-3x)$ oe **M1** for common denominator $(5 - 3x)(2x + 3)$

89. 0607_s16_ms_41 Q: 13

Question	Answer	Mark	Part Marks
(a) (i)	2.25 oe	**2**	**M1** for $1 = 2(5 - 2x)$ or $5 - 2x = \frac{1}{2}$ oe
(ii)	$-5 + 4x$ final answer	**2**	**B1** for $5 - 2(5 - 2x)$
(iii)	$\frac{5-x}{3}$ oe final answer	**2**	**M1** for $2x = 5 - y$ or $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$
	$\frac{2}{3}$	**1**	

90. 0607_s16_ms_42 Q: 10

Question	Answer	Mark	Part Marks
(a)	31	2	**B1** for [f(7) =] 12 or **M1** for $2(x^2 - x - 30) + 7$
(b)	$\frac{x-7}{2}$ oe	2	**M1** for $y - 7 = 2x$ or $x = 2y + 7$ or $\frac{y}{2} = x + \frac{7}{2}$
(c)	$(2x+13)(2x+1)$ final answer	3	**B2** for $(2x+7+6)(2x+7-6)$ or for $4x^2 + 28x + 13$ or **M1** for $(2x+7)^2 - 36$
(d)	$\frac{x+5}{x+6}$ final answer nfww	4	**B2** for $(x - 6)(x + 5)$ or **SC1** for $(x+a)(x+b)$ where $ab = -30$ or $a + b = -1$ and **B1** for $(x + 6)(x - 6)$

91. 0607_w16_ms_41 Q: 11

Qu.	Answer	Mark	Part Marks
(a)	2	2	**B1** for [f(33) =] 100 or **M1** for $\log(3x+1)$
(b)	$\frac{1}{100}$ or [0].01	2	**M1** for g(x) = 3(–1) + 1 oe
(c) (i)	$\frac{x-1}{3}$ oe	2	**M1** for $x = 3y + 1$ or $y - 1 = 3x$
(ii)	10^x	2	**M1** for $x = \log y$ or $10^y = x$

92. 0607_s15_ms_42 Q: 12

Qu.	Answer	Mark	Part Marks
(a)	4 nfww	2	**B1** for $\frac{6}{4+1}$ oe seen or **M1** for $5\left(\frac{6}{4x+1}\right)-2$
(b) (i)	$\frac{6}{20x-7}$ final answer	2	**M1** for $\frac{6}{4(5x-2)+1}$
(ii)	$\frac{x+2}{5}$ oe final answer	2	**M1** for $y+2=5x$ or $x=5y-2$ or $\frac{y}{5}=x-\frac{2}{5}$ or better
(c) (i)	$\frac{1}{x+1}$ final answer	3	**M2** for $\frac{5x-2}{(5x-2)(x+1)}$ oe or **M1** for $\frac{5x-2}{(5x+a)(x+b)}$ oe where $ab=-2$ or $a+5b=3$ or **SC1** for $(5x-2)(x+1)$ seen

Qu.	Answer	Mark	Part Marks
(ii)	$\frac{26x-13}{(4x+1)(5x-2)}$ oe final answer	3	**M1** for common denominator $(4x+1)(5x-2)$ soi **M1** for $6(5x-2)-(4x+1)$ oe

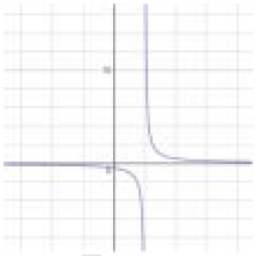
93. 0607_s15_ms_43 Q: 12

Qu.	Answer	Mark	Part Marks
(a) (i)	–2	1	
(ii)	–7	1FT	
(b) (i)	$6-6x$ oe	2	**B1** for $4-2(3x-1)$
(ii)	$\frac{4-x}{2}$ or $2-\frac{x}{2}$ oe	2	**B1** for $x=4-2y$ or $2x+y=4$
(iii)	$\frac{11-13x}{(3x-1)(4-2x)}$	3	**M2** for $\frac{2(4-2x)-3(3x-1)}{(3x-1)(4-2x)}$ or **B1** for $2(4-2x)-3(3x-1)$ or **SC2** for $\frac{5-13x}{(3x-1)(4-2x)}$ or **M1** for common denominator $(3x-1)(4-2x)$

94. 0607_m22_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)(i)	25	1	
(a)(ii)	–47	1	**FT** 3 – 2 × *their* 25
(b)	$\frac{1}{2}$ oe	2	**M1** for $2x + 1 = 3 - 2x$ or better
(c)	$7 - 4x$ final answer	2	**M1** for $2(3 - 2x) + 1$
(d)	$\frac{3-x}{2}$ oe final answer	2	**M1** for $y + 2x = 3$ or better or $\frac{y}{2} = \frac{3}{2} - x$ or $x = 3 - 2y$
(e)	99	2	**M1** for $\log(x+1) = 2(0.5) + 1$ or better
(f)	$10^x - 1$	2	**M1** for $10^y = x + 1$ or $x = \log(y + 1)$

95. 0607_m21_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	3	**B2** for correct branches but joined or for 'correct' but with excessive overlap or 'curl back' **B1** for one correct branch

Question	Answer	Marks	Partial Marks
(b)	$y = 0$ $x = 2$	B2	**B1** for each
(c)	$-2.67 < x < 0.524$	B2	**B1** for $x > -2.67$ or $x < 0.524$ or $-2.7 < x < 0.52$
	$2 < x < 2.15$	B2	**B1** for either $x > 2$ or $x < 2.145\ldots$
			If B0, B0 scored, then **SC1** for 2 of the boundaries –2.67, 0.524, 2.15 seen

96. 0607_s21_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Correctly equating one set of coefficients	**M1**	or making x or y the subject of one equation
	Correct method to eliminate one variable	**M1**	May be intersection of two straight line graphs
	$[x =] 2$ $[y =] -3$	**A2**	**A1** for each If 0 scored for whole question, **SC1** for answers that satisfy one equation
(b)(i)	–5	**2**	**M1** for $3x = 4 - 19$ oe
(b)(ii)	4	**2**	**M1** for $5x - 3x = 15 - 7$ oe

Question	Answer	Marks	Partial Marks
(b)(iii)	–8	**2**	**M1** for $28 = -4(x + 1)$ oe or $\frac{28}{4} = -(x+1)$ oe
(c)	$\sqrt{\frac{p^3}{8q}}$ oe final answer	**3**	**M1** for $\log p^3$ or $\log x^2$ or better **M1** for correct use of $\log a + \log b = \log ab$ or $\log a - \log b = \log \frac{a}{b}$

97. 0607_s21_ms_43 Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	8	**1**	
(a)(ii)	29	**2**	**M1** for $g(3) = 9$ or $3(x^2) + 2$
(a)(iii)	8	**3**	**B1** for $h(g(3)) = 2^9$ or 512 **B1** for $g(h(3)) = 2^6$ or 64

Question	Answer	Marks	Partial Marks
(a)(iv)	$\frac{x-2}{3}$ oe final answer	2	**M1** for $x = 3y - 2$ or $y - 2 = 3x$ or $\frac{y}{3} = x + \frac{2}{3}$
(a)(v)	$\log_2 x$ or $\frac{\log x}{\log 2}$	2	**M1** for $x = 2^y$ or $x \log 2 = \log y$ oe
(b)(i)	$4\frac{1}{2}$ oe	2	**B1** for $[\log_3 81 =]4$ or $\left[\log_9\left(\frac{1}{3}\right) =\right] -\frac{1}{2}$
(b)(ii)	125	2	**B1** for $25 = b^{\frac{2}{3}}$ oe

98. 0607_w21_ms_42 Q: 3

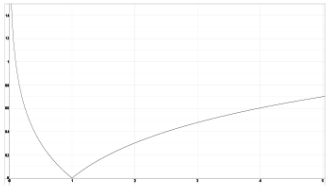
Question	Answer	Marks	Partial Marks
(a)(i)	1437	3	**B2** for 1440 or 1436.6 to 1436.7 or **M1** for $882 \times \left(1 + \frac{5}{100}\right)^{10}$ oe

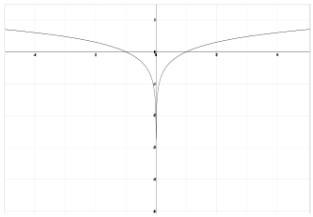
Question	Answer	Marks	Partial Marks
(a)(ii)	17 nfww	4	**B3** for 16.8 or 16.78... OR or **M3** $n \log\left(1 + \frac{5}{100}\right) = \log\left(\frac{2000}{882}\right)$ oe or correct trials reaching 16 and 17 or good sketch indicating value between 16 and 17 or **M2** for $\left(1 + \frac{5}{100}\right)^n = \frac{2000}{882}$ oe or at least 3 correct trials, $n > 10$ or suitable graph or **M1** for $882 \times \left(1 + \frac{5}{100}\right)^n = 2000$ oe soi by at least 2 trials with $n > 10$
(b)	7 or 6.999... nfww	3	**M2** for $\sqrt[10]{\frac{242}{500}}$ or **M1** for $500 \times (...)^{10} = 242$

99. 0607_w21_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)(i)(a)	7	**1**	
(a)(i)(b)	$\frac{1}{8}$ oe	**1**	**FT** *their* 7
(a)(ii)	$15x - 5$ or $5(3x - 1)$ final answer	**2**	**M1** for $3(5x - 1) - 2$
(a)(iii)	$-\frac{1}{2}$ oe	**2**	**M1** for $3x - 2 = 5x - 1$
(a)(iv)	$\frac{x+1}{5}$ oe final answer	**2**	**M1** for $x = 5y - 1$ or $y + 1 = 5x$ or $\frac{y}{5} = x - \frac{1}{5}$
(a)(v)	$\frac{3x+5}{(x+1)(x+2)}$ or $\frac{3x+5}{x^2+3x+2}$ final answer	**4**	**M1** for $\frac{2}{x+1} + \frac{1}{x+1+1}$ **FT** *their* fractions provided there are two fractions of the form $\frac{a}{b+c}$ to be collected **and** the denominators are different **M1** for $2(x + 2) + x + 1$ or better or **M1** for denominator $(x + 1)(x + 2)$
(b)(i)	$-\frac{3}{2}$ oe	**1**	
(b)(ii)	$\log_5 x$ or $\frac{\log x}{\log 5}$	**2**	**M1** for $x = 5^y$ or $\log y = x \log 5$ or $\log_5 y = x$

100. 0607_s20_ms_41 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)	Correct curve 	**2**	**B1** for correct curve from 0 to 1 or for correct curve from 1 to 5
(a)(ii)(a)	0.631 or 0.6309 to 0.6310 1.58 or 1.584 to 1.585	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
(a)(ii)(b)	0.106 or 0.1063... 2.45 or 2.446...	4	**M2** for $y = 1 - \frac{x}{4}$ sketched or **M1** for sketch of line through (0, 1) approx or line with negative but inaccurate gradient **B1** for each answer
(b)(i)	Correct curve 	2	**B1** for one branch correct, not crossing y-axis
(b)(ii)	–1.58 or –1.585 to –1.584 1.58 or 1.584 to 1.585	2	**B1** for each
(c)	$x \geqslant 1$ oe	1	

101. 0607_s20_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)	253	2	**M1** for $2(5^x) + 3$ or f(125)
(b)	$\frac{x-3}{2}$ oe final answer	2	**M1** for $x = 2y + 3$ or for $y - 3 = 2x$ or for $\frac{y}{2} = x + \frac{3}{2}$
(c)	–2.5 oe	2	**M1** for $25 = 5^2$ and $\sqrt{5} = 5^{\frac{1}{2}}$ or better
(d)	$\log_5 x$ oe	2	**M1** for $x = 5^y$ or for $\log_5 y = x$ or for $x = \frac{\log y}{\log 5}$

102. 0607_s20_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	–2	**2**	**M1** for $2x = 1 - 5$ or $\frac{5}{2} + x = \frac{1}{2}$
(a)(ii)	2	**2**	**M1** for $-\frac{10}{x} = 1 - 6$ oe or $6x - 10 = x$
(a)(iii)	–13.5	**3**	**M1** for correct expansion $3 - 6x = 2 - 4x + 28$ **M1** for correct collection of *their* terms $3 - 30 = 6x - 4x$ **M1** for $\frac{their\,(3-30)}{their\,(6-4)}$
(b)(i)	$6x^2 + 3x - 7 = 0$	**B1**	
	Correct sketch OR $\frac{-3 \pm \sqrt{3^2 - 4 \times 6 \times -7}}{2 \times 6}$	**M2**	**M1** for any U-shaped parabola OR for $\frac{b}{2a}$ or $\sqrt{b^2 - 4ac}$ correct
	0.859, –1.359	**B1**	
(b)(ii)	0.927, –0.927	**2**	**FT** *their* (b)(i) **B1** for each
(c)	1.41 or 1.414… cao	**4**	**M3** for $5x^2 = 10$ or **M2** for $\log 5x^2$ [=1] or **M1** for $\log x^2 + \log 5$ [=1]

103. 0607_w20_ms_41 Q: 12

Question	Answer	Marks	Partial Marks
(a)	0.25 oe	3	**M2** for $8x=2$ or $-2=-8x$ or better or **M1** for $6x-2=-2x$ or $\frac{-2}{x}=-8$ oe OR **M2** for correct sketch that could lead to correct answer or **M1** for appropriate but incomplete sketch e.g. $6-\frac{2}{x}$
(b)	–2.8 oe	3	**M2** for $8x+2x=1-16-3-10$ oe or **M1** for $3+8x+10$ or $1-2x-16$
(c)	2	3	**M1** for $\log x^3$ or $\log 3^2$ or $\log 6^2$ or better **M1** for correct use of $\log p-\log q=\log\frac{p}{q}$ or $\log p+\log q=\log pq$
(d)	3.32 or 3.321 to 3.322	3	**B2** for $\frac{\log 10}{\log 2}$ or $\log_2 10$ or $\frac{1}{\log 2}$ or **M1** for $x\log 2=\log 10$ OR **M2** for correct sketch that could lead to correct answer or **M1** for appropriate but incomplete sketch e.g. $y=2^x$

104. 0607_s19_ms_42 Q: 12

Question	Answer	Marks	Partial Marks
(a)	10	**1**	
(b)	9.5 oe	**2**	**M1** for $10-\frac{1}{x}$ soi e.g. $10-\frac{1}{2}$
(c)	$x^2-20x+101$	**3**	**M1** for $(10-x)^2+1$ **B1** for $100-10x-10x+x^2$ oe
(d)	f(x) and h(x)	**2**	**B1** for each
(e)	$\frac{10-2x}{x(10-x)}$ oe	**3**	**M1** for common denominator $x(10-x)$ oe **B1** for $(10-x)-x$ oe seen
(f)(i)	5	**1**	
(f)(ii)	$3\sqrt{3}$ oe or $3^{\frac{3}{2}}$ or 5.2[0] or 5.196...	**1**	
(f)(iii)	3^x	**2**	**M1** for $x=\log_3 y$ or $x=3^y$

105. 0607_s19_ms_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	27	**1**	
(a)(ii)	–5	**2**	**M1** for $5-25=7x-3x$ or better

Question	Answer	Marks	Partial Marks
(a)(iii)	1.05 or 1.054… –1.3[0] or –1.304…	**4**	**M3** for $\frac{-2\pm\sqrt{2^2-4\times8\times-11}}{2\times8}$ or correct sketch which would lead to solution. or **M2** for $\frac{b}{2a}$ correct or b^2-4ac correct or **M1** for $8x^2+2x-11$ or $-8x^2-2x+11$ or sketch of $8x^2$ or $11-2x$
(b)(i)	$x \leqslant -2$ oe	**2**	**M1** for $6-10 \geqslant 2x$ or $-2x \geqslant 10-6$ or $3-x \geqslant 5$ or better If 0 scored **SC1** for $x \geqslant -2$ or $x = -2$
(b)(ii)	$2 < x < 2\frac{1}{3}$ oe	**3**	**M2** for $x = 2$ and $x = \frac{7}{3}$ or correct sketch which would lead to solution. or **M1** for $1 > 3(x-2)$ or better or sketch of $y = \frac{1}{x-2}$ or **B1** for $x < 2\frac{1}{3}$ or for $x > 2$
(c)	Correctly equating one set of coefficients oe	**M1**	
	Correct method to eliminate one variable	**M1**	
	[x=] 4	**B1**	
	[y=] –3	**B1**	
			If 0 scored **SC1** for correct substitution into one of original equations and evaluation to find other variable.
(d)	$\frac{13}{16}$ or 0.8125	**3**	**M1** for $\log 2^4$ or better **M1** for correct use of $\log p - \log q = \log \frac{p}{q}$ or use of $\log p + \log q = \log pq$

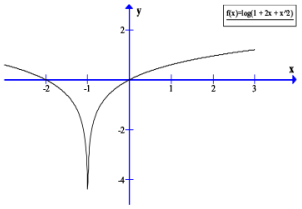
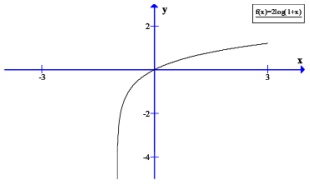
106. 0607_w19_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)	–1	1	
(a)(ii)	2	1	
(b)	$\frac{1}{5}$ oe	2	**B1** for 5 or **M1** for $\frac{1}{2x+3}$ soi e.g. $\frac{1}{2(1)+3}$
(c)	–3	1	
(d)	4	1	
(e)	$4x + 9$	2	**M1** for $2(2x + 3) + 3$ oe
(f)	$4x^2 + 14x + 13$	3	**M1** for $(2x+3)^2 + 2x + 3 + 1$ oe **B1** for $[(2x+3)^2 =]\ 4x^2 + 12x + 9$
(g)	3^x	2	**M1** for $x = \log_3 y$ or for $x = 3^y$

107. 0607_w19_ms_43 Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	a^6 final answer	2	**B1** for a^9 or $a^2 \times a^4$ or $a^5 \times a$[1]
(a)(ii)	x	1	
(a)(iii)	$\frac{1}{2}x$ oe	1	
(b)	40	2	**M1** for one correct use of $a\log b = \log b^a$ or for correct use of $\log a - \log b = \log(a \div b)$

108. 0607_s16_ms_41 Q: 8

Question	Answer	Mark	Part Marks
(a) (i)	Correct sketch 	2	**B1** RH branch through (0, 0) ,with asymptote $x = a$ (–ve a) **B1** for LH branch symmetrical, with asymptote $x = a$ (–ve a)
(ii)	–2 0	1 1	
(iii)	$x = -1$	1	
(b) (i)	Correct sketch 	2	**B1** for correct shape
(ii)	Same right hand branch	1	
(iii)	e.g. $\log(1 + 2x + x^2) = 2\log(1 + x)$ No log of a negative number	1 1	Independent

109. 0607_w16_ms_42 Q: 13

Question	Answer	Mark	Part Marks
(a)	$\frac{p^3q^2}{6}$ final answer	3	**M1** for correct use of $a\log b$ **M1** for correct use of $\log a \pm \log b$
(b) (i)	1.29 or 1.292…	3	**M2** for $\frac{\log 6}{\log 4}$ or $\log_4 6$ or sketch of $y = 4^x$ and $y = 6$ oe or **M1** for $x\log 4 = \log 6$ or sketch of $y = 4^x$
(ii)	$6x^2 - 5x - 7 = 0$	B2	or **B1** for 3 terms correct in expansion $6x^2 - 9x + 4x - 6$
	$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 6 \times (-7)}}{2 \times 6}$	M1	**FT** *their* three term quadratic or for sketch of parabola with minimum point **Alternative** If sketch of parabola with minimum point and $y = 1$ and no three term quadratic seen, allow **B3**
	$x = 1.57$ or 1.574... $x = -0.741$[01...]	B2	**B1** for each

110. 0607_w15_ms_41 Q: 10

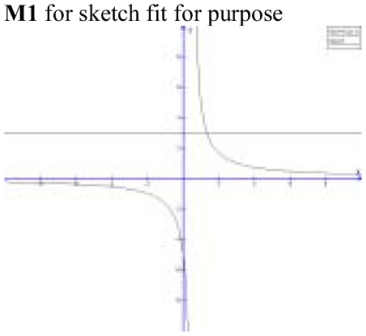
Question	Answer	Mark	Part Marks
(a)	5	2	**M1** for [h(9)=] 1 or for $2(\log(x+1))+3$
(b)	$2x + 2$ or $2(x + 1)$	2	**M1** for $2x + 3 – 1$
(c)	$\frac{3x+2}{(2x+3)(x-1)}$ oe final answer	3	**B1** for denominator $(2x + 3)(x – 1)$ oe **B1** for $x – 1 + 2x + 3$ as numerator
(d)	$-\frac{9}{10}$ oe	2	**M1** for $x+1=10^{-1}$ oe or appropriate sketch

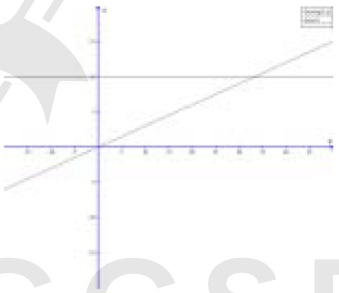
Question	Answer	Mark	Part Marks
(e)	$1\pm\sqrt{5}$ final answer cao	3	**B2** for $x-1=\sqrt{5}$ or $x-1=-\sqrt{5}$ or $\frac{2\pm\sqrt{20}}{2}$ oe or for –1.24 (or –1.236...) **and** 3.24 (or 3.236...) or **M1** for $(x-1)^2=5$ oe

111. 0607_w15_ms_42 Q: 2

Question	Answer	Mark	Part Marks
(a) (i)	40.5 oe	3	**M1** for correct use of $a\log b$ **M1** for correct use of $\log a \pm \log b$
(ii)	210, 330 with no extras in range	3	**B2** for 210 or 330 ignoring any extras from using 30. or **M2** for appropriate sketch or **M1** for $\sin x = –0.5$ **A1** for 30 or – 30 soi
(b)	$[x=]\frac{1}{1-a^2}$ oe	3	**M1** Correct squaring **M1** Correct multiplication **M1** Collection of terms **M1** Correct factorisation and division by *their* $(1-a^2)$ **If answer incorrect, maximum possible is M2**

112. 0607_w15_ms_42 Q: 15

Question	Answer	Mark	Part Marks
(a)	$x < 0.5$ and $x > \frac{4}{3}$	3	**M1** for sketch fit for purpose  **B1** for $x > \frac{4}{3}$ or for $x < 0.5$ or for 0.5 and $\frac{4}{3}$ soi

Question	Answer	Mark	Part Marks
(b)	$x > 33.2$ or 33.21 to 33.22	2	**M1** for appropriate sketch  or **M1** for $x \log 2 > 10$

113. 0607_w15_ms_43 Q: 8

Question	Answer	Mark	Part Marks
(a) (i)	$x > -7$ oe	3	**M2** for $2x - 5x < 15 + 6$ or better or **B1** for $2x - 6$ or $5x + 15$
(ii)	Line with empty circle at –7 and arrow to right	1FT	**Strict FT, must be from an inequality.**
(b)	Sketch of $y = (x + 3)^2 + (x + 1)^2 - 25$ oe	M2	**M1** for sketch of $(x + 3)^2 + (x + 1)^2$
	or	or	
	$2x^2 + 8x - 15 = 0$	B2	**B1** for $x^2 + 3x + 3x + 9$ or $x^2 + x + x + 1$ oe
	–5.39 **and** 1.39	B4	**B3** for –5.391... **and** 1.391... or **B2** for –5.39 **or** 1.39 or **B1** for –5.391... **or** 1.391... or **M1** for sketch of parabola or correct substitution in formula or reaching $2(x+2)^2 - 23$ oe
(c) (i)	Appropriate sketch which could lead to answer	M2	**M1** for correct sketch of log$x$ or other equation containing log$x$
	4.36 or 4.360…	B1	
(ii)	4.36 or 4.360… 5.76 or 5.760…	B1FT B1	
(d)	$\frac{x^2 - x + 2}{(x-1)(x+1)}$ oe final answer	3	**B1** for $x(x+1) - 2(x-1)$ oe seen **B1** for denominator $(x-1)(x+1)$ oe