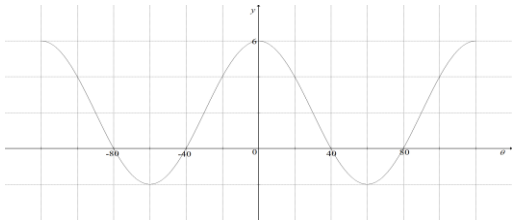
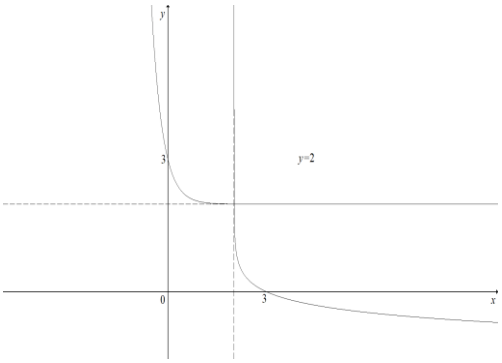
Question	Answer	Marks	Guidance
1(a)	4	**B1**	
1(b)	120^o	**B1**	
1(c)		**3**	To score marks, must have minimum points in the correct quadrants and symmetry about the *y*-axis. **B1** for correct θ intercepts $\pm 40^o$, $\pm 80^o$ and no others **B1** for *y*-intercept of 6 **B1** for a completely correct shape with no errors.
2(a)	$\log_p \frac{12a}{6} = \log_p 4^3$ soi	**2**	**B1** for correct use of addition and subtraction rule **B1** for correct use of power rule
	$a = 32$	**B1**	
2(b)	$4\log_3 x = \frac{9}{\log_3 x}$ or $\frac{4}{\log_x 3} = 9\log_x 3$ soi	**B1**	For change of base
	$(\log_3 x)^2 = \frac{9}{4}$ or $(\log_x 3)^2 = \frac{4}{9}$ soi	**B1**	
	$x = 3^{\pm 1.5}$ or exact equivalents	**2**	**B1** for each solution
3	$\frac{3x^2}{x^3+3}$	**B1**	
	When $x = 1$, $\frac{dy}{dx} = \frac{3}{4}$ oe	**M1**	For finding the value of *their* $\frac{dy}{dx}$
	$y = \ln 4$	**B1**	
	$y - \ln 4 = -\frac{4}{3}(x-1)$	**2**	**M1** for attempt at normal equation using *their* $\frac{dy}{dx}$ and *their y* Allow **A1** if $c = \frac{4}{3} + \ln 4$ seen
	$\left(\frac{4+3\ln 4}{7}, \frac{4+3\ln 4}{7}\right)$	**2**	**M1 dep** for attempt to use $y = x$ and obtain at least one solution
4(a)	$f > 2$	**B1**	
4(b)	$f^{-1}(x) = -\frac{1}{3}\ln(x-2)$ or $\frac{1}{3}\ln\left(\frac{1}{x-2}\right)$ isw	**2**	**M1** for a complete attempt at inverse, allow sign slip but brackets must be used correctly.

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Question	Answer	Marks	Guidance
4(c)		**4**	**B1** for correct $y = \mathrm{f}(x)$ with *y*-intercept of 3. Must have correct asymptotic behaviour and be in the first and second quadrant. **B1dep** for correct reflection of $y = \mathrm{f}(x)$ to obtain $y = \mathrm{f}^{-1}(x)$ with *x*-intercept of 3. Must have correct asymptotic behaviour and be in the first and fourth quadrant. **B1** for asymptote of $y = 2$ stated or drawn through $y = 2$, must have a correctly shaped $y = \mathrm{f}(x)$ **B1** for asymptote of $x = 2$ stated or drawn or drawn through $x = 2$, must have a correctly shaped $y = \mathrm{f}^{-1}(x)$
4(d)	$\left(2 + \mathrm{e}^{-3x}\right)^{\frac{3}{2}} + 4$ soi	**B1**	For correct order
	$2 + \mathrm{e}^{-3x} = 4$	**M1**	For forming an equation, must be correct order
	$x = -\frac{1}{3}\ln 2$	**2**	**M1 dep** for correct attempt to solve for *x*.
5(a)	$\mathrm{p}'(x) = 15x^2 + 2ax + 39$ soi	**B1**	
	$\mathrm{p}'(-3)$: $135 - 6a + 39 = 0$ oe	**B1**	
	$\mathrm{p}(-3)$: $-135 + 9a - 117 + b = 0$ oe	**B1**	
	$a = 29$	**B1**	
	$b = -9$	**B1**	
5(b)	$\left[(x+3)\right]\left(5x^2 + 14x - 3\right)$	**2**	**M1** for attempt by any valid method, to obtain a quadratic with 2 correct terms or correct follow through on *their a* and *b*.
	$x = -3,\ \frac{1}{5}$	**A1**	For both