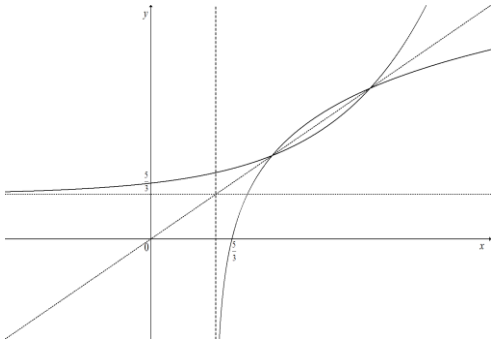
Question	Answer	Marks	Guidance
7(a)	$ar^3 = \frac{8k^6}{27}$, $ar^5 = \frac{32k^{10}}{243}$ soi	**B1**	May be implied by a correct 5th term $\frac{16k^8}{81}$
	$r = \frac{2k^2}{3}$	**2**	**M1** for solution of *their* equations to obtain either $r = mk^2$ or $a = c$, where m is an unsimplified numeric constant and c is a non-zero constant e.g. Use of $r^2 = \frac{\text{6th term}}{\text{4th term}}$
	$a = 1$	**A1**	
7(b)	$\frac{1}{1-\frac{2k^2}{3}} = 3$ soi	**B1**	For use of sum to infinity formula with *their* values of a where a is numeric and r which is in terms of k^2
	$k = \pm 1$	**2**	**B1** for each must be from correct work
8(a)	$\left(\frac{dy}{dx} =\right)$ $\frac{(x+2)\frac{6x}{3x^2+16} - \ln(3x^2+16)}{(x+2)^2}$	**3**	**B1** for $\frac{6x}{3x^2+16}$ **M1** for differentiation of a quotient or equivalent product **A1** for all other terms apart from $\frac{6x}{3x^2+16}$ correct
	When $x = 0$, $\frac{dy}{dx} = -\frac{\ln 16}{4}$ $= \ln\frac{1}{2}$ from correct work	**2**	**M1 dep** for attempt to substitute in $x = 0$ and obtain a single log term For **A1**, **all** previous marks must have been awarded.
8(b)	Change = $h \ln\frac{1}{2}$ oe	**B1**	**FT** on *their* single log answer to part **(a)** **B0** for $\ln\frac{1}{2}h$ or *their* $\ln\frac{1}{2}h$
9(a)	$\frac{4}{3}$ or $a = \frac{4}{3}$	**B1**	Award **B1** when a correct answer is seen
9(b)	$\mathbb{R}$ oe	**B1**	May be in terms of f or y but not x
9(c)	$\left[f^{-1}(x)\right] = \frac{4 + e^{\frac{x}{2}}}{3}$ oe	**2**	**M1** for a complete valid method, allow a sign error **A1** must be using the correct notation

Question	Answer	Marks	Guidance
9(d)		**4**	**B1** for $y = \mathrm{f}(x)$ in the 1st and 4th quadrants and appropriate asymptotic behaviour **B1 dep** on previous B mark for $y = \mathrm{f}^{-1}(x)$ intersecting twice with $y = \mathrm{f}(x)$, in the 1st and 2nd quadrants and appropriate asymptotic behaviour **B1 dep** on first **B1** for $\frac{5}{3}$ marked correctly on each axis or stated, and no other intercepts **B1** for $y = \frac{4}{3}$ and $x = \frac{4}{3}$ (independent) either on the graph or at the side.
10(a)	$\frac{1}{2}\left(\frac{4r}{3}\right)^2\theta - \frac{1}{2}r^2\sin\theta$ oe	**3**	**B1** for $\frac{1}{2}\left(\frac{4r}{3}\right)^2\theta$ **B1** for $\frac{1}{2}r^2\sin\theta$ or $r^2\sin\frac{\theta}{2}\cos\frac{\theta}{2}$ or $\frac{r^2\sin^2\frac{\theta}{2}}{\tan\frac{\theta}{2}}$ oe Allow final answer unsimplified
10(b)	Arc length = $r\frac{(\pi-\theta)}{2}$	**B1**	
	$BE = \sqrt{2r^2(1-\cos\theta)}$ or $2r\sin\frac{\theta}{2}$ or $\frac{r\sin\theta}{\sin\left(\frac{\pi-\theta}{2}\right)}$ oe	**2**	**M1** for complete method to find *BE* or BE^2, using either cosine rule, sine rule or basic trig using *r* and a correct angle. **A0** if an error in rearranging to obtain *BE* is made. Allow unsimplified
	Perimeter = $r(\pi-\theta)+2r+\sqrt{2r^2(1-\cos\theta)}$ oe	**2**	**M1** for a correct plan using *their* lengths 2 arc lengths + 2*r* + *their BE* Allow **A1** for an unsimplified answer