Question	Answer	Marks	Guidance
5(a)	$p'(x) = 9x^2 - 14x + a$ soi	**B1**	
	$p'(-1) = 9 + 14 + a = 21$ $a = -2$	**B1**	
	$p(2) = 24 - 28 + 2a + b = 0$ soi	**B1**	Each term must be simplified, allow using *their a*
	$b = 8$	**B1**	
5(b)	$[x-2](3x^2 - x - 4)$ soi	**2**	**M1** for quadratic factor with two terms correct **A1** must be from correct *a* and *b*
	$(x-2)(x+1)(3x-4)$	**A1**	**A1** must be from correct *a* and *b*
5(c)	$(e^{2y} - 2) = 0$ soi	**B1**	
	$y = \frac{1}{2}\ln\frac{4}{3}$ oe, $y = \frac{1}{2}\ln 2$ oe	**2**	**B1** for one correct solution **B2** for both solutions and no extra solution.
6(a)	$\ln y = mx^3 + c$ soi	**B1**	*c* may be shown as a log term
	$25 = -8m + c$ $5 = 2m + c$	**M1**	For at least one correct equation, may be used with gradient of -2
	$m = -2,\ c = 9$	**A1**	$y = -2x + 9$ seen implies **M1A1**
	$y = e^{9-2x^3}$ oe	**A1**	
6(b)	$25 = 9 - 2x^3$	**M1**	For equating exponential indices and obtaining $x = \ldots$ or use of $x = \sqrt[3]{\frac{25 - their\ 9}{their - 2}}$
	$x = -2$ only	**A1**	

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