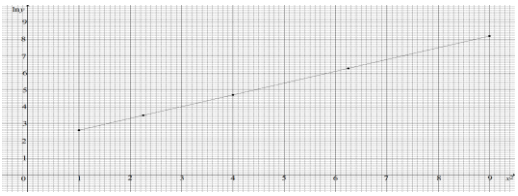
Question	Answer	Marks	Guidance
4(a)	$3 = \log_2 8$	**B1**	
	$\log_2 \frac{8a^4}{b}$	**2**	**M1** for correct use of two operations from multiplication, division or power rule for logs to the base of 2. **A1** for log to the base of 2 only
4(b)	$\lg x = \frac{4}{\lg x}$ or $\frac{1}{\log_x 10} = 4\log_x 10$	**B1**	Change of base
	$(\lg x)^2 = 4$ or $(\log_x 10)^2 = \frac{1}{4}$	**B1**	Dep on correct change of base Must work with $(\lg x)^2$ or $(\log_x 10)^2$ not $\log x^2$ or $(\log_x 100)$
	$x = 100$	**B1**	Dep on correct change of base
	$x = \frac{1}{100}$ or 0.01	**B1**	Dep on correct change of base
5(a)	$\mathrm{p}(-2): -8a + 4b + 38 + c = 0$	**M1**	For substitution of -2 in p(x) and equating to zero. Allow one sign error in evaluating
	$\mathrm{p}(-1): -a + b + 19 + c = 20$	**M1**	For substitution of -1 in p(x) and equating to 20. Allow one sign error in evaluating
	$7a - 3b = 39$	**A1**	AG – must be from correct work
5(b)	$\mathrm{p}'(1): 3a + 2b - 19 = 1$	**M1**	For substitution of 1 in $\mathrm{p}'(x)$ and equating to 1 Allow one sign error in evaluating. Can be unsimplified
	$a = 6,\ b = 1,\ c = 6$	**2**	**M1 dep** for solution of *their* equation with that from **(a)** to find at least one unknown.
6(a)	<table><tr><td>x^2</td><td>1</td><td>2.25</td><td>4</td><td>6.25</td><td>9</td></tr><tr><td>ln y</td><td>2.64</td><td>3.51</td><td>4.72</td><td>6.28</td><td>8.18</td></tr></table>	**2**	**M1** for plotting points with one error

Question	Answer	Marks	Guidance
6(b)	$\ln y = x^2 \ln b + \ln A$	**B1**	May be seen in part **(a)**
	Gradient = $\ln b$ $(\ln b = 0.7)$ $b = 2$	**2**	**M1** for attempt to find the gradient and equate to $\ln b$ Gradient must be from linear graph of ln*y* vs x^2
	Intercept = $\ln A$ $(\ln A = 1.95)$ $A = 7$	**2**	**M1** for attempt to use intercept
6(c)	When $y = 200$, $\ln y = 5.3$ $x^2 = 4.85$ $x = 2.2$ (allow 2.1 or 2.3)	**2**	**M1** for using *their* linear graph with $\ln y = 5.3$ to obtain a value for x^2 **A0** for $x = \pm 2.2$ if –2.2 is not rejected
7(a)	$x^2 + 3x^2 \ln x$	**2**	**M1** for attempt to differentiate a product Allow unsimplified for 2 marks
7(b)	$\int 3x^2 \ln x \, dx = x^3 \ln x - \int x^2 dx$	**B1**	
	$\left[x^3 \ln x - \frac{x^3}{3} \right]_1^2$ $8\ln 2 - \frac{8}{3} + \frac{1}{3}$	**M1**	Dep on **B1 M1** for correct use of limits
	$\ln 256 - \frac{7}{3}$	**2**	**A1** for one correct term
8(a)	$5x^2 + 3x - 14 = 0$ or $5y^2 - 4y - 57 = 0$	**M1**	soi
	$x = \frac{7}{5}$, $y = \frac{19}{5}$ $x = -2$, $y = -3$	**3**	**M1** for attempt to solve *their* quadratic to obtain either *x* = ... or *y* = … **A1** for one correct pair both *x* or both *y* or one correct (*x*, *y*) point
	Midpoint $\left(-\frac{3}{10}, \frac{2}{5} \right)$	**B1**	Must be correct midpoint
	Gradient of perpendicular $-\frac{1}{2}$	**B1**	Must be correct
	Perp bisector: $y - \frac{2}{5} = -\frac{1}{2}\left(x + \frac{3}{10} \right)$	**M1**	Must be using *their* midpoint and a gradient = $-\frac{1}{2}$
	$k = -\frac{4}{5}$	**A1**	

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