Question	Answer	Marks	Partial Marks
1	$x^2 - 18x + 45$ (= 0)	**B1**	Expand and simplify to three terms.
	$(x - 15)(x - 3)(= 0)$ or $x = \frac{18 \pm \sqrt{18^2 - 4 \times 45}}{2}$ or $(x - 9)^2 = -45 + 81$	**M1**	Factorise or use formula on *their* 3 term quadratic or complete the square
	$x = 15$ and $x = 3$	**A1**	
	$x < 3$ or $x > 15$ or $(-\infty, 3) \cup (15, \infty)$	**A1**	oe Do not accept 'and'. Do not accept $3 > x > 15$. Mark final answer.
2	$\frac{2^{(2x+2)}}{2^{(x-1)}} = 2^{\frac{5x}{3}} \times 2^1$	**M1**	Convert all to powers of 2 – allow one error**.**
	$2^{(x+3)} = 2^{\left(\frac{5x}{3}+1\right)}$	**M1**	Use $\frac{2^x}{2^y}$ and $2^{(x-y)}$ correctly on *their* expression. Allow one arithmetic slip.
	$x + 3 = \frac{5x}{3} + 1$	**M1**	**Dep** on previous M1. Forms linear equation using *their* powers correctly.
	$x = 3$	**A1**	
3(a)	Gradient of line $\frac{3-1}{4-12} = \left(-\frac{1}{4}\right)$	**B1**	
	Gradient of perpendicular = 4	**M1**	$\frac{-1}{\textit{their}\text{ grad line}}$
	Mid-point is (8, 2)	**B1**	
	Equation: $\frac{y-2}{x-8} = 4$	**M1**	Using *their* perpendicular gradient and mid-point
	$y = 4x - 30$	**A1**	
3(b)	$x = 0 \rightarrow (y) = -30$	**B1**	**FT** equation must have 3 terms
	$y = 0 \rightarrow (x) = 7.5$	**B1**	**FT** equation must have 3 terms
	$AB = \sqrt{30^2 + 7.5^2} = 30.9$ or better	**B1**	nfww Accept exact answer of $\frac{15\sqrt{17}}{2}$

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4	$x + y = 9$	**B1**	
	$(x + 1)^2 = y + 2$	**B1**	
	$x + (x + 1)^2 - 2 = 9$ or $(10 - y)^2 = y + 2$	**M1**	Replace y or x. Allow unsimplified using *their* three term expressions both containing x and y terms. Condone one sign or arithmetic error. Result must be a quadratic function.
	$x^2 + 3x - 10$ (= 0) or $y^2 - 21y + 98$ (= 0)	**A1**	Correct 3 term quadratic
	$x = -5$ and $x = 2$ or $y = 7$ and $y = 14$ or $(x + 5)(x - 2)$ or $(y - 7)(y - 14)$	**M1**	**Dep** on correct method to solve their quadratic
	$x = 2$ and $y = 7$ **only**	**A1**	Reject $x = -5$, $y = 14$ as log –4 is not appropriate
5(a)	$x = 1 \rightarrow y = 8$	**B1**	
	$\frac{dy}{dx} = 3x^2 - 12x + 3$	**M1**	Attempt to differentiate. Powers reduced by 1 in all four terms.
	$x = 1 \rightarrow \frac{dy}{dx} = -6$	**A1**	
	$\frac{y-8}{x-1} = -6 \rightarrow y = -6x + 14$	**A1**	Either form. isw
5(b)	$x^3 - 6x^2 + 9x - 4 = 0$ $(x - 1)(x^2 - 5x + 4) = 0$ or $(x - 4)(x^2 - 2x + 1) = 0$	**2**	**M1** for equating *their* tangent to curve and simplifying to 4 term cubic. **M1Dep** for finding a factor or stating that $(x - 1)$ is a factor or makes at least 3 attempts to find a factor.
	$(x - 1)(x - 1)(x - 4) = 0$	**2**	**A1** for $(x - 1)$ or $x = 1$ can be implied. nfww **A1** for $(x - 4)$ or $x = 4$ not repeated. nfww
	$x = 4 \rightarrow y = -10$ only	**A1**	nfww