Question	Answer	Marks	Partial Marks
8(a)	$10r = 10 + 3d$ soi	**B1**	
	$10r^2 = 10 + 5d$ soi	**B1**	
	$10\left(\frac{10+3d}{10}\right)^2 = 10 + 5d$ oe or $10r^2 = 10 + \frac{5(10r-10)}{3}$ oe	**M1**	
	$9d^2 + 10d = 0$ or $3r^2 - 5r + 2 = 0$ oe	**A1**	
	Correct method to find d or r	**A1**	**FT** *their* quadratic in d or r
	$d = -\frac{10}{9}$ and $r = \frac{2}{3}$	**A1**	
8(b)	Appropriate determination for *their r* e.g. $\lvert r \rvert < 1$ so the geometric progression has a sum to infinity oe	**B1**	**STRICT FT** *their r*
9	Correct change of base e.g. $\log_2(x+1) - \frac{4\log_2 2}{\log_2(x+1)} = 3$ or $\frac{\log_{(x+1)}(x+1)}{\log_{(x+1)} 2} - 4\log_{(x+1)} 2 = 3$	**B1**	
	$(\log_2(x+1))^2 - 3\log_2(x+1) - 4 \quad [=0]$ oe or $4(\log_{(x+1)} 2)^2 + 3\log_{(x+1)} 2 - 1 \quad [=0]$ oe	**B1**	
	Factorises or solves e.g. $(\log_2(x+1) - 4)(\log_2(x+1) + 1) = 0$ or $(4\log_{(x+1)} 2 - 1)(\log_{(x+1)} 2 + 1) = 0$	**M1**	**FT** *their* 3-term quadratic in a suitable logarithm providing correct change of base seen
	$\log_2(x+1) = their\, 4$ and $\log_2(x+1) = their(-1)$ or $\log_{(x+1)} 2 = their\, \frac{1}{4}$ and $\log_{(x+1)} 2 = their(-1)$ **and** correctly solves as far as $x =$ … at least once	**M1**	**dep** on previous **M1** **FT** $\log_2(x+1) = a$ or $\log_{(x+1)} 2 = b$ where a and b are constants
	$x = 15, \; x = -\frac{1}{2}$ nfww mark final answer	**A1**	

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Question	Answer	Marks	Partial Marks
10	[When $x = 5$] $y = 9$	**B1**	
	$\frac{dy}{dx} = \frac{2}{3}(5x+2)^{-\frac{1}{3}} \times 5$ oe	**B2**	**B1** for $\frac{dy}{dx} = k(5x+2)^{-\frac{1}{3}}$, $k \neq \frac{10}{3}$
	$\left.\frac{dy}{dx}\right\|_{x=5} = \frac{10}{9}$	**B1**	**FT** *their* $\left.\frac{dy}{dx}\right\|_{x=5}$ providing previous **B1** awarded
	Equation of normal e.g. $y - \textit{their}9 = -\frac{1}{\textit{their}\frac{10}{9}}(x-5)$ oe, soi	**M1**	**FT** $\frac{-1}{\textit{their}\left.\frac{dy}{dx}\right\|_{x=5}}$ and *their y*-coordinate
	Eliminates one variable e.g. $11 - x - \textit{their}9 = -\frac{1}{\textit{their}\frac{10}{9}}(x-5)$	**M1**	**dep** on previous **M** mark
	For Q: $x = -25$, $y = 36$	**A2**	**A1** for each
	Coordinates of R: (35, –18) or $\left((10 - \textit{their}(-25)),\ (18 - \textit{their}36)\right)$	**B1**	**FT** *their* coordinates of Q
11(a)	$\left[\overrightarrow{OX} =\right]\ \ \mathbf{b} + \lambda\left(\frac{3}{4}\mathbf{a} - \mathbf{b}\right)$ oe or $\left[\overrightarrow{OX} =\right]\ \ \frac{3}{4}\mathbf{a} + (1-\lambda)\left(\mathbf{b} - \frac{3}{4}\mathbf{a}\right)$ oe	**3**	**B2** for $\overrightarrow{BN} = \frac{3}{4}\mathbf{a} - \mathbf{b}$ oe, soi or **B1** for $\overrightarrow{ON} = \frac{3}{4}\mathbf{a}$ oe, soi
11(b)	$\left[\overrightarrow{OX} =\right]\ \ \frac{1}{2}\mathbf{b} + \mu\left(\mathbf{a} - \frac{1}{2}\mathbf{b}\right)$ oe or $\left[\overrightarrow{OX} =\right]\ \ \mathbf{a} + (1-\mu)\left(\frac{1}{2}\mathbf{b} - \mathbf{a}\right)$ oe	**2**	**B1** for $\overrightarrow{MA} = \mathbf{a} - \frac{1}{2}\mathbf{b}$
11(c)	$\mathbf{b} + \lambda\left(\frac{3}{4}\mathbf{a} - \mathbf{b}\right) = \frac{1}{2}\mathbf{b} + \mu\left(\mathbf{a} - \frac{1}{2}\mathbf{b}\right)$ soi	**M1**	**FT** *their* answer to **(a)** in terms of **a**, **b** and λ and **(b)** in terms of **a**, **b** and μ
	$\frac{3}{4}\lambda = \mu$ or $1 - \lambda = \frac{1}{2} - \frac{1}{2}\mu$	**M1**	**FT** *their* answer to **(a)** in terms of **a**, **b** and λ and **(b)** in terms of **a**, **b** and μ
	$\frac{3}{4}\lambda = \mu$ and $1 - \lambda = \frac{1}{2} - \frac{1}{2}\mu$	**A1**	
	$\lambda = \frac{4}{5}$, $\mu = \frac{3}{5}$	**A1**	

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