Question	Answer	Marks	Partial Marks
2	$\frac{a+b\sqrt{5}}{1+7\sqrt{5}} = \frac{20}{4+2\sqrt{5}}$ or $\frac{20(1+7\sqrt{5})}{4+2\sqrt{5}}$ oe, soi	**B1**	
	$[20\times]\frac{1+7\sqrt{5}}{4+2\sqrt{5}}\times\frac{4-2\sqrt{5}}{4-2\sqrt{5}}$ or $[10\times]\frac{1+7\sqrt{5}}{2+\sqrt{5}}\times\frac{2-\sqrt{5}}{2-\sqrt{5}}$ oe	**M1**	condone one slip providing it is not in the rationalisation factor
	$\frac{20(28\sqrt{5}-70+4-2\sqrt{5})}{16-20}$ or $\frac{10(14\sqrt{5}-35+2-\sqrt{5})}{4-5}$ oe	**A1**	
	$a = 330$ and $b = -130$ oe, nfww	**A1**	
	Alternative method		
	$\frac{a+b\sqrt{5}}{1+7\sqrt{5}} = \frac{20}{4+2\sqrt{5}}$ oe, soi	**(B1)**	
	Cross multiplies and multiplies out: $20+140\sqrt{5} = 4a+4b\sqrt{5}+2a\sqrt{5}+10b$	**(M1)**	condone one sign or arithmetic error
	Correct pair of simultaneous equations $4a + 10b = 20$ oe $2a + 4b = 140$ oe and solves for $a = 330$ or $b = -130$	**(A1)**	
	$a = 330$ and $b = -130$ oe, nfww	**(A1)**	
3(a)	$\frac{3}{4}\mathbf{a} + \frac{1}{4}\mathbf{b}$ or equivalent simplified expression	**B2**	**B1** for $\mathbf{a} + \frac{1}{4}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{3}{4}(\mathbf{a} - \mathbf{b})$ oe or for $3(\overrightarrow{OP} - \mathbf{a}) = \mathbf{b} - \overrightarrow{OP}$ oe

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Question	Answer	Marks	Partial Marks
3(b)	$\mathbf{q} = \begin{pmatrix} 24 \\ -12 \end{pmatrix}$ oe	**2**	**M1** for $12\sqrt{5} \times \frac{1}{\sqrt{6^2 + (-3)^2}} \begin{pmatrix} 6 \\ -3 \end{pmatrix}$ oe, soi
	$\mathbf{r} = \begin{pmatrix} -15 \\ 15 \end{pmatrix}$ oe	**2**	**M1** for $15\sqrt{2} \times \frac{1}{\sqrt{(-5)^2 + 5^2}} \begin{pmatrix} -5 \\ 5 \end{pmatrix}$ oe, soi If M0 M0, then **SC1** for the unit direction vectors $\frac{1}{\sqrt{45}} \begin{pmatrix} 6 \\ -3 \end{pmatrix}$ or better and $\frac{1}{\sqrt{50}} \begin{pmatrix} -5 \\ 5 \end{pmatrix}$ or better
	$\lvert\mathbf{q} + \mathbf{r}\rvert = \left\lvert \begin{pmatrix} 9 \\ 3 \end{pmatrix} \right\rvert = \sqrt{9^2 + 3^2}$	**M1**	**FT** *their* (**q** + **r)** providing at least M1 previously awarded
	[unit vector in direction **q** + **r** =] $\frac{1}{\sqrt{90}} \begin{pmatrix} 9 \\ 3 \end{pmatrix}$ oe, isw	**A1**	
4(a)(i)	$\frac{\mathrm{d}y}{\mathrm{d}x} = 6\sin x \cos x - \sin x$ oe, isw	**B2**	**B1** for an attempt to differentiate both terms with one term correct
	$3\sin^2 x + \cos x + \frac{\cos x}{\sin x}(6\sin x \cos x - \sin x)$	**M1**	**FT** *their* $\frac{\mathrm{d}y}{\mathrm{d}x}$ of the form $k\sin x \cos x \pm \sin x$
	Correct simplified step e.g. $3\sin^2 x + \cos x + 6\cos^2 x - \cos x$ or $3\sin^2 x + 6\cos^2 x$ or $3 + 3\cos^2 x$ leading to $3(1 + \cos^2 x)$ nfww	**A1**	
4(a)(ii)	$\cos^2 x = \frac{1}{3}$	**M1**	**FT** *their k* providing $0 < k \leq 4$
	$\cos x = [\pm]\sqrt{\frac{1}{3}}$ oe	**M1**	**dep** on previous **M1; FT** *their k*
	±0.955 or ±0.9553[1...] rot to 4 or more sf ±2.19 or ±2.186[2...] rot to 4 or more sf	**A2**	and no other angles in range **A1** for any two correct angles, ignoring extras