Question	Answer	Marks	Partial Marks
3(b)	$a^2 - 2\sqrt{3}a + 3$ [= $b + (3 - b)\sqrt{3}$]	**B1**	
	Equates coefficients to form two equations	**M1**	**FT** *their*($a^2 - 2\sqrt{3}a + 3$) = $b + (3 - b)\sqrt{3}$ providing of equivalent difficulty
	$a^2 + 3 = b$ and $-2a = 3 - b$ oe	**DM1**	**FT** *their*($a^2 - 2\sqrt{3}a + 3$) = $b + (3 - b)\sqrt{3}$
	$a^2 - 2a$ [= 0] or $b^2 - 10b + 21$ [= 0]	**DM1**	
	$a = 2, 0$ or $b = 3$ or 7	**A1**	
	$a = 2, b = 7$ **and** $a = 0, b = 3$	**A1**	
4	$\mathbf{b} - \mathbf{a} = \frac{p}{p+q}(\mathbf{c} - \mathbf{a})$ oe AND Correct completion to given answer $\mathbf{b} = \frac{q\mathbf{a} + p\mathbf{c}}{q+p}$	**5**	**B4** for $\mathbf{b} - \mathbf{a} = \frac{p}{p+q}(\mathbf{c} - \mathbf{a})$ OR **B1** for $\overrightarrow{AB} = \frac{p}{p+q}\overrightarrow{AC}$ soi **B1** for $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ soi **B1** for $\overrightarrow{AC} = \mathbf{c} - \mathbf{a}$ soi
	Alternative 1		
	$q(\mathbf{b} - \mathbf{a}) = p(\mathbf{c} - \mathbf{b})$ oe AND Correct completion to given answer $\mathbf{b} = \frac{q\mathbf{a} + p\mathbf{c}}{q+p}$	**(5)**	**B4** for $q(\mathbf{b} - \mathbf{a}) = p(\mathbf{c} - \mathbf{b})$ OR **B1** for $q\overrightarrow{AB} = p\overrightarrow{BC}$ soi **B1** for $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ soi **B1** for $\overrightarrow{BC} = \mathbf{c} - \mathbf{b}$ soi
	Alternative 2		
	$\mathbf{b} = \mathbf{a} + \frac{p}{p+q}(\mathbf{c} - \mathbf{a})$ oe or $\mathbf{b} = \mathbf{c} + \frac{q}{p+q}(\mathbf{a} - \mathbf{c})$ oe AND Correct completion to given answer $\mathbf{b} = \frac{q\mathbf{a} + p\mathbf{c}}{q+p}$	**(5)**	**B4** for $\mathbf{b} = \mathbf{a} + \frac{p}{p+q}(\mathbf{c} - \mathbf{a})$ oe or $\mathbf{b} = \mathbf{c} + \frac{q}{p+q}(\mathbf{a} - \mathbf{c})$ oe OR **B1** for $\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$ or $\overrightarrow{OB} = \overrightarrow{OC} + \overrightarrow{CB}$ soi **B1** for $\overrightarrow{AB} = \frac{p}{p+q}\overrightarrow{AC}$ or $\overrightarrow{CB} = \frac{q}{p+q}\overrightarrow{CA}$ soi **B1** for $\overrightarrow{AC} = \mathbf{c} - \mathbf{a}$ **or** $\overrightarrow{CA} = \mathbf{a} - \mathbf{c}$ soi

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Question	Answer	Marks	Partial Marks
5	$\log_a\left(\frac{5(p+1)p}{p+2}\right) = \log_a 12$ oe, nfww or $\frac{5(p+1)p}{p+2} = 12$ oe, nfww	**M2**	**M1** for correct use of one log law in a correct equation e.g. $\log_a(p+1)+\log_a p-\log_a(p+2)+\log_a 5=\log_a 12$ or $\log_a p(p+1)-\log_a(p+2)=\log_a 12-\log_a 5$ or $\log_a \frac{p+1}{p+2}+\frac{1}{\log_p a}+\log_a 5=\log_a 12$
	$5p^2 - 7p - 24 = 0$	**A1**	
	$(5p + 8)(p - 3) = 0$ or formula	**DM1**	**FT** *their* 3-term quadratic
	$p = 3$ and no other solution nfww	**A1**	
6(a)	*OA*: $2\sqrt{3}$ or $\sqrt{12}$ soi	**B1**	
	Correct method to find angle *AOE* e.g. $2\tan(\ldots) = \frac{3}{\sqrt{3}}$ oe or $36 = 12+12-2(12)\cos AOE$ oe or $\pi - 2\tan^{-1}\frac{\sqrt{3}}{3}$ oe	**M1**	
	Angle *AOE*: $\frac{2\pi}{3}$ soi, isw	**A1**	
	Arc *AFE*: *their* $2\sqrt{3}$ × *their* $\frac{2\pi}{3}$ soi or $\frac{4\sqrt{3}}{3}\pi$	**M1**	**FT** *their* $\frac{2\pi}{3}$ and *their* $2\sqrt{3}$
	Perimeter: $10 + 2\sqrt{3} + \frac{4\sqrt{3}}{3}\pi$ or exact equivalent, cao	**A1**	

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