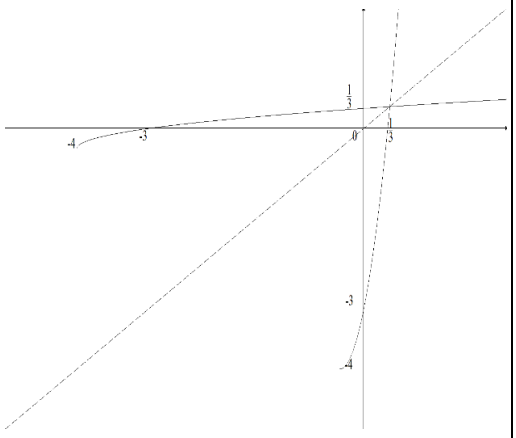
Question	Answer	Marks	Guidance
7(a)(ii)	**Alternative 2**		
	(Number not divisible by 5:) 107 520 or $8\times8\times{}^{8}\mathrm{P}_{4}$	**(B1)**	
	136 080 – 107 520	**(B1)**	**FT** on *their* 136 080
	Total: 28 560	**(B1)**	
7(b)(i)	346 104	**B1**	
7(b)(ii)	18	**B1**	Do not isw subsequent work
7(b)(iii)	the number of committees with no dentists: 11 440	**M1**	Allow attempts at 7 options, but must have all of them: 8, 448, 6720, 39 200, 101 920, 122 304 and 64 064
	334 664	**A1**	May come from ${}^{24}\mathrm{C}_{7}-{}^{16}\mathrm{C}_{7}$
8(a)(i)	$a=-\frac{1}{3}$ or $x\geqslant-\frac{1}{3}$	**B1**	Allow -0.333 or better Allow a correct recurring decimal
8(a)(ii)	$\mathrm{f}\geqslant-4$	**B1**	
8(a)(iii)		**4**	**B1** for $y=\mathrm{f}(x)$, must have a correct shape (right hand side from the vertex of a quadratic curve), must be a 1:1 function, intersecting each of the *x* and *y* axes once, in quadrants 1, 3 and 4. **B1**, **dependent** on previous **B** for passing through $(0,-3)$ and $\left(\frac{1}{3},\ 0\right)$. **B1 dependent** on first **B1** for $y=\mathrm{f}^{-1}(x)$, being a correct reflection of *their* $y=\mathrm{f}(x)$, intersecting each of the *x* and *y* axes and $y=\mathrm{f}(x)$ once. **B1 dependent** on previous **B** for passing through $(-3,\ 0)$ and $\left(0,\ \frac{1}{3}\right)$.
8(b)	$3\left(\ln\left(2x^{2}+5\right)\right)-2(=4)$	**M1**	For correct order
	$x=\sqrt{\frac{\mathrm{e}^{2}-5}{2}}$ or exact equivalent	**2**	**M1 dep** for a correct attempt to deal with logarithms and obtain *x* = … Allow one arithmetic or sign slip.

Question	Answer	Marks	Guidance
9	$12\left(x^{\frac{2}{3}}\right)^2 - 11\left(x^{\frac{2}{3}}\right) - 5 = 0$	**B1**	For recognition of a 3-term quadratic equation in terms of $x^{\frac{2}{3}}$ or a suitable substitution
	$\left(3x^{\frac{2}{3}} + 1\right)\left(4x^{\frac{2}{3}} - 5\right) = 0$ $x^{\frac{2}{3}} = -\frac{1}{3},\ x^{\frac{2}{3}} = \frac{5}{4}$	**2**	**M1** for attempt to solve a 3-term quadratic equation in the form $12u^2 \pm 11u \pm 5 = 0$ to obtain at least one solution in the form $x^{\frac{2}{3}} = ...$ or 'u' = … **A1** for at least one correct solution.
	$x = 1.4$ only	**A1**	
10(a)	$27 = 12\theta$ $\theta = \frac{9}{4}$ oe	**B1**	$\angle AOB = \theta$
	Either $\tan(\pi - \theta) = \frac{CB}{12}$ soi Or $\frac{CB}{\sin(\pi - \theta)} = \frac{12}{\sin\left(\theta - \frac{\pi}{2}\right)}$	**M1**	Allow with *their* θ.
	Perimeter = $24 + 27 + 2(14.86..)$	**M1**	Allow with *their CB*.
	Perimeter = awrt 80.7	**A1**	From correct working only
10(b)	$\left(\frac{1}{2} \times 12^2 \times \textit{ their } \theta\right) + (12 \times \textit{ their } CB)$ 340 oe or 341 oe	**3**	**M1** for each area **A1** for awrt 340 or 341
11(a)	$\overrightarrow{AX} = \frac{\mathbf{b}}{2} - \mathbf{a}$	**B1**	Allow unsimplified
	$\overrightarrow{OZ} = \mathbf{a} + \lambda\left(\frac{\mathbf{b}}{2} - \mathbf{a}\right)$	**2**	**M1** for $\overrightarrow{OZ} = \mathbf{a} + \lambda \times their\left(\frac{\mathbf{b}}{2} - \mathbf{a}\right)$ Allow unsimplified Mark final answer
11(b)	$\overrightarrow{OY} = \frac{1}{2}(\mathbf{a} + \mathbf{b})$ oe	**B1**	Allow unsimplified
	$\overrightarrow{OZ} = \frac{\mu}{2}(\mathbf{a} + \mathbf{b})$	**B1**	**FT** on *their* $\overrightarrow{OY}$, allow unsimplified Mark final answer