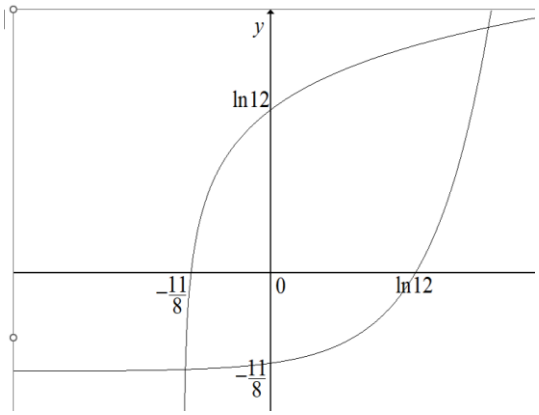
Question	Answer	Marks	Guidance
5(c)	$2p+2q=-5p+5$ or $p+4q=5p+5q$	**M1**	For equating like vectors to obtain at least one equation
	$p=-5,\ q=20$	**2**	**Dep M** mark for attempt to solve *their* equations to obtain both *p* and *q* **A1** for both
6	1144	**3**	**B1** With the brothers: 220 or ${}^{12}C_3$ **B1** Without the brothers: 924 or ${}^{12}C_6$
7(a)	2.8 oe	**B1**	
7(b)	$(BC=AC=)\ 10\tan 1.4$ or $\frac{10\sin 1.4}{\sin 0.1708}$	**M1**	
	Perimeter = $10(\textit{their}\ 2.8)+2(\textit{their}\ AC \text{ or } BC)$	**M1**	
	144	**A1**	
7(c)	Area of triangle *AOC* or *BOC* = $\frac{1}{2}\textit{their}(AC \text{ or } BC)\times 10$ or $\frac{1}{2}\textit{their}\ OC\times 10\sin 1.4$ soi	**M1**	Allow premature approximation for *OC*
	Area of minor sector *AOB* = 140	**B1**	**FT** on 50 × *their* 2.8
	Shaded area = 439 to 440	**A1**	Must have 579 ⩽ kite area ⩽ 580
8(a)	–1.5	**B1**	
8(b)	$f\in\mathbb{R}$	**B1**	Allow $y\in\mathbb{R}$, $\mathbb{R}$, $-\infty<f(x)<\infty$ oe, $f(x)\in\mathbb{R}$

Question	Answer	Marks	Guidance
8(c)	$\ln(8x+12)$ or $\ln(4(2x+3))$	**B1**	May be implied
	$f^{-1}(x)=\frac{e^x-12}{8}$ oe	**2**	**M1** for attempt to find the inverse, allow one sign error **A1** allow y = …
	Range: $f^{-1} > their(-1.5)$	**B1**	Must be correct notation, follow through on *their* **(a)** $f^{-1}(x) > their(-1.5)$, $y > their(-1.5)$
	Alternative		
	$f^{-1}(x)=\frac{e^{x-\ln 4}-3}{2}$ oe	**(3)**	**B1** for $e^{x-\ln 4}$ or $e^{y-\ln 4}$ **M1** for attempt to find the inverse, allow one sign error **A1** allow y = …
	Range: $f^{-1} > their(-1.5)$	**(B1)**	Must be correct notation, follow through on *their* **(a)** $f^{-1}(x) > their(-1.5)$, $y > their(-1.5)$
8(d)		**4**	**B1** for correct shape of $f(x)$ in quadrants 1, 2 and 3, with asymptotic behaviour **B1** for $\ln 12$ and $-\frac{11}{8}$ or -1.375 in correct position, must have a correct shape. **B1** for correct shape of $f^{-1}(x)$ in quadrants 1, 3 and 4, with asymptotic behaviour **B1** for $\ln 12$ and $-\frac{11}{8}$ or -1.375 in correct position, must have a correct shape and intersect at least once with $y=f(x)$
9(a)	$\frac{(4x-1)(2x+1)-(4x-1)+4(2x+1)^2}{(2x+1)^2(4x-1)}$	**M1**	For attempt to obtain a single fraction An extra term of $(2x+1)$ throughout must be dealt with correctly before awarding **M1**
	$\frac{24x^2+14x+4}{(2x+1)^2(4x-1)}$	**A1**	Must see sufficient detail of expansion and collecting terms cso as **AG**