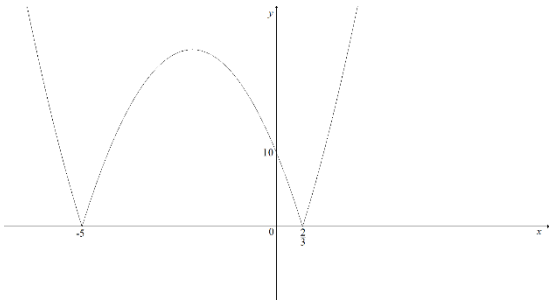
Question	Answer	Marks	Guidance
1	$a=2$	**B1**	
	$b=3$	**B1**	
	$c=-4$	**B1**	
2(a)		**4**	**B1** for a correct basic shape, allow 'construction curve' **Dep B1** for (0, 10) must have correct basic shape, must be convinced that this is the vertical intercept **B1** for (–5, 0) and $\left(\frac{2}{3},0\right)$ or (0.667, 0) or better **Dep B1** on all previous **B** marks for all correct with cusps and the correct shape for $x<-5$ and $x>\frac{2}{3}$
2(b)	Stationary point when $x=-\frac{13}{6}$ soi	**M1**	For differentiation or completing the square or use of symmetry
	$(-)\frac{289}{12}$ or $(-)24.1$ or better	**A1**	For *y*-value of stationary point, allow +ve or –ve value.
	$k>\frac{289}{12}$ or $k>24.1$ or better	**A1**	
	$k=0$	**B1**	
	Alternative		
	$3x^2+13x-(10+k)$ Using discriminant, $169+12(10+k)$	**(M1)**	Allow a sign error in $3x^2+13x-(10+k)$, but must have a term in *k* not k^2
	Critical value $(-)\frac{289}{12}$ or $(-)24.1$ or better	**(A1)**	
	$k>\frac{289}{12}$ or $k>24.1$ or better	**(A1)**	One solution only from correct work
	$k=0$	**(B1)**	

Question	Answer	Marks	Guidance
3	$\frac{3}{8}p^{-2}q^{\frac{3}{2}}r^{-\frac{16}{5}}$	**4**	**B1** for $k=\frac{3}{8}$ or 0.375 **B1** for $a=-2$ **B1** for $b=\frac{3}{2}$ oe **B1** for $c=-\frac{16}{5}$, –3.2. $-3\frac{1}{5}$
4	$\tan\left(2x+\frac{\pi}{4}\right)=\frac{1}{\sqrt{3}}$ or $\sin^2\left(2x+\frac{\pi}{4}\right)=\frac{1}{4}$ or $\cos^2\left(2x+\frac{\pi}{4}\right)=\frac{3}{4}$	**B1**	Must be from correct working Allow if $\theta=2x+\frac{\pi}{4}$ oe
	$2x+\frac{\pi}{4}=\frac{\pi}{6},\ \frac{7\pi}{6},\frac{13\pi}{6}$ $x=-\frac{\pi}{24}$	**M1**	**Dep** on previous **B1** For attempt at the correct order of operations, may be implied by a correct solution or $x=-\frac{\pi}{24}$.
	$x=\frac{11\pi}{24}$ or $\frac{23\pi}{24}$ oe 0.458π or 0.958π 1.44 or 3.01	**2**	**Dep M1** for an attempt to find a solution within the given range. Must be working with $\frac{7\pi}{6}$ or $\frac{13\pi}{6}$ **A1** for either
	$x=\frac{11\pi}{24}$ or $\frac{23\pi}{24}$ oe 0.458π or 0.958π 1.44 or 3.01	**A1**	For a second solution within the given range with no extra solutions within the range.
5(a)	25	**B1**	soi
	$\begin{pmatrix}56\\-192\end{pmatrix}$ or $8\begin{pmatrix}7\\-24\end{pmatrix}$	**B1**	
5(b)	$\overrightarrow{AC}=\frac{1}{3}(\mathbf{b}-\mathbf{a})$ or $\overrightarrow{CB}=\frac{2}{3}(\mathbf{b}-\mathbf{a})$ oe	**B1**	
	$\overrightarrow{OC}=\mathbf{a}+\frac{1}{3}(\mathbf{b}-\mathbf{a})$ or $\mathbf{b}-\frac{2}{3}(\mathbf{b}-\mathbf{a})$ oe	**M1**	For using $\overrightarrow{OA}+their\,\overrightarrow{AC}$ or $\overrightarrow{OB}+their\,\overrightarrow{BC}$ oe
	$\frac{2}{3}\mathbf{a}+\frac{1}{3}\mathbf{b}$	**A1**	