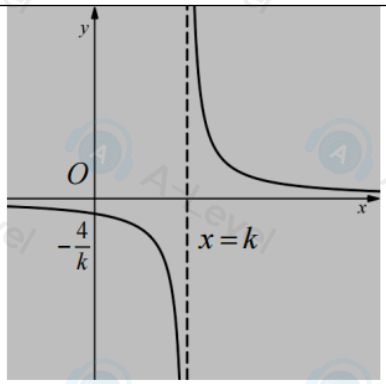
Question Number	Scheme	Marks
7. (a)		
	Shape in quadrant One	M1
	Fully correct shape and position	A1
	C cuts the y-axis at $-\frac{4}{k}$	B1
	C has a vertical asymptote at $x=k$	B1 **(4)**
(b)	$\frac{4}{x-k}=9-x \Rightarrow x^2-(9+k)x+9k+4=0$	M1, A1
	Uses $b^2-4ac<0 \Rightarrow (9+k)^2-4\times1\times(9k+4)<0$	dM1
	$k^2-18k+65<0 \Rightarrow (k-13)(k-5)<0 \Rightarrow 5<k<13$	ddM1, A1 **(5)** **(9 marks)**

Question	Scheme	Marks
11(a)	$x=\frac{5\pi}{2}$ **or** $y=12$	B1
	$x=\frac{5\pi}{2}$ **and** $y=12$	B1
		(2)
(b)	$x=\frac{3\pi}{2}$ **or** $y=-21$	B1
	$x=\frac{3\pi}{2}$ **and** $y=-21$	B1
		(2)
(c)(i)	$(A=)-12$	B1
(ii)	$(B=)\frac{5\pi}{4}$	B1
		(2)
		Total 6

Question Number	Scheme	Marks
5(a)	$f'(x) = 12x^{-\frac{1}{2}} + \frac{x}{3} - 4$	
	One of $x^{-\frac{1}{2}} \to x^{\frac{1}{2}}$, $-4 \to -4x$, $x \to x^2$	M1
	$f(x) = \int 12x^{-\frac{1}{2}} + \frac{x}{3} - 4\,dx = 24x^{\frac{1}{2}} + \frac{x^2}{6} - 4x + c$	A1A1
	$8 = 24(9)^{\frac{1}{2}} + \frac{(9)^2}{6} - 4(9) + c \Rightarrow c = \ldots$	dM1
	$(f(x) =)\ \ 24x^{\frac{1}{2}} + \frac{x^2}{6} - 4x - \frac{83}{2}$	A1
		(5)
(b)	$f'(9) = \frac{12}{\sqrt{9}} + \frac{9}{3} - 4 \quad (=3)$	M1
	$3 \to -\frac{1}{3}$	dM1
	$y - 8 = "-\frac{1}{3}"(0-9)$	M1
	$(0, 11)$	A1
		(4)
		(9 marks)

Question Number	Scheme	Marks
3.(a)	$y = \frac{5x^3 - 8}{2x^2} = \frac{5}{2}x - 4x^{-2}$	M1
	$\frac{dy}{dx} = \frac{5}{2} + 8x^{-3}$	dM1 A1 A1
		(4)
(b)	Substitutes $x = 2$ into their $\frac{dy}{dx} = "\frac{5}{2} + \frac{8}{2^3}" \Rightarrow \frac{dy}{dx} = "\frac{7}{2}"$	M1
	Uses their $\frac{7}{2}$ and $(2, 4) \Rightarrow y - 4 = "\frac{7}{2}"(x-2)$	M1
	$\Rightarrow 7x - 2y - 6 = 0$	A1
		(3)
		(7 marks)