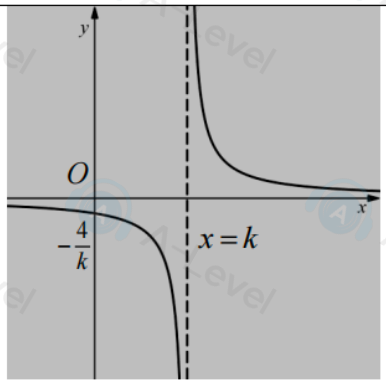
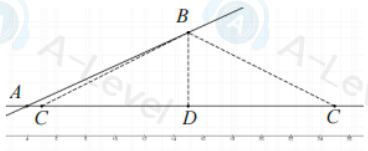
Question Number	Scheme	Marks
2. (a)	$5(x+3)>4(2x-5)\Rightarrow 5x+15>8x-20\Rightarrow ax>b$ or $px<q$	M1
	$\Rightarrow x<\frac{35}{3}$	A1
		(2)
(b) (i)	$x^2-6x+1=(x-3)^2\pm\ldots=(x-3)^2-8$	M1, A1
(ii)	$(x-3)^2-8=0\Rightarrow x=3+\sqrt{8}$ or $3-\sqrt{8}$	M1
	$x^2-6x+1\geqslant 0\Rightarrow x\leqslant 3-\sqrt{8}, x\geqslant 3+\sqrt{8}$	A1
		(4)
(c)	$x\leqslant 3-\sqrt{8},\ 3+\sqrt{8}\leqslant x<\frac{35}{3}$	B1
		(1)
		(7 marks)

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 $b^2-4ac<0\Rightarrow (9+k)^2-4\times 1\times(9k+4)<0$	dM1
	$k^2-18k+65<0\Rightarrow (k-13)(k-5)<0\Rightarrow 5<k<13$	ddM1, A1
		(5)
		(9 marks)

Question Number	Scheme	Marks
	$f'(x)=4\sqrt{x^3}+\frac{k}{x^2}=4x^{\frac{3}{2}}+kx^{-2}$	
10 (a)	$f''(x)=6x^{\frac{1}{2}}-2kx^{-3}$	M1, A1
	$f''(2)=6\sqrt{2}-2k\times\frac{1}{8}=0\Rightarrow k=24\sqrt{2}$	dM1, A1
		(4)
(b)	$f'(x)=4x^{\frac{3}{2}}+kx^{-2}\Rightarrow\ f(x)=4\times\frac{2}{5}x^{\frac{5}{2}}-kx^{-1}\left(+c\right)$	M1, A1 ft
	Uses $P\left(2,8\sqrt{2}\right)\Rightarrow 8\sqrt{2}=4\times\frac{2}{5}\times 2^{\frac{5}{2}}-\frac{k}{2}+c\Rightarrow c=p\sqrt{2}$	dM1
	$f(x)=\frac{8}{5}x^{\frac{5}{2}}-\frac{24\sqrt{2}}{x}+\frac{68}{5}\sqrt{2}$	A1
		(4)
		(8 marks)

Question	Scheme	Marks
9(a)	$m=\dfrac{7-2}{15-4}\left(=\dfrac{5}{11}\right)$	M1
	$y-2=\dfrac{5}{11}(x-4)$ or $y-7=\dfrac{5}{11}(x-15)$ or $y=\dfrac{5}{11}x+c\Rightarrow 2=\dfrac{5}{11}\times 4+c\Rightarrow c=\ldots\left(\dfrac{2}{11}\right)$	M1
	$5x-11y+2=0$	A1
		(3)
(a) ALT	$y=mx+c\Rightarrow \begin{matrix}2=4m+c\\7=15m+c\end{matrix}$	M1
	$\begin{matrix}2=4m+c\\7=15m+c\end{matrix}\Rightarrow m=\ldots\left(\dfrac{5}{11}\right),\quad c=\ldots\left(\dfrac{2}{11}\right)$	M1
	$5x-11y+2=0$	A1
(b)	$(15-x)^2+(7-2)^2=\left(5\sqrt{5}\right)^2$ or e.g. $\sqrt{(15-x)^2+(7-2)^2}=5\sqrt{5}$ or e.g. $\left(5\sqrt{5}\right)^2=5^2+CD^2$ oe 	M1
	Way 1: $(15-x)^2+25=125\Rightarrow(15-x)^2=100\Rightarrow x=\ldots$ or e.g. Way 2: $125=25+CD^2\Rightarrow CD^2=100\Rightarrow CD=10\Rightarrow x=\ldots$	M1
	$(5,\ 2)$ **or** $(25,\ 2)$	A1
	$(5,\ 2)$ **and** $(25,\ 2)$	A1
		(4)
(c)	Area $=\dfrac{1}{2}("5"-4)\times 5$	M1
	$=\dfrac{5}{2}$	A1
		(2)
		Total 9

Question Number	Scheme	Marks
10(a)	One of $-\frac{20}{3}<x<-6, \quad x>\frac{3}{2}$	M1
	Both $-\frac{20}{3}<x<-6, \quad x>\frac{3}{2}$	A1
		(2)
(b)	$(3x+20)(x+6)(2x-3)=(3x+20)\left(2x^2+9x-18\right)=$	M1
	$=6x^3+67x^2+126x-360$	A1 A1
		(3)
(c)	$\frac{dy}{dx}=18x^2+134x+126 \Rightarrow$ Gradient at $x=0$ is 126	M1
	Equation of l is $y=126x-360$	A1ft
	l cuts C again when $6x^3+67x^2+126x-360=126x-360$	dM1
	$6x^3+67x^2=0 \Rightarrow x^2(6x+67)=0$	ddM1
	$x=-\frac{67}{6}$	A1
		(5)
		(10 marks)

Question Number	Scheme	Marks
4. (a)	$(270°, 0)$	B1 **(1)**
(b)	$(-180°, -4)$	B1, B1 **(2)**
(c)(i)	100	B1
(ii)	4	B1
(iii)	7	B1 **(3)**
		(6 marks)

Question Number	Scheme	Marks
	$y=2x^{\frac{5}{2}}-4x+3$	
2. (a)	$\left\{\frac{dy}{dx}=\right\}5x^{\frac{3}{2}}-4$	M1, A1 **(2)**
(b)	$5x^{\frac{3}{2}}-4=16 \Rightarrow x^{\frac{3}{2}}=4$	M1, A1
	$\Rightarrow x=4^{\frac{2}{3}}=2^{\frac{4}{3}} \quad \Rightarrow k=\frac{4}{3}$	A1 **(3)**
		(5 marks)