Question Number	Scheme	Marks
6. (a)	$(540°, -5)$	B1, B1 **(2)**
(b) (i)	$(360°, 3)$	B1, B1 **(2)**
(ii)	$(180°, 5)$	B1, B1 **(2)**
		(6 marks)

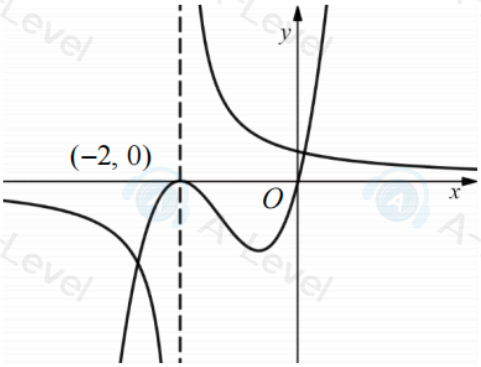
Question	Scheme	Marks
10(a)(i)	Equation is $y = \frac{1}{2}(x+2)$	**B1**
		(1)
(ii)	l_1 intersect parabola $\Rightarrow -\frac{1}{4}(x+2)(x-b) = \frac{1}{2}(x+2) \Rightarrow x = ...$	**M1**
	$x = b-2$	**A1**
	$y = \frac{1}{2}b$	**A1**
		(3)
(b)	l_2 passes through $(b, 0)$ and has gradient $-2 \Rightarrow y = ...$	**M1**
	$y - 0 = -2(x-b)$	**A1**
		(2)
(c)	So equation is $y - "\frac{1}{2}b" = "-2"(x - "b-2")$	**M1**
	$y - \frac{1}{2}b = -2x + 2b - 4 \Rightarrow y = -2x + \frac{5}{2}b - 4$ *	**A1***
		(2)
(d)	$y = -2x + 2b = -2x + \frac{5}{2}b - 4 \Rightarrow 2b = \frac{5}{2}b - 4 \Rightarrow b = ...$ or $y = -2x + \frac{5}{2}b - 4,\ x = b,\ y = 0 \Rightarrow 0 = -2b + \frac{5}{2}b - 4 \Rightarrow b = ...$ or $-\frac{1}{4}(x+2)(x-b) = -2(x-b) \Rightarrow x = ...(6) \Rightarrow b - 2 = 6 \Rightarrow b = ...$	**M1**
	$b = 8$	**A1**
		(2)
		(10 marks)

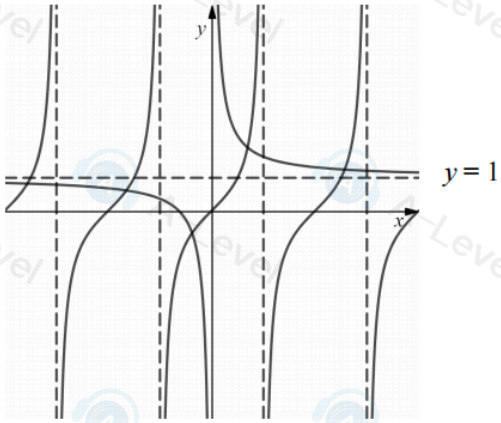
Question Number	Scheme	Marks
8 (a)	States or implies that gradient of tangent is 24	B1
	Solves $f'(3)=24$ to find k. E.g $4\times3^2+k\times3+3=24\Rightarrow k=...$	M1
	$3k+39=24\Rightarrow k=\dfrac{24-39}{3}=-5$ *	A1*
		(3)
(b)	$f'(x)=4x^2-5x+3\Rightarrow f(x)=\dfrac{4}{3}x^3-\dfrac{5}{2}x^2+3x+c$	M1 A1
	Substitutes $x=3, y=-\dfrac{3}{24}+5$ into $y=f(x)$ to find "c"	dM1
	$f(x)=\dfrac{4}{3}x^3-\dfrac{5}{2}x^2+3x-\dfrac{141}{8}$	A1
		(4)
		(7 marks)

Question Number	Scheme	Marks
7. (a)	$2x-3\sqrt{x}-5=9\Rightarrow 2x-3\sqrt{x}-14=0$ and treats as quadratic equation	M1
	$\Rightarrow\left(2\sqrt{x}-7\right)\left(\sqrt{x}+2\right)=0\Rightarrow\left(\sqrt{x}=\right)\dfrac{7}{2},(-2)$	A1
	$\Rightarrow x=\left(\dfrac{7}{2}\right)^2=\dfrac{49}{4}$	dM1 A1
		(4)
(b)	$\left(f'(x)=\right)\ 2-\dfrac{3}{2}x^{-\frac{1}{2}}$	B1

Question Number	Scheme	Marks
	$\left(f''(x)=\right)\ \dfrac{3}{4}x^{-\frac{3}{2}}$	M1 A1
	Attempts $\dfrac{3}{4}x^{-\frac{3}{2}}=6\Rightarrow x^{-\frac{3}{2}}=8\Rightarrow x=\dfrac{1}{4}$	dM1 A1
		(5)
		(9 marks)

Question Number	Scheme	Marks
3(a)	$\left(2\sqrt{2}\right)^2 = p^2+q^2-2pq\cos 60°$ oe $p^2+q^2-pq=8$ *	M1 A1*
		(2)
(b)	$q=p+2 \Rightarrow 8=p^2+("p+2")^2-p("p+2")$	M1
	$p^2+2p-4=0$ or $q^2-2q-4=0$	A1
	$p=\frac{-2\pm\sqrt{2^2-4\times1\times(-4)}}{2}$ or $q=\frac{2\pm\sqrt{(-2)^2-4\times1\times(-4)}}{2}$	M1
	$p=-1+\sqrt{5}$ or $q=1+\sqrt{5}$	B1 (A1 on EPEN)
	$p=-1+\sqrt{5}$ and $q=1+\sqrt{5}$ only	A1cso
		(5)
(c)	$\text{Area}=\frac{1}{2}\times("-1+\sqrt{5}")("1+\sqrt{5}")\times\sin 60°$	M1
	$\text{Area}=\sqrt{3}$ (m^2)	A1
		(2)
Alt(a)	Forming a line BX which is perpendicular to AC where X is on the line AC. $AX=p\cos 60=\frac{p}{2}$ $BX=\sqrt{p^2-\left(\frac{p}{2}\right)^2}=\frac{\sqrt{3}}{2}p$ or $BX=p\sin 60$ $\left(\frac{\sqrt{3}}{2}p\right)^2+\left(q-\frac{p}{2}\right)^2=\left(2\sqrt{2}\right)^2$ or $(p\sin 60)^2+\left(q-\frac{p}{2}\right)^2=\left(2\sqrt{2}\right)^2$	M1
	$\frac{3p^2}{4}+q^2-pq+\frac{p^2}{4}=8$ $p^2+q^2-pq=8$ *	A1*
		(9 marks)

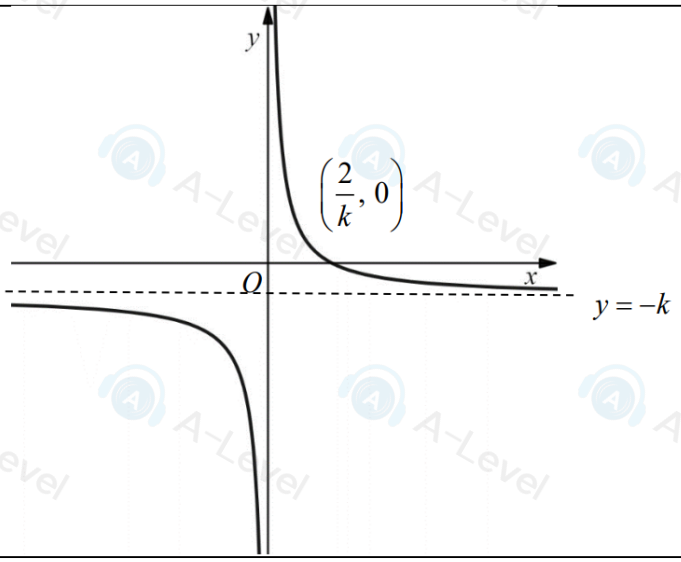
Question Number	Scheme	Marks
4a	$x=-2$	B1
		(1)
b	$x^3+4x^2+4x=x(x+2)^2$	M1A1
		(2)
c		B1B1B1
		(3)
d	2 as the graphs intersect (each other) twice (since $(x+2)(x^3+4x^2+4x)=1$ is the same as $x^3+4x^2+4x=\frac{1}{x+2}$)	B1
		(1)
		(7 marks)

Question Number	Scheme	Marks
9(a)	$x = \frac{3\pi}{2}$ oe	B1
		(1)
(b)(i)		B1B1
(ii)	5 (solutions)	B1
	Number of solutions are the number of points of intersections between the graphs	B1
		(4)
(c)		
(i)	(Number of solutions) = 40	B1ft
(ii)	(Number of solutions) = 14	B1
		(2)
		(7 marks)

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)	$x^2 - 6x + 1 = (x-3)^2 \pm ... = (x-3)^2 - 8$	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
1.	$\int (2x-5)(3x+2)(2x+5)\,dx$ $(2x-5)(3x+2)(2x+5) = (6x^2-11x-10)(2x+5) = \ldots$ $= 12x^3+8x^2-75x-50$ $\int (2x-5)(3x+2)(2x+5)\,dx = 3x^4+\frac{8}{3}x^3-\frac{75}{2}x^2-50x+c$	M1 A1 M1, A1ft, A1 **(5 marks)**

Question Number	Scheme	Marks
11a	$2(x\pm\ldots)^2$ $\ldots(x\pm 3)^2\ldots$ $2(x-3)^2-4$	B1 M1 A1
		(3)
b	$(3, -4)$	B1ft
		(1)
c	$m = \frac{28--4}{-1-3}\ (=-8)$ $y-28=-8(x+1)$ $y=-8x+20$	M1 dM1 A1
		(3)
d	$y \leqslant "-8x+20"$ and $y \geqslant 2x^2-12x+14$ (or $y \geqslant "2(x-3)^2-4"$) $y \leqslant -8x+20$ $\quad y \geqslant 2x^2-12x+14$ $\quad y \geqslant 0,\ x \geqslant 0$	B1ftB1ft B1cso
		(3)
		(10 marks)

Question Number	Scheme	Marks
7(a)		B1B1B1
		(3)
(b)	$-kx-6=\frac{2}{x}-k \Rightarrow -kx^2-6x=2-kx \Rightarrow kx^2+(6-k)x+2=0$	M1
	$(6-k)^2-4\times k\times 2 \Rightarrow k^2-20k+36$	dM1A1
	$\Rightarrow$ CVs $=2, 18 \Rightarrow k<$"2" or $k>$"18"	M1
	$(0<)k<2$ or $k>18$	A1
		(5)
		(8 marks)

Question	Scheme	Marks
2(i)(a)	$2^{n+3}=2^n\times 2^3=8m$	B1
		(1)
(b)	$16^{3n}=\left(2^4\right)^{3n}$	M1
	$=2^{12n}=\left(2^n\right)^{12}=m^{12}$	A1
		(2)

(ii)	$x\sqrt{3}-3=x+\sqrt{3} \Rightarrow x\sqrt{3}-x=3+\sqrt{3} \Rightarrow x\left(\sqrt{3}-1\right)=3+\sqrt{3} \Rightarrow x=...$	M1
	$=\frac{3+\sqrt{3}}{\sqrt{3}-1}\times\frac{\pm\left(\sqrt{3}+1\right)}{\pm\left(\sqrt{3}+1\right)}$	M1
	$=\frac{\pm\left(4\sqrt{3}+6\right)}{\pm(3-1)}=3+2\sqrt{3}$	A1
		(3)

Question	Scheme	Marks
7(a)	$0=10-2x \Rightarrow x=5$ or $y=2, y=10-2x \Rightarrow x=4$	B1
	Examples: $\frac{1}{2}\times 2\left(5+4-a\right)=\frac{27}{4}$ or $\frac{1}{2}\times 2\left(5+4-\frac{2}{k}\right)=\frac{27}{4}$ Trapezium or $\frac{1}{2}\times 2a+\frac{1}{2}\times 2\left(5-a+4-a\right)=\frac{27}{4}$ or $\frac{1}{2}\times 2\times\frac{2}{k}+\frac{1}{2}\times 2\left(5-\frac{2}{k}+4-\frac{2}{k}\right)=\frac{27}{4}$ Triangle + Trapezium or $\frac{1}{2}\times 2a+2\left(4-a\right)+\frac{1}{2}\times 1\times 2=\frac{27}{4}$ or $\frac{1}{2}\times 2\times\frac{2}{k}+2\left(4-\frac{2}{k}\right)+\frac{1}{2}\times 1\times 2=\frac{27}{4}$ Triangle + Rectangle + Triangle or $\frac{1}{2}\times 5\times 2+\frac{1}{2}\left(4-a\right)\times 2=\frac{27}{4}$ or $\frac{1}{2}\times 5\times 2+\frac{1}{2}\left(4-\frac{2}{k}\right)\times 2=\frac{27}{4}$ 2 Triangles	M1
	$\Rightarrow k=\frac{8}{9}, a=\frac{9}{4}$	A1 A1ft
		(4)
(b)	Two of $y\geqslant "\frac{8}{9}"x,\ y\leqslant 10-2x, x>"\frac{9}{4}"$	M1
	All three of $y\geqslant \frac{8}{9}x,\ y\leqslant 10-2x, x>\frac{9}{4}$	A1
		(2)
		(6 marks)