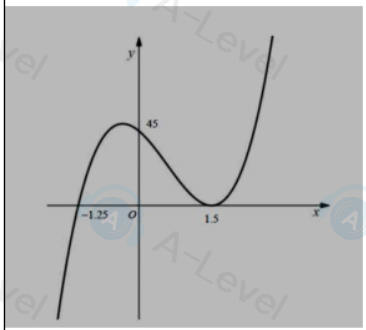
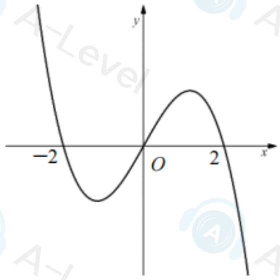
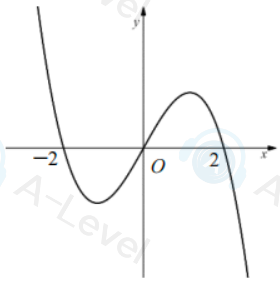
Question Number	Scheme	Marks
8 (a)	$\mathrm{f}'(x) = 2(x-3)(3x+2) = 6x^2 - 14x - 12$	B1
	$\mathrm{f}(x) = 2x^3 - 7x^2 - 12x + k$	M1, A1
	Uses $P(4, 13) \Rightarrow 13 = 2\times 64 - 7\times 16 - 12\times 4 + k \Rightarrow k = \ldots$	M1
	$(\mathrm{f}(x)) = 2x^3 - 7x^2 - 12x + 45$	A1
		(5)
(b)	$2x^3 - 7x^2 - 12x + 45 \equiv (x^2 - 6x + 9)(px + q) \Rightarrow p = "2"$ or $q = \frac{"45"}{9}$	B1 ft
	States either $2x^3 - 7x^2 - 12x + 45 \equiv (x-3)^2(2x+5)$ or $p = 2$ & $q = 5$ following a fully correct (a) or correct but incomplete part (a) (See notes)	B1
		(2)
(c)	 + ve cubic curve	B1
	"Correct" y intercept for their part (b) equation. So $9q$ or "45"	B1ft
	Turning point at $(1.5, 0)$	B1
	x intercept at $(-1.25, 0)$	B1
		(4)
		(11 marks)

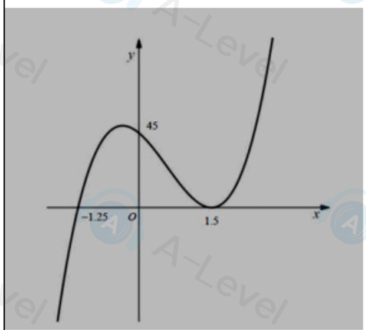
Question Number	Scheme	Marks
9 (a) (i)	Stretch parallel to the x-axis $\times\frac{1}{2}$ or stretch parallel to the y-axis $\times\sqrt{2}$	M1, A1
(ii)	Translate by the vector $\begin{pmatrix}0\\12\end{pmatrix}$ (or translate up by 12 (units))	M1, A1
		(4)
(b) (i)	$12 - \sqrt{x} = \sqrt{2}\sqrt{x}$	
	$12 = (\sqrt{2}+1)\sqrt{x}$	M1
	$\Rightarrow \sqrt{x} = \frac{12}{\sqrt{2}+1}\times\frac{\sqrt{2}-1}{\sqrt{2}-1} = 12(\sqrt{2}-1)$ *	dM1, A1 *
Alt (i)	$12 - \sqrt{x} = \sqrt{2x} \Rightarrow (12-\sqrt{x})^2 = 2x \Rightarrow x + 24\sqrt{x} - 144 = 0$	M1
	$\Rightarrow (\sqrt{x}) = \frac{-24\pm\sqrt{24^2 - 4\times -144}}{2} = -12\pm\frac{12}{2}\sqrt{4+8} = -12\pm 12\sqrt{2}$	dM1
	$\sqrt{x} > 0 \Rightarrow \sqrt{x} = -12 + 12\sqrt{2} = 12(\sqrt{2}-1)$*	A1
(ii)	$\Rightarrow x = 12^2(\sqrt{2}-1)^2 = 144(2+1-2\sqrt{2}) = 144(3-2\sqrt{2})$	M1, A1
	$y\{= 12 - \sqrt{x} = 12 - 12(\sqrt{2}-1)\} = 12(2-\sqrt{2})$	B1
	Or common acceptable alt forms: $P(432 - 288\sqrt{2},\ 24 - 12\sqrt{2})$	
		(6)
		(10 marks)

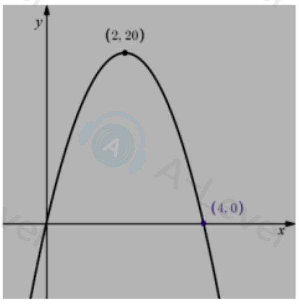
Question Number	Scheme	Marks
3(a)	$(\mathrm{f}(x)=)-3\cos x$ or $(\mathrm{f}(x)=)3\sin(x-90°)$	M1 A1
		(2)
(b)(i)	8	B1
(ii)	5	B1
		(2)
		(4 marks)

Question	Scheme	Marks
8(a)		B1B1B1
		(3)
(b)	$x(4-x^2)=\frac{A}{x}\Rightarrow 4x^2-x^4=A$ $\Rightarrow x^4-4x^2+A=0$*	B1*
		(1)
(c)	$A>0$	B1
	$b^2=4ac\Rightarrow 16=4A\Rightarrow A=...$	M1
	$0<A<4$	A1
		(3)
		Total 7

Question	Scheme	Marks
8(a)		B1B1B1
		(3)
(b)	$x(4-x^2)=\frac{A}{x}\Rightarrow 4x^2-x^4=A$ $\Rightarrow x^4-4x^2+A=0$*	B1*
		(1)
(c)	$A>0$	B1
	$b^2=4ac\Rightarrow 16=4A\Rightarrow A=...$	M1
	$0<A<4$	A1
		(3)
		Total 7

Question Number	Scheme	Marks
9. (a)	24π	B1 **(1)**
(b)	$(18\pi, -1)$	B1ft **(1)**
(c)(i)	$-12\pi - \alpha$	B1 ft
(ii)	$6\pi - \alpha$	B1 ft **(2)** **(4 marks)**

Question Number	Scheme	Marks
8 (a)	$f'(x) = 2(x-3)(3x+2) = 6x^2 - 14x - 12$	B1
	$f(x) = 2x^3 - 7x^2 - 12x + k$	M1, A1
	Uses $P(4, 13) \Rightarrow 13 = 2\times 64 - 7\times 16 - 12\times 4 + k \Rightarrow k = ...$	M1
	$(f(x)) = 2x^3 - 7x^2 - 12x + 45$	A1 **(5)**
(b)	$2x^3 - 7x^2 - 12x + 45 \equiv (x^2 - 6x + 9)(px + q) \Rightarrow p = "2"$ or $q = \frac{"45"}{9}$	B1 ft
	States either $2x^3 - 7x^2 - 12x + 45 \equiv (x-3)^2(2x+5)$ or $p = 2$ & $q = 5$ following a fully correct (a) or correct but incomplete part (a) (See notes)	B1 **(2)**
(c)	 + ve cubic curve	B1
	"Correct" y intercept for their part (b) equation. So $9q$ or "45"	B1ft
	Turning point at $(1.5, 0)$	B1
	x intercept at $(-1.25, 0)$	B1 **(4)** **(11 marks)**

Question Number	Scheme	Marks
9 (a)	 Correct shape and position passing through (0, 0)	B1
	Intersection at (4, 0)	B1
		(2)
(b)	Attempts form of equation. E.g. $y = Ax(x-4)$ or $y = 20 \pm C(x-2)^2$	M1
	Full attempt to find equation. E.g. $20 = A \times 2(2-4) \Rightarrow A = ...$ Or $0 = 20 + C(4-2)^2 \Rightarrow C = ...$	dM1
	$y = -5x(x-4)$, $y = 20-5(x-2)^2$ o.e.	A1
		(3)
(c)	Sets $x\left(x^2-4\right) = \text{"}-5x(x-4)\text{"}$	M1
	$x^3+5x^2-24x=0 \Rightarrow x\left(x^2+5x-24\right)=0$	dM1
	$(x+8)(x-3)=0 \Rightarrow$ x coordinate of P is -8	ddM1, A1
	$P=\left(-8,-480\right)$	A1
		(5)
		(10 marks)

Question	Scheme	Marks
2(a)	$AB = 21$ cm, $BC = 13$ cm, $\angle BAC = 25°$, $\angle ACB = x°$	
	$\dfrac{\sin x°}{21} = \dfrac{\sin 25°}{13}$ o.e	**M1**
	$\sin x° = 0.6827$ (awrt)	**A1**
		(2)
(b)	$\sin^{-1}(0.6827) = ...(43.05°)$	**M1**
	($AC < AB$ so $\angle ABC < \angle ACB$ so) required angle is $180° - \sin^{-1}(0.6827) = ...$	**M1**
	So $x =$ awrt 136.95	**A1**
		(3)
		(5 marks)
Notes:		
Condone the omission of the ° symbol. Mark (a) and (b) as one		