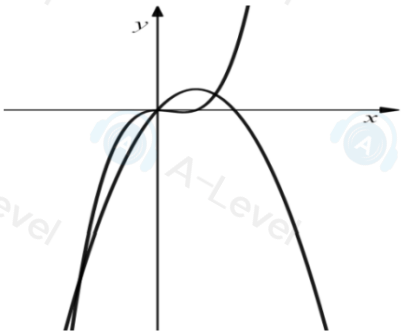
Question Number	Scheme	Marks
8 (a)	Attempts to use $S=r\theta \Rightarrow 9=OD\times 0.8 \Rightarrow OD=11.25$ or $\frac{45}{4}$	M1, A1
	$AO=\frac{5}{8}\times "11.25"=7.03\text{ m}$ *	A1*
		(3)
(b)	Attempts $A=7.03\times(2\pi-0.8)=(38.55)$	M1
	Attempts $9+2\times(11.25-7.03)+7.03\times\theta$	M1
	Perimeter = awrt 56.0 m	A1
		(3)
(c)	Attempts $\frac{1}{2}\times "11.25"^2\times 0.8=(50.625)$ OR $\frac{1}{2}\times 7.03^2\times(2\pi-0.8)=(135.4)$	M1
	Full method for area of platform $=\frac{1}{2}\times "11.25"^2\times 0.8+\frac{1}{2}\times 7.03^2\times(2\pi-0.8)$	M1
	=awrt 186 m^2	A1
		(3)
		(9 marks)

Question Number	Scheme	Marks
7 (a)	States or implies that $f(x)=\lambda x^2(x-4)$	M1
	Attempts to find λ. E.g. $120=\lambda 10^2(10-4)\Rightarrow\lambda=...$	dM1
	$\{f(x)=\}0.2x^2(x-4)$	A1
		(3)
(b)		
	"Upside down" parabola	M1
	Passing through O and +ve x axis > 4	A1
		(2)
(c)	Sets $1.2x(8-x)=$ their $0.2x^2(x-4)$	B1ft
	$1.2x(8-x)=0.2x^2(x-4)\Rightarrow x\left(x^2+2x-48\right)=0$ or $\Rightarrow x^3+2x^2-48x=0$	M1
	$\Rightarrow x=...,...(,0)$	dM1
	For $x=$ $-8,0,6$ OR one of $(-8,-153.6),(6,14.4)$	A1
	All of $(-8,-153.6),(6,14.4),(0,0)$ $\left\{\left(-8,-\frac{768}{5}\right),\left(6,\frac{72}{5}\right),(0,0)\right\}$	A1
		(5)
		(10 marks)

Question Number	Scheme	Marks
	$y=\frac{1}{2}x^4-3+\frac{10}{x^2}$	
5(a)	$\left(\int \frac{1}{2}x^4-3+\frac{10}{x^2}\,dx=\right)\frac{1}{10}x^5-3x-\frac{10}{x}+c$	M1A1A1
		(3)
(b)(i)	$\left(\frac{dy}{dx}=\right)2x^3-\frac{20}{x^3}$	M1A1A1
		(3)
(b)(ii)	$2x^3-\frac{20}{x^3}=3\Rightarrow 2x^6-20=3x^3$	M1
	$2x^6-3x^3-20=0\Rightarrow\left(2x^3+5\right)\left(x^3-4\right)=0\Rightarrow x^3=...\Rightarrow x=...$ or e.g. $x^3=a\Rightarrow(2a+5)(a-4)=0\Rightarrow a=...\Rightarrow x^3=...\Rightarrow x=...$	dM1
	$\Rightarrow x=-\sqrt[3]{\frac{5}{2}},\ \sqrt[3]{4}$	A1A1
		(4)
		(10 marks)

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

Question Number	Scheme	Marks
1. (a)	$y=2x^3-5x^2-\frac{3}{2x}+7\Rightarrow\frac{dy}{dx}=6x^2-10x+\frac{3}{2x^2}$	M1 A1 A1 **(3)**
(b)	$x=\frac{1}{2}\Rightarrow y=3$	B1
	Substitutes $x=\frac{1}{2}$ into their $\frac{dy}{dx}=6x^2-10x+\frac{3}{2x^2}=...\left(=\frac{5}{2}\right)$	M1
	Uses the perpendicular gradient rule Eg. $\frac{5}{2}\rightarrow-\frac{2}{5}$	dM1
	Attempts the equation of the normal at P $y-3=-\frac{2}{5}\left(x-\frac{1}{2}\right)$	M1
	$2x+5y-16=0$ oe	A1 **(5)**
		(8 marks)

Question Number	Scheme	Marks
4.	When ---- represents $<$ or $>$ and —— represents $\leq$ or $\geq$ Either $2y \leq x$ or $y \geq 2x - \frac{1}{8}x^2$	B1
	$2x - \frac{1}{8}x^2 = 0 \Rightarrow x = 16 \Rightarrow x < \ldots$ or $x \leq \ldots$	M1
	$x < 16$, $2y \leq x$ and $y \geq 2x - \frac{1}{8}x^2$	A1 (3) **(3 marks)**
Alt1	When ---- represents $\leq$ or $\geq$ and —— represents $<$ or $>$ Either $2y < x$ or $y > 2x - \frac{1}{8}x^2$	B1
	$2x - \frac{1}{8}x^2 = 0 \Rightarrow x = 16 \Rightarrow x < \ldots$ or $x \leq \ldots$	M1
	$x \leq 16$, $2y < x$ and $y > 2x - \frac{1}{8}x^2$	A1
		(3)

Question Number	Scheme	Marks
1(a)(i)	$(2, 12)$	B1
(ii)	$(2, 15)$	B1
		(2)
(b)	k ,, 3, $k = 5$	M1 A1
		(2)
(c)	$(x =) -5$	B1
		(1)
		(5 marks)