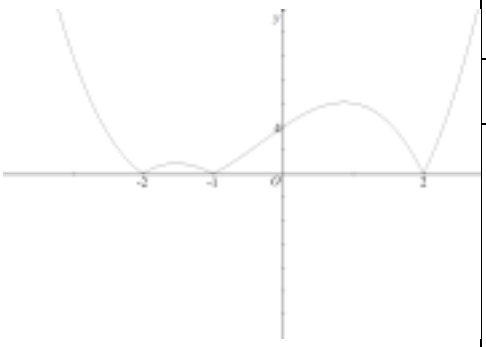
Question	Answer	Marks	Partial Marks
1		**B1**	Shape
		B1	Correct x-coordinates
		B1	Correct y-coordinate and max in first quadrant
2	$\frac{\mathrm{d}r}{\mathrm{d}t} = 0.5$	**B1**	
	$\frac{\mathrm{d}V}{\mathrm{d}r} = 4\pi r^2$	**B1**	
	$\frac{\mathrm{d}V}{\mathrm{d}t} = \frac{\mathrm{d}V}{\mathrm{d}r} \times \frac{\mathrm{d}r}{\mathrm{d}t}$ $\frac{\mathrm{d}V}{\mathrm{d}t} = \pi r^2$	**M1**	For attempt to use a correct form of the chain rule
	When $r = \frac{1}{4}$, $\frac{\mathrm{d}V}{\mathrm{d}t} = 0.125\pi$	**A1**	
3(a)	$4096 - 384x + 15x^2$	**B1**	For 4096
		B1	For $-384x$
		B1	For $15x^2$
3(b)	$(4096 - 384x + 15x^2)\left(x^2 - 2 + \frac{1}{x^2}\right)$	**B1**	For $\left(x^2 - 2 + \frac{1}{x^2}\right)$
	Term independent of x : $-2(4096) + 15$	**M1**	For use of 2 appropriate terms
	–8177	**A1**	
4(a)(i)	720	**B1**	
4(a)(ii)	600	**B1**	**FT** on *their* (i) $\times \frac{5}{6}$

Question	Answer	Marks	Partial Marks
4(a)(iii)	Starting with 8: $1\times4\times3\times2\times1=24$	**B1**	
	Starting with 3, 5 or 7: $3\times4\times3\times2\times2=144$	**M1**	May be considering each case separately, need all three cases for M1
		A1	
	Total = 168	**A1**	
4(a)(iii)	**Alternative** Plan for adding numbers ending in 2 and numbers ending in 8	**M1**	
	Ending in 2: $\left(\frac{1}{6}\times720\right)\times\frac{4}{5}=96$	**B1**	Allow unsimplified
	Ending in 8: $\left(\frac{1}{6}\times720\right)\times\frac{3}{5}=72$	**B1**	Allow unsimplified
	Total = 168	**A1**	
4(b)	${}^{n}C_{3}=6\,{}^{n}C_{2}$	**B1**	$\frac{n(n-1)(n-2)}{3!}$
	$\frac{n(n-1)(n-2)}{3!}=\frac{6n(n-1)}{2!}$	**B1**	$\frac{6n(n-1)}{2!}$
	$n(n-1)\left[(n-2)-18\right]=0$	**M1**	Valid attempt to solve, must have at least one previous B mark
	$n=20$	**A1**	
4(b)	**Alternative** ${}^{n}C_{3}=6\,{}^{n}C_{2}$ $(n-2)!2!=(n-3)!3!$	**B1**	For dealing with $(n-2)!$ and $(n-3)!$ to obtain $(n-2)$
	$(n-2)=6\times3$	**B1**	For dealing with 2! and 3! To obtain 6
	$n=20$	**M1**	Valid attempt to solve, must have at least one previous B mark
		A1	
5(a)	f > 9	**B1**	Allow *y* but not *x*
5(b)	It is a one-one function because of the restricted domain	**B1**	