

Question no:	Question:	Answer:	Marks:
1. a)	trapezium rule	0.646	4
1. b)	How to make answer more accurate?	Use more trapezia with a narrower width over the same interval	1
1. c)	It is difficult to tell whether this value was an overestimate or underestimate. Explain why.	because the curve was both convex and and concave within the interval	2
2.	Z inversely proportional to cube of y $Y \propto 1/x^6$		
	What is the value of .. when	+/-2 What did u get for k?? k I got $48\frac{3}{4}$	
	Fig 1.1,1.2,1.3 or 1.4?	1.1	1
	Proof	Prove that the product of 2 primes isn't always odd $2 \times 3 = 6$	
§	Arrows questions		
	$x^2 = 3x$ so $x=3$	$\leq$	1
	$X > 4 - x^3 > 64$	$\Leftrightarrow$	1
	$x = 45$ so $\tan x = 1$	$\Rightarrow$	1
	Prove that the sum of the squares of any 2 odd numbers is divisible by 2 but not 4	$(2n+1)^2 \times (2m+1)^2$	4

	Periodic sequence questions	$U_1 = 2$ $U_2 = 1/2$ $U_3 = -1$ $U_4 = 2$	2?
	Behaviour of the sequence	Periodic, period of 3	1
	Sum from $n=1$ to $K = 73$, find K	$k=143$ $\sum_{n=1}^{72} U_n$	
	Line normal to curve $y=?$	Simultaneous equation of gradient=13, and plugging coordinates into curve $a=2$ $b=-12$	8
Q6	Binomial Theorem		
a	Given cubic, show that $\frac{1}{4}$ is a root of the equation	$f(\frac{1}{4})=0$	1
b	Given that, split the cubic into a linear and quadratic		
c	Cubic from first bit, but in terms of e^y . Find y , express answer as $k \ln 2$ where k is a constant	$-2\ln 2$ and $3\ln 2$	
Q7	Coordinate geometry		
a	Find x coordinate of B given A and gradient of $AB = 2$	$h=2.5$	2
b	Find the point C given B is the midpoint of AC	(4,13)	
c	The straight line ABC intersect a quadratic (not given		

	c) exactly twice. Find		
	Depth of water trigonometric modelling question		
	Minimum depth	0.8	
	Minimum time for this depth?	$\cos(30t-60)=-1$ $30t-60=180$ $t=8$	
	Time when boat cannot go out	6:50 - 9:10 18:50 - 21:10	5
	Sum to infinity geometric series question	125 Someone please do their workings: $2x+3$, $x+9$, $2x-6$ For G.P, $u_2/u_1 =$ $u_3/u_2...$ $x+9/2x+3 = 2x-6/x+9$ $(x+9)^2 = (2x+3)(2x-6)$ $x^2 + 18x + 81 = 4x^2$ $- 6x - 18$ $3x^2 - 24x - 99 = 0$ $X = 11, -3$ If $x = -3$, then $r =$ $(-3)+9/2(-3)+3 = -2$ But the G.P was convergent, which meant $ r < 1$, so this can't be right. If $x = 11$, then $r =$ $(11)+9/2(11)+3 = \frac{1}{2}$, this works. If $r = \frac{1}{2}$, then $a = 2(11)$ $+3 = 25$ Now sum to infinity = $a/1-r$ $= 25 / 1 - (\frac{1}{2})$	8

		= 125	
		$-2\ln 2$ and $3\ln 2$	
		$h=2.5$	
		C (4,13)	
10d		$k < 14$	4?
11a	Value of x where $5\ln(1-\cos 2x)$ is undefined	$n\pi$ for $n \in \mathbb{Z}$	2?
11b	Find the coordinate of P	$(\pi/2, 5\ln 2)$ $d/dx[5\ln(1-\cos 2x)] = 10\sin 2x/(1-\cos 2x)$ $\sin 2x = 0$ $2x = 2n\pi + \pi$, or $2n\pi$. For $n \in \mathbb{Z}$ reject $2n\pi = 2x$ because of part (a): $n\pi \neq x$ $2x = 2n\pi + \pi$ hence $2x = \pi$ is the smallest positive solution ($n=1$) Hence $x = \pi/2$ $5\ln(1-\cos(2\pi/2)) = 5\ln 2$	4
11c	$d^2/dy^2 + 20e^{-1/5y}$	Was a show that (had to rearrange	5

		$y = 5\ln(1 - \cos 2x)$ $\frac{dy}{dx} = \frac{10\sin 2x}{1 - \cos 2x}$ $\frac{d^2y}{dx^2}:$ $\frac{(20\cos 2x - 20\cos^2 x - 20\sin^2 x)}{(1 - \cos 2x)^2}$ $= \frac{20\cos 2x - 20(\cos^2 x + \sin^2 x)}{(1 - \cos 2x)^2}$ $= \frac{20\cos 2x - 20}{(1 - \cos 2x)^2}$ $= \frac{20(\cos 2x - 1)}{(1 - \cos 2x)^2}$ $= \frac{-20(1 - \cos 2x)}{(1 - \cos 2x)^2}$ $\frac{d^2y}{dx^2} = \frac{-20}{1 - \cos 2x}$ Now $y = 5\ln(1 - \cos 2x)$ $\frac{1}{5}y = \ln(1 - \cos 2x)$ $e^{(y/5)} = 1 - \cos 2x$ $\frac{1}{e^{(y/5)}} = \frac{1}{1 - \cos 2x}$ $e^{-(y/5)} = \frac{1}{1 - \cos 2x}$ $20e^{-(y/5)} = \frac{20}{1 - \cos 2x}$ Therefore $\frac{d^2y}{dx^2} + 20e^{-(y/5)}$ $= \frac{-20}{1 - \cos 2x} + \frac{20}{1 - \cos 2x}$ $= 0$ AS RQ.	
12a	Parametric integration	Was a show that where: Integral of $x \, dy$ $= \int x \left(\frac{dy}{dt} \right) dt$	5
12b	Find the exact area of the curve	25/24	6