NAME _____ INDEX NUMBER _____

SCHOOL _____ DATE _____

AREA APPROXIMATIONS

		· ·
COU	NTING SQUARES TECHNIQUE	Working space
KCSE	1989 – 2012 Form 4 Mathematics	
Answ	ver all the questions	
1.	1999 Q 5 P1	
	The figure below is a map of a forest drawn on a grid	
	of 1 cm squares	
	and the	
	IN X 1 X	
	all x x a	
	KAAAA	
	VXXXX	
	9	
	i. Estimate the area of the map in square centimeters	
	ii. If the scale of the map is $1:50,000$ estimate the	
	area of the forest in hectares	
2.	2000 Q 6 P1	
	The enclosed region shown in the figure below	
	represents a ranch drawn to scale.	
	The actual area of the ranch is 1075 hectares.	
	Estimate the area of the enclosed region in square	
	centimetres	
	$\gamma \rightarrow I = \chi$	
	A = A	
	(a) Calculate the linear scale used	
	(.) Suiteriete interneur boure ubou	

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TRAPEZIOD	ΔΙ								Working space
					working space				
1. 1992 (Q24 P2								
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Distanc (cm)	ce 0	25	50	75	100	125	150	175	
Depth (cm)	100	115	132	156	167	200	163	153	
1) ii) 2. 1993 (Use trap cross-se marks)	ection	al rule	to est					
a) U: ci	se the tra arve y = x	apezoi $x^2 + 1$	dal ru	le to fi	nd the	e area	under	• the	
Fre b) Tl ar 5 The firs log rul	om $x = 1$ he cross- n 18m wo 5.0, 5.4, 7 e cross se st and the c. Estimat e.	to x = section ooden 2.0, 8.0 ectiona e last a te its v	15 us n area log ar , 5.5, 5 al area reas r olume	ing sev is in m e: 5.8, 6.0 as are represe e using	ven str 2 alor equall ent th ; the tr				

							,	Working s	space	
3.	1996 Q 11 P2	alow fo	r tho fur	oction						
	$y = 3x^2 - 8x + 10$									
		X	0	2	4	6	8	10	7	
		у	10	6		70		230		
	Heing the veloce in th	a tabla	and the	t wo n o n o		ula				
	estimate the area bou	ie table inded f	ov the cu	rve	nual r	ule,				
	$y=3x^2 - 8x + 10$ and the	he line	s $y=0,x=0$	0 and x=	=10					
					(31	marks)				
4.	1997 Q 8 P2									
	Use the trapezoidal	rule w	rith inter	vals of 2	1 cm to	D				
	estimate the area of	f the sh	aded reg	gion be	low					
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	0 1 2	3	4 S	6						



	(d) I u	f the inde	trapez r the c	zoidal urve b	rule etwe	is use een x	ed to es = 0 and	timate x = 2, s	the ar state	ea	
	W. OV	heth /er- (estima	te. Giv	give a re a i	an uno reasoi	der- est n for yo	ur ansv	or an wer		
											Working space
6.	20	01(Q 11 P	1							
	A p rec	oarti corde	cle is p ed as sl	roject hown	ed fr in th	rom th ie tabl	ie origi le belov	n. Its sp v	eed v	vas	
	Tim (sec	ne C)	0	5 1	0	15	20	25	39	35	
	Spe (m/	ed ′s)	0	2.1 5	5.3	5.1	6.8	6.7	4.7	2.6	
	Use t cove	the t red	rapezo by the	oidal r partic	ule to le wi	o estii ithin t	mate th he 35 s	e dista econds	nce		
7.	20 The	02 (tabl	Q 21 P e belov	2 w sho	ws th	ne valı	ues of x	and			
	corre	espo	nding	value	s of y	y for a	given c	urve.]	
		0	π	π		π	π	<u>5</u> π			
			12	0		+ 	3	12	۲ <u>۲</u>		
	У	0	0.26	0.4	8 (0.65	0.76	0.82	0.84	ł	

the values in the table only to estimate the area enclosed by the curve, x - axis and the line x = $^{3}/_{2}$ to four decimal places. (Take π = 3.142) b) The exact value of the area enclosed by the curve is known to be 0.8940. Find the percentage error made when the trapezium rule is used. Give the answer correct to two decimal places. Working space 8. 2006 Q 16 P1 A circle centre 0, ha the equation x ² + y ² = 4. The area of the circle in the first quadrant is divided into 5 vertical strips of width 0.4 cm (a) Use the equation of the circle to complete the table below for values of y correct to 2 decimal places. $\overline{\frac{X 0 0.4 0.8 1.2 1.6 2.0 }{Y 2.00 1 1.60 0 0}} \begin{pmatrix} 1 \\ mark \end{pmatrix}$ (b) Use the trapezium rule to estimate the area of the circle (3 marks)		а) Use t	he trap	ezium	rule wit	h sever				
8. 2006 Q 16 P1 A circle control 0, and the quation $x^2 + y^2 = 4$. The area of the circle in the first quadrant is divided into 5 vertical strips of width 0.4 cm (a) Use the equation $x^2 + y^2 = 4$. The area of the circle in the first quadrant is divided into 5 vertical strips of width 0.4 cm (a) Use the equation of the circle to complete the table below for values of y correct to 2 decimal places $\overline{X + 2.00} = 1.60 = 0.2$ ($1.0 = 1.60 = 0.2$ ($1.0 = 1.60 = 0.2$ ($3.0 = $			the v	alues ir	the ta	ble only	to esti				
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X 0 0.4 0.8 1.2 1.6 2.0 Y 2.00 1 1.60 0 (1 mark) (b) Use the trapezium rule to estimate the area of the circle (3 marks)			below	for valu	ues of y	/ correct	to 2 de	ecimai	places		
Y 2.00 1.60 0 (1 mark) (b) Use the trapezium rule to estimate the area of the circle (3 marks)		X	0	0.4	0.8	1.2	1.6	2.0]		
(b) Use the trapezium rule to estimate the area of the circle (3 marks)		Y	2.00			1.60		0	(1		
(b) Use the trapezium rule to estimate the area of the circle (3 marks)									mark)		
circle (3 marks)		ſŊ) Use th	e trane	zium r	ule to es	imate	the are	a of the		
		(0)	circle	e trupe			linate	(3	8 marks)		

9.	2007 Q 24 P1 The diagram on the grid below represents as extract of a survey map showing two adjacent plots belonging to	Working space	
	rash vey map showing two adjacent plots belonging to Kazungu and Ndoe.		
	$\begin{array}{ c c c c c } \hline \mathbf{X} & \mathbf{y}_1 & \mathbf{y}_2 \\ \hline \end{array}$	7	

	0 0 1 4 0.2 2 5.7 0.6 3 6.9 1.3 4 8 2.4 5 9 3.7 6 9.8 5.3 7 10.6 7.3 8 11.3 9.5 9 12 12	
	On the grid provided above draw and label the boundaries as claimed by Kazungu and Ndoe (2 marks)	Working space
10.	 2011 Q 21 P1 a) Using the trapezium rule with seven ordinates, estimate the area of the region bounded by the curve y = -x² + 6x + 1, the lines x=0, y=0 and x=6. (5 marks) b) Calculate i) the area of the region in a) above by integration: (3 marks) ii) the percentage error of the estimated area to the actual area of the region, correct to two decimal places. (2 marks) 	

MID-ORDINATE	Working space
1. 1995 Q 16 P2 The shaded region below represents a forest. The region has been drawn to scale where 1 cm represents 5 km. Use the mid – ordinate rule with six strips to estimate the area of forest in hectares.(4 marks)	

2.	1996 Q 21	P1			
		11			
	I ne table be $u = v^2 + 2v$	elow snows some v	values of the function		
	y - x + 2x -	3			
	x	v			
	-6	21			
	-6.75	18.56			
	-5.5				
	-5	14.06			
	-4.75				
	-4.5	10.06			
	4.25	8.25			
	-4.0				
	-3.75	5			
	-3.75				
	-3.5	2.25			
	-3.25	1.06			
	-3	0			
				Working space	
	a) Complete	the table			
	b) Using the	completed table a	and the mid- ordinate		
	rule with	six ordinates, estir	mate the area of the		
	region bo	unded by the $y = x$	$x^2 + 2x - 3$ and the line		
	y = 0, x = -	6 and x = -3	(3 marks)	
	(i) By it	togration find the	actual area of the		
		n in (h) shove	(2 marks)		
	(ii) Calcul	late the nercentage	e error arising from the		
	estima	te in (b)	(2 marks)		
			()		
3.	2003 Q 20	P1			
	The diagram	n below is a sketch	to of the curve $y = x^2 + 5$.		
	1-23	25	v=x ² +5		
	1		/		
	× 1		1		
		/			
	+				
	8	-			
	1				
			Sector Sector		
	0		3		
	ंदेवी.		32-232/5		
	a) i) Use	the mid -ordinate	rule, with six strips to		
	estimate	e the area enclosed	d by the curve, the		

	x – axis and the y	- axis a	nd	line 2	x =3					
	ii)Calculate the same a	ea usii	1g tł	ne in	teg	ration				
	mathad		U		0	()r	narka)			
	b) Assuming the area	calcula	ted	in (a) (i :	i) is	liai KS J			
	exact, calculate th	e perce	enta	ge er	ror	made	when			
	the mid – ordinate	e rule i	s use	ed.						
4.	2004 Q 11 P1									
	The table below shows	some v	zalu	es of	the	e functi	on			
	$y = x^2 + 3$									
	X Y									
	0 3									
	1									
	4 4									
	1 ¹ / ₂ $5^{1}/_{4}$									
	2 7									
	$\frac{2^{-}/_{2}}{3}$ 12									
	$\frac{3^{1}}{3^{1}}$ $\frac{12}{15^{1}}$									
	4 19									
	$\frac{4^{1}}{2}$									
	5 28 $5^{1}/_{-}$									
	6 39									
]							
									Wo	orking space
	a) Complete the table									
	b) Use the mid – ordina	ate rule	e wit	th siz	k or	dinates	s to			
	estimate the area bo	unded	by	y = 2	x ² +	3, the y				
	– axis, the x – axis an	d the li	ine y	x = 6						
5	2005 O 20 P1									
	The table below gives s	some o	f the	e valı	ıes	of x for				
	the function $y=\frac{1}{2}x^2 + 2$	2x + 1 i	n th	e int	erv	al 0≤ x	≤ 6.			
				1	2	2	4		(]
		X	0	1	Z	3	4	5	6	
		у	1	3.	7	11.5	17	23.5	31	
				5						
]			
	(a) Use the values in th	e table	to d	raw						
	the function									
	(b) (i) Using the graph	and th	ne m	id –						
	ordinate rule with	SIX (6)	stri	ps, e	stir	nate th	e -			
	axis and the line =	6	e, u	IC Y-	алl	s, the y	-			
	(ii) If the exact area	of the	reg	ion c	leso	cribed i	n (b)			

	 (i) above is 78cm², calculate the percentage error made when the mid – ordinate rule is used. Give the answer correct to two decimal places (2 marks) 	
6.	2008 Q 18 P1 The figure below is a sketch of the curve whose equation is y=x ² +x+5. It cuts the line y=11 at points P and Q. year (year)	
7.	 2009 Q 24 P1 (a) On the grid provided, draw a graph of the function y = ½ x² - x + 3 for 0 ≤ x ≤ 6. (b) Calculate the mid - ordinates for 5 strips between x = 1 and x=6, and hence use the mid- ordinate rule to approximate the area under the curve between x = 1,x=6 and the x - axis. (3 marks) (c) Assuming that the area determine by integration to be the actual area, calculate the percentage error in using the midordinate rule. (4 marks) 	Working Space
	27	12

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0722614502/0733494581 All subjects, All topics available

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INTEGRATION		Working space
1.	1992 Q22 P1	
	a) The gradient of the curve $y = ax^2 + bx$ at the origin is equal to 8. Find the values of a and b if the curve has a maximum point at $x = 4$ (5 marks)	
	 b) Determine the area bounded by the lines x=0, x=6, y=0 and the curve y=ax²+bx, for the values of a and b obtained in part (a) (3 marks) 	

2.	1994 Q6 P2 Determine the area bounded by the curve y=x ² - 4, the x axis and the line x=4 (4 marks)	
3	3. 1995 Q 7 P1 Find the area enclosed by the curve y=4x -x ² , the x- axis and the lines x=1and x=2 (3 marks)	Working Space
4.	1996 Q 8 P2 Find the area bounded by the curve y= 2x ³ -5, the x-axis and the lines x=2 and x=4	

5.	1998 Q 20 P2 (a) Find the value of x at which the curve $y=x^2-2x-3$ crosses the x- axis(2 marks)	
	(b) Find	
	$\int (x^2 - 2x - 3) dx$	
	c) Find the area bounded by the curve $y = x^2 - 2x - 3$, the axis and the lines $x= 2$ and $x = 4$	
		Working Space
6.	2000 Q 21 P2 The curve of the equation $y = 2x + 3x^2$, has $x = -2^3/3$ and $x = 0$ and x intercepts. The area bounded by the axis $x = -2^3/3$ and $x = 2$ is shown by the sketch below.	
	o Y-aris	
	©Pyramid Assignments 0722614502 /073 349	15 4581 All subjects, All topics available

	 Find: (a) ∫(2x + 3 x²) dx (b) The area bounded by the curve x - axis, x = -²/₃ and x =2 	
7	 2006 Q 24 P2 The diagram below shows a sketch of the line y = 3x and the curve y = 4 - x² intersecting at points P and Q. a) Find the coordinates of P and Q (b) Given that QN is perpendicular to the x- axis at N, calculate (i) The area bounded by the curve y = 4 - x², the x- axis and the line QN (2 marks) (ii) The area of the shaded region that lies below the x- axis (iii) The area of the region enclosed by the curve y = 4-x², the line y - 3x and the y axis 	
	2005 0 20 22	Working Space
ð	2007 Q 20 P2 The gradient function of a curve is given by the expression 2x + 1. If the curve passes through the point (-4, 6); (a) Find: (i) The equation of the curve (3 marks) (ii) The values of x, at which the curve cuts the x- axis (b) Determine the area enclosed by the curve and the x- axis (4 marks)	