c)	Use the graph drawn above in (b) to det	ermine the maximum possible profit that c	can be
	made.	(2 marks)	

NAME:

121/2
MATHEMATICS
PAPER 2
July/August 2015
$2\frac{1}{2}$ Hours

NAROK SOUTH SECONDARY SCHOOLS JOINT EXAMINATION Kenya Certificate of Secondary Education (K.C.S.E) MATHEMATICS Paper 2 $\frac{1}{2}$ $\frac{1}{2}$

INSTRUCTIONS TO CANDIDATE

- Write your name and index number in the spaces provided at the top of this page.
- This paper contains two sections: Section \hat{A} and \hat{B} . •
- Answer all the questions in Section A and any five questions from Section B. •
- each question.
- Marks may be given for correct working even if the answer is wrong. •
- •

FOR EXAMINER'S USE ONLY

SECTION A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION B

17	18	19	20	21	22	23	24	TOTAL

This paper consists of **16** printed pages. Candidates should ensure that all pages are printed as indicated and no questions are missing.

..... INDEX NO:.....

Show all the steps in your calculations, giving your answers at each stage in the spaces below

Non-programmable silent electronic calculators and KNEC Mathematical tables may be used.

GRAND TOTAL



SECTION A Answer all the questions in this section.

The length and breadth of a rectangular paper were measured to the nearest centimeter and 1. found out to be 18cm and 12cm respectively. Find the relative percentage error of its area. (2 marks)

A circular ring of radius 60cm is cut and shaped into a rectangle such that the length of the

rectangle is twice its width. Find the area of the rectangle correct to 1 d.p.

A private college offers two types of courses: Technical course and business course. The college 24. of Kshs 6,000 per business student and Kshs 4,000 per technical student. Form all the linear inequalities which represent the above information. a)

On the grid, draw all the inequalities and shade the unwanted region. b)



2.

$$2 x - y = 3$$
$$x^{2} - x y = -4$$

(3 marks)

(3 marks)

has a capacity of less than 20 students. There must be more technical students than business students. The number of business students must be more than three and the number of technical students must not be more than 12 in order for the college to operate. The college makes a profit

(4 marks)

(4 marks)



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Data collected from an experiment involving two variable x and y was created as shown in the 23. table below.

x	11	1.2	1.3	1.4	1.5	1.6
у	-0.3	0.5	1.4	2.5	3.8	5.2

By drawing a suitable line graph, estimate the values of a and b.

Write down the relationship connecting y and x.

The variables are known to satisfy a relation of the form $y = ax^3 + b$ where a and b are constants.

For each value of x in table above, write down the value of x3 correct to 2 d.p.(2 marks) a)

4.

Solve for x in log (3x + 4) - log (3 - x) = 15.

Expand and simplify $(1-x)^6$ 6.

1 1 1 1 1 1 1 1 1 1	Mathematics	121/2
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b)

c)

(7 marks)

(1 mark)

Given that $\sqrt{2} = 1.471$ and $\sqrt{2} = 1.743$, evaluate without using a calculator $\frac{3}{\sqrt{3} - \sqrt{2}}$ (3 marks)

(3 marks)

(1 mark)

			22. a)	Comple	te the t	table be	elow, gi	ving yo	our valı	ies cor	rect to	2 decir	nal pla	ce.	(2 ma	ırks)
7.	The area of triangle ABC is 4.2cm ² . The triangle ABC is transformed using the mat	rix	X	00	15 ⁰	30°	45 ⁰	60°	75 ⁰	90 ⁰	105°	1200	135°	150°	165°	180°
	$\begin{pmatrix} -3 & -4 \\ -3 & -4 \end{pmatrix}$ Calculate the area of the image of triangle ABC.	(3 marks)	$\cos 2x$	1.00	0.97	50	0.00	0.50	15	1.00	0.97	0.50	155	0.50	0.07	1.00
	$\begin{pmatrix} 2 & 2 \end{pmatrix}$		$\sin(x+20)$	1.00	0.87		0.00	-0.50		-1.00	-0.8/	-0.50		0.50	0.87	1.00
				0.50	0.71		0.97	0.10		0.87	0.71	0.42		0.00		
			b) (On the g	grid bel	low and	l using	same a	ixes, the	e graph	s of y	$= \cos 2$	x and	y = sin	ı (x - 30	0°) for
				$5 \le x \le T$	ale, 1cr	n for 1	50 on x	- axis								
																++++++
0		, . .														
8.	A plot of land was valued at Kshs 600,000 at the start of 2005. It appreciated by 249	6 during														
	a) the value of the land at the start of 2006.	(1 mark)														
	b) the value of the land at the end of 2008.	(2 marks)														
		(2 marks)														
9.	Solve the equation cos $(2x-10^\circ) = 0.64 \text{ for } 0^\circ \le x \le 180^\circ$	(2 marks)	c) Find the	e period	of the	curve y	$v = \cos \theta$	2x							(1 ma	.rk)

Using the graph n part (b) above, estimate the solutions to the question. d) $\sin(x+30) = \cos 2x$

Complete the table below giving your values correct to 2 decimal place

(2 marks)



(2 marks)

 $12x^2 + ax - 6a$ $9x^2 - 4a$

21. The table below shows marks scored by students in Maths end term exam.

Marks scores	20-29	30 - 39	40 - 49	50 - 59	60 - 69		
Number of students	5	11	20	14	10		

Draw a cumulative frequency curve on the grid provided. (5 marks) a)



Using the curve drawn in (a) above, determine; b) i) The quartile deviation range.

(2 marks)

ii) The percentage of students who passed the test if a student had to score more than 46 marks in order to pass the test.. (3 marks)

Factorize and simplify the expression. 10.

$$\frac{12x^2 + ax - 6a}{9x^2 - 4a^2}$$

11. A solid metal sphere of radius 8.4cm was melted material used to make a cube. Find to 3 significant figures the length of the side of the cube.

12.

(3 marks)

(2 marks)

A point of $P(30^{\circ}S, 45^{\circ}E)$ and point $Q(30^{\circ}S, 55^{\circ}W)$ are on the surface of the earth. Calculate the shortest distance along a circle of latitude between the two points. (Radius of earth =6370) (3 marks)



-2 -4 -3 -2 -1 -1 -3 -4 -5 1





i) the size of the angle between the lines FC and FH. b)

4cm

ii) the size of the angle between the line AB and FH.

A and B are two matrices. It $A = \begin{pmatrix} 3 & -2 \\ -4 & 1 \end{pmatrix}$ find B given that $A^2 - A^T = B$ 14. (3 marks)

(3 marks)

20.

the size of the angle between the planes ABHE and the plane FGHE. c)



G



-5

The figure below represents a cuboid ABCDEFGH in which FG = 4cm, GH = 6cm and HC =

(3 marks)

(2 marks)

(2 marks)

(3 marks)

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- Use a ruler and a pair of compass only for all the construction in this question. A triangular plot 19. of land ABC is such at that AB = 280 cm, AC = 300 m and angle $BAC = 75^{\circ}$.
 - Construct this plot of land using the scale 1cm rep 50m. (4 marks) a)

15. previous one by Ksh. 800. If he started by depositing Ksh 4,000, how much will he have deposited in 16 months.

- 16. Determine;
 - the coordinates of A. a)

A borehole P is equidistant from side BA and BC and lies on the perpendicular from b) point C to side AB. Locate the position of P. (4 marks)

> the radius of the circle. b)

Find the shortest distance in km from the borehole P to side AC. c)

(2 marks)

c)

A man deposited his money in a saving bank on a monthly basis. Each deposit is exceeds the (3 marks)

The points which coordinates (5,5) and (-3,-1) are the ends of a diameter of a circle centre A.

(1 mark)

(1 mark)

the question of the circle in the form $x^2 + y^2 + ax + by = 0$ where a,b and c are constants. (2 marks)

SEC	TION I	I	18.	M is the mid-point of the side AB of a triangle O
(Ans	wer any	v five questions		produces cuts OB at Q. If $\overrightarrow{OA} = \underline{a}$. $\overrightarrow{OB} = \underline{b} = and$
17.	A cot a)	 ffee merchant mixes two blend of coffee; priced at sh. 50 and sh. 75 per kg in the ratio 3:2 by weight. i) Find the profit if he sells the mixture at shs. 80 per kg. (3 marks) 		i) \overline{AB}
				ii) <u>QM</u>
		 ii) The price of the sh. 50 coffee goes up by 110%. If by selling the mixture by shs. 90 per kg., the merchant intends to make the same percentage profit as before, find the ratio in which he has to mix the two blends. (3 marks) 		iii) \overrightarrow{OP}
	b)	Local sugar cost sh. 40 per kg while imported sugar costs shs 24 per kg. A dealer mixes the two types of sugar to get a mixture worth Sh. 30 per kg. Calculate the ratio of the local to imported sugar in the mixture. (4 marks)		iv) \overrightarrow{AP}
				v) Use the fact that $\overrightarrow{QP} = rAP$ to find r a

OAB. P lies on \overrightarrow{OM} such that $\overrightarrow{OP} = \frac{2}{3}$ OM and AP and also $\overrightarrow{OQ} = \overrightarrow{KOB}$, express in terms of <u>a</u> and <u>b</u>;

r and K.

(4 marks)