

NAMEINDEX NO.

CANDIDATE SIGN.....

DATE

GATUNDU SOUTH JOINED EVALUATION EXAMINATION**121/2****MATHEMATICS PAPER 2****JULY/AUGUST 2016****TIME: 2 ½ HOURS****INSTRUCTIONS TO CANDIDATES**

- Write your name and index number in the spaces provided above
- Sign and write the date of exam in the space provided above.
- This paper consists of two section : section I and section II
- Answer all questions in section I and Only Five questions form section II
- All answers and working must be written on the question paper in the space provided below each question.
- Show all the steps in your calculation.
- Marks may be given for correct working even if the answer is wrong.
- Non –programmable silent electronic calculators and KNEC maths tables may be used except where stated otherwise.

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

Section II

17	18	19	20	21	22	23	24

GrandTotal

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SECTION I 50 MARKS.

1. Solve for y in the equation.
 $2\text{Log}_{10}y + \text{Log}_{10}5 = \text{Log}_{10}10 + 2\text{Log}_{10}4.$ (3mks)

2. Make W the subject of the formulae (3mks)

$$g = \frac{w}{d} \sqrt{\left[\frac{b^2 - k^2}{W} \right]}$$

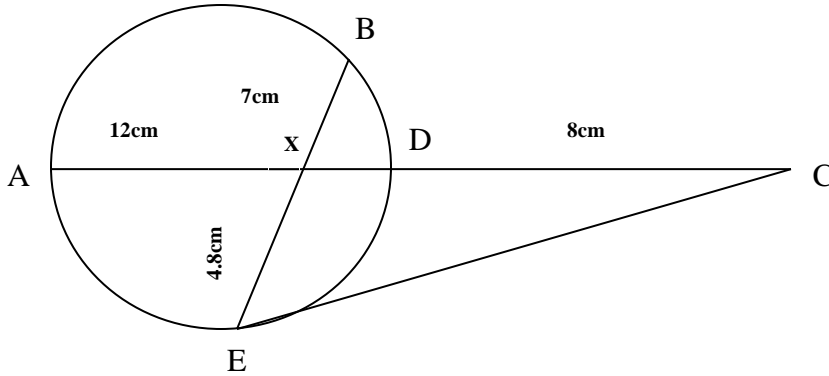
3. Simplify $\frac{6}{\sqrt{5} - \sqrt{3}} - \frac{4}{\sqrt{5} + \sqrt{3}}$ giving your answer in the form $\sqrt{a} + b\sqrt{c}$ where a , b and c are constants. (3mks)

4. In a maths test, the scores of 10 form 4 students we as follows.
70,65,64,61,57,57,55,54,52 and 45. Calculate the standard deviation of the scores. (4mks)

- 5(i) Expand and simplify $(1 - 3x)^5$ up to the term in x^3 . (2mks)

- (ii) Hence use your expansion to estimate $(0.97)^5$ correct to 4 decimal places. (2mks)

6. In the figure above EC is a tangent to the circle at E. AXDC and BXE are straight lines. AX = 12cm, DC = 8cm, EX = 4.8cm and XB = 7cm. Find the length of;



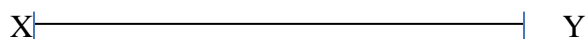
- (a) XD. (2mks)

- (b) EC (2mks)

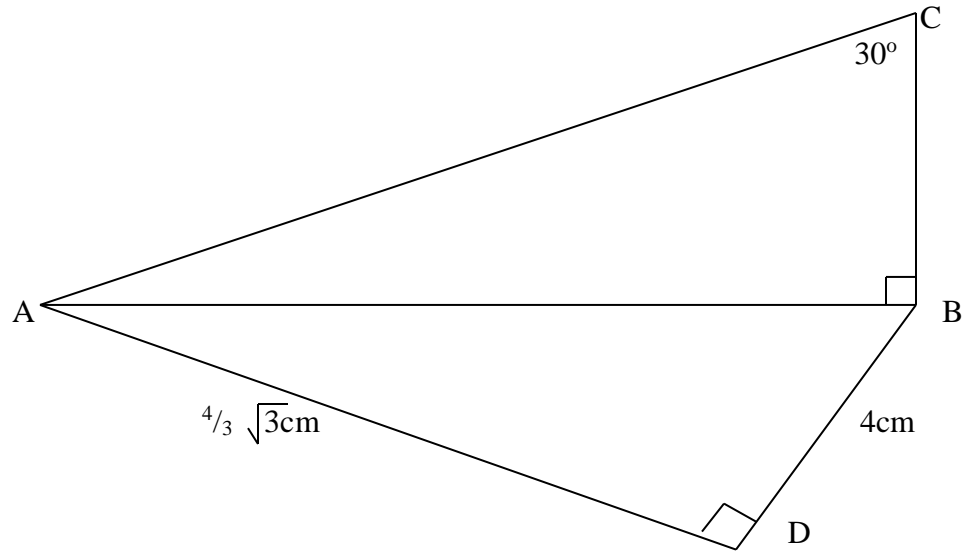
7. A bag contains 7 green and 5 red tennis balls. Two are drawn without replacements. Find the probabilities that

- (a) Both are green. (1mk)

- (b) At least one is green. (2mks)
8. The length and breadth of a sheet of metal are measured to the nearest centimeter and recorded as 25.0cm and 16cm respectively.
- (a) Find the maximum possible error in the area of the sheet. (1mk)
- (b) Calculate to one decimal place the percentage error in the area of the sheet. (2mks)
9. Given that line $XY = 6.5\text{cm}$ construct the locus of P such that $\angle XPB = 90^\circ$. (2mks)



10. In the figure below $\angle ACB = 30^\circ$, $\angle ABC = \angle ADB = 90^\circ$, $AD = \frac{4}{3}\sqrt{3}$ and $DB = 4\text{cm}$. Calculate the length of ;



- (a) AB (1mk)

- (b) CB . (2mks)

11. The equation of a circle is given by $4t^2 + 4s^2 - 8t + 20s - 7 = 0$. Determine the co-ordinates of the centre and radius of the circle. (3mks)

12. Given that $\tan 65^\circ = 3 + \sqrt{5}$, without using tables or a calculator determine $\tan 25^\circ$. (3mks)

13. In a transformation, an object with an area of 10cm^2 is mapped onto an image whose area is 60cm^2 . Given that the matrix of the transformation is $\begin{pmatrix} y & y-1 \\ 2 & 4 \end{pmatrix}$, find the value of y . (3mks)

14. A cube of copper was found to have a mass of 0.630kg. What are the dimensions of the cube?
Given that the density of copper is 8.94g/cm^3 find its volume. (2mks)

15. A staff canteen at a military camp is open as shown in the schedule below.

	Monday to Friday	Saturday	Sunday
Opening time	0645 h	0730 h	0845 h
Closing time	1730 h	1730 h	1200 h

An employee who operates the canteen is paid a kshs 25 per hour at the shop. How much is her weekly pay. (3mks)

16. Under enlargement A(1,3) is mapped onto A1 (4,4) and C (5,1) is mapped onto C1 (12,0) determine the centre and linear scale factor of the enlargement. (4mks)

ATTEMPT ANY FIVE QUESTIONS

SECTION II (50 MARKS)

17. Mr. Kamau has two children whose age difference is 5 years. Twice the sum of the ages of the two children is equal to the age of the parent.
- (a) Taking y to be the age of the elder child, write an expression for:
- (i) The age of the younger child. (1mk)
- (ii) The age of the parent. (1mk)

- (b) In twenty years time, the product of the children's ages will be 15 times the age of their parent.
(i) Form an equation in y and hence determine the present possible ages of the elder child. (4mks)

- (ii) Find the present possible ages of the parent. (2mks)

- (iii) Determine the possible ages of the young child in 20 years time. (2mks)

18. The table below shows income tax rate for a certain year.

Monthly income in Kenya shillings (Kshs)	Tax rate in Kenya shillings per pound.
0 – 10 164	2
10 165 – 19 740	3
19 741 – 29 316	4
29 317 – 38 892	5
Over 38 892	6

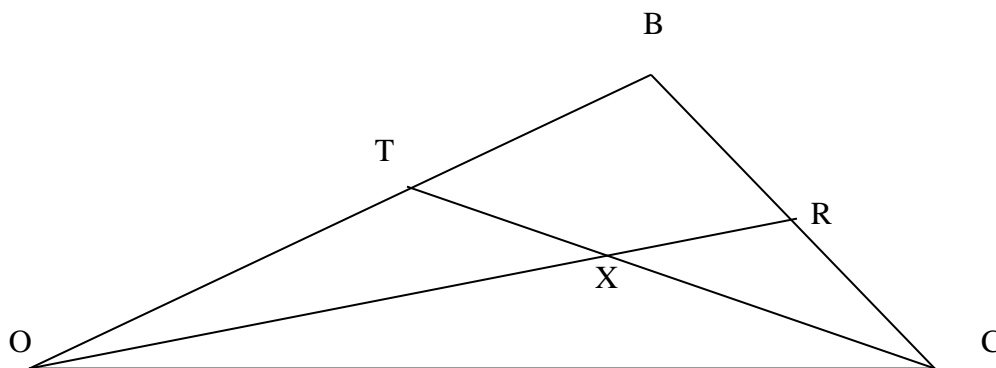
A tax relief of Kshs 1162 per month was allowed. In a certain month, of that year, an employee's taxable income in the fifth band was Kshs 2108.

- (a) Calculate
- (i) the employee's total taxable income in that month. (2mks)

- (ii) The tax payable by the employee in that month. (5mks)

- 18(b) The employee's income included a house allowance of Kshs 15 000 per month. The employee contributed 6% of basic salary to a co-operative society. Calculate the employees net pay for that month. (3mks)

19. In the figure below OBC is a triangle in which $OT = \frac{3}{4} OB$ and $BR:RC = 2:1$. Line OR and TC meets at x



- (a) Given that $\underline{OB} = \underline{b}$ and $\underline{OC} = \underline{c}$. Express the following vectors in terms of \underline{b} and \underline{c} .
- (i) \underline{BC} (1mk)

(ii) OR (2mks)

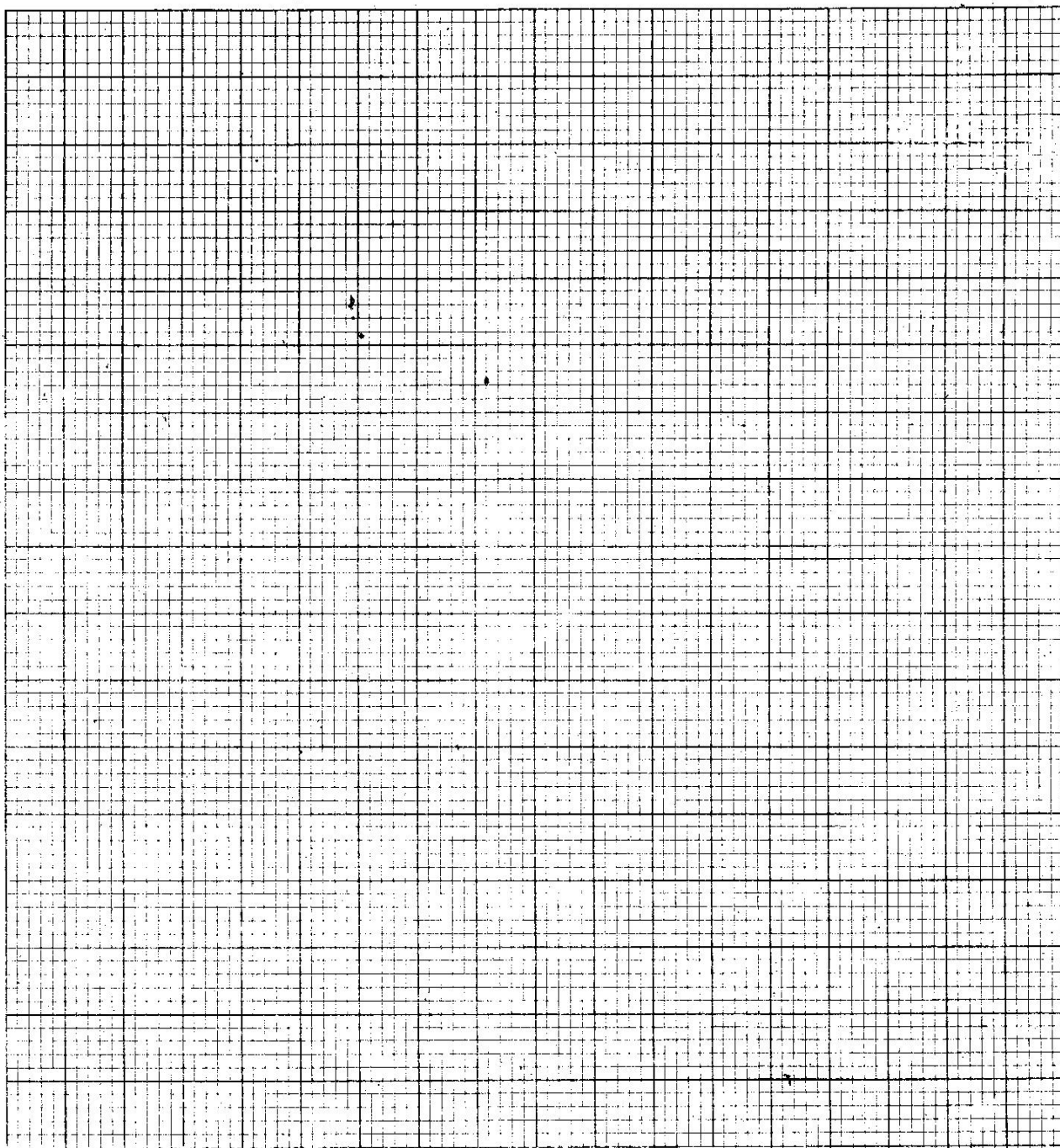
(iii) TC (1mk)

(b) Given further that $TX = m TC$ and $OX = n OR$, Determine the values of m and n (6mks)

20(a) Complete the table below for the functions $y = \sin x$ and $y = 2 \sin (x + 30^\circ)$ for $0^\circ \leq x \leq 360^\circ$

X	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Sinx	0	0.5	0.87		+0.87	0.5	0		-0.87	-1		-0.5	0
$2\sin(x+30^\circ)$	1		2	1.73		0	-1	-1.73		-1.73	-1	0	1

(b) On the same axis, draw the graphs of $y = \sin x$ and $y = 2\sin (x+30)$ for $0^\circ \leq x \leq 360^\circ$ (4mks)



20c(i) State the amplitude of the graph $y = 2\sin(x + 30)$ (1mk)

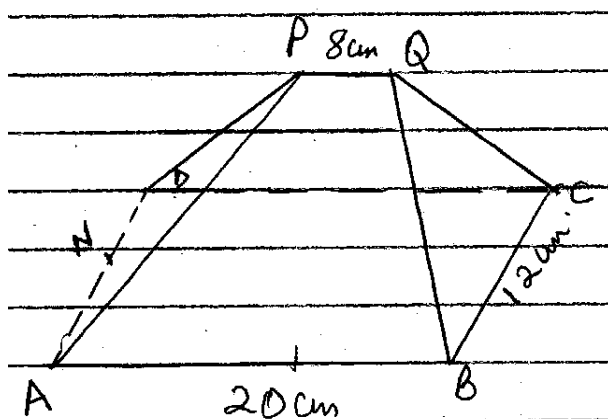
(ii) State the period of the graph $y = \sin x$. (1mk)

(iii) Use your graph to solve.

$$\sin x - 2 \sin(x + 30) = 0$$

(2mks)

21. The figure below shows a plan of a roof with a rectangular base ABCD, $AB = 20\text{cm}$ and $BC = 12\text{cm}$. The edge $PQ = 8\text{cm}$ and is centrally placed. The faces ADP and BCQ are equilateral triangles. N is the mid-point of AD.



Calculate to 2 d.p

(a) The length of PN. (2mks)

(b) The height of P above the base ABCD. (3mks)

21c) The angle between ABQP and ABCD. (2mks)

(d) The obtuse angle between the lines PQ and DB. (3mks)

22. The first three terms of a geometric series are: $2x$, $x - 8$, and $2x + 5$ respectively.

(a) Find the possible values of x .

(4mks)

(b) For the value of x being an integer, find:

(i) The value of the eleventh term

(3mks)

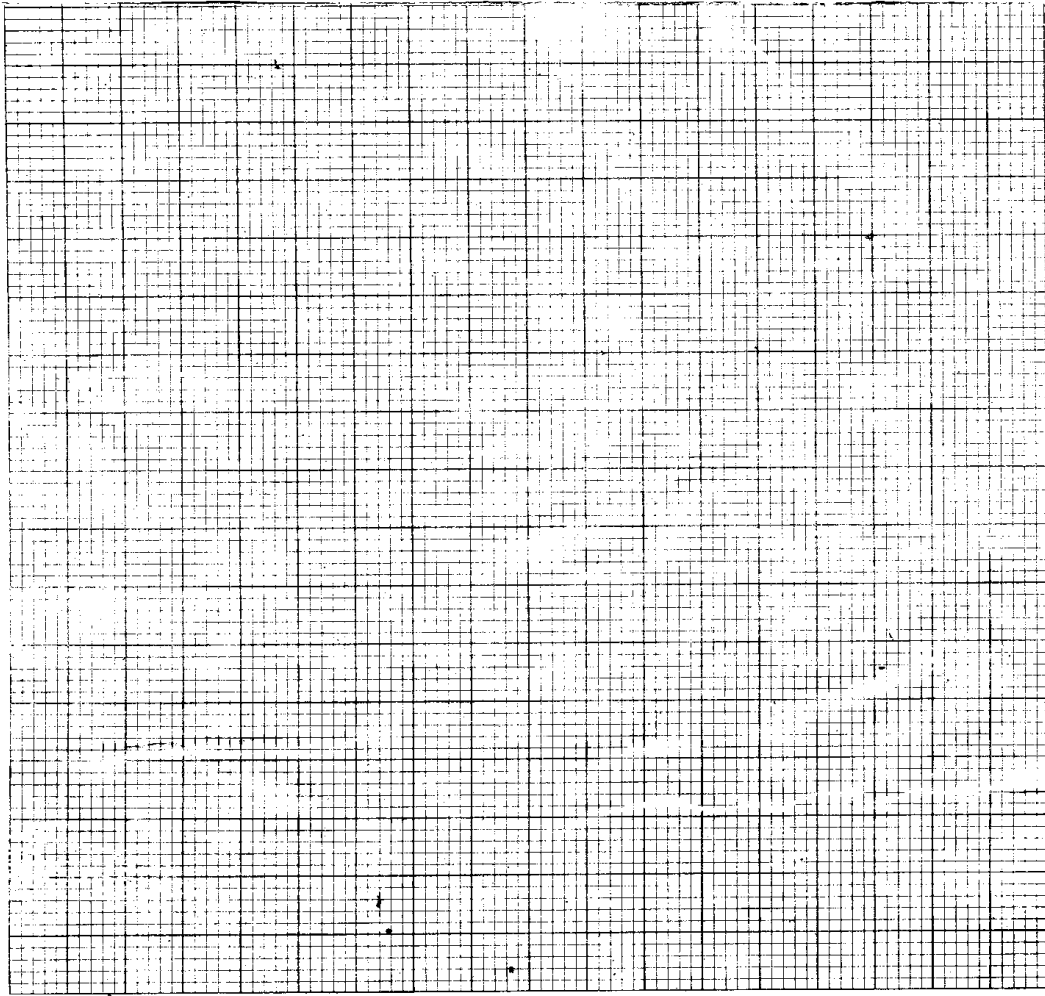
(ii) The sum of the first 15 terms.

(3mks)

23. The table below shows the distribution of marks of 100 form four students in a mathematics examination.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
No. of student	2	8	15	18	17	14	10	8	6	2

(a) Using a suitable scale, draw a cumulative frequency curve to represent the above information on the provided grid (4mks)



(b) Using your graph estimate the

(i) median

(1mk)

(ii) Semi-inter quartile range

(3mks)

(iii) Number of students who passed if pass mark was 43% (2mks)

24. An aircraft leaves town P(30°S , 17°E) and moves directly northwards to Q (60°N , 17°E). It then moved at an average speed of 300 knots for 8 hours westwards to town R. Determine

(a) The distance PQ in nautical miles. (2mks)

(b) The position of town R. (4mks)

c) The local time at R if local time at Q is 3.12pm. (2mks)

(d) The total distance moved from P to R in kilometers. (take $1\text{nm} = 1.853\text{km}$) 2mks)