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121/2
MATHEMATICS
PAPER 2
JULY/AUGUST- 2014
TIME: $21 / 2$ HOURS

Candidate's Signature
Date:
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## RACHUONYO SOUTH DISTRICT JOINT EVALUATION EXAM

## Kenya Certificate of Secondary Education (K.C.S.E.)

121/2
Mathematics
Paper 2
$21 / 2$ Hours

## INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided at the top of the page.
- The paper contains two sections; section I and II.
- Answer all the questions in section I and any five questions from section II.
- All answers and working Must be written on the question paper in the spaces provided below each question.
- Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.
- Mark may be given for correct working even if the answer is wrong. .


## For Examiners Use Only

## Section I

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
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## Section II

| Question | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Total |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |  |  |  |

This paper consists of 16 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

## SECTION $R^{R}(50$ MARKS)

## Answer all questions in this section in the spaces provided.

1. Use logarithms in all steps to evaluate.

$$
\frac{2.53^{2} \times 83.45}{\sqrt{0.4562}}
$$

2. By using completing square method, solve for $x$ in $4 x 2-3 x-6=0$
3. Make p the subject in $\mathrm{T}=\sqrt[3]{\frac{p^{2}+n}{m^{2}}}+R$
(3mks)
4. If $\frac{\sqrt{14}}{\sqrt{7}-\sqrt{2}}-\frac{\sqrt{14}}{\sqrt{7}+\sqrt{2}}=\mathrm{a} \sqrt{7}+\mathrm{b} x^{2}{ }^{\text {e }}$

Find the value of $a$ and $b$ where $a$ and $\&$ are rational numbers.
5. $e^{(a)}$ (a) Find the first three terms in ascending powers of $x$ of $(2-x)^{5}$
(b) Hence find the value of the constant $K$, for which the coefficient of $x$ in the expansion of ( $k+x$ ) $(2-\mathrm{x})^{5}$ is -8
(2mks)
6. $\mathrm{OA}=3 \mathrm{i}+4 \mathrm{j}-6 \mathrm{k}$ and $\mathrm{OP}=\mathrm{I}+15 \mathrm{k}$. P divides AB in the ratio $3-2$. Write down the coordinates of B.
7. Solve the following equation giving answer if degrees for $0^{\circ} \leq x \leq 360^{\circ}$ $5-4 \operatorname{Cos} 2 x=4 \sin x$
8. Find the relative error in the area of a parallelogram whose base is 8 cm and height 5 cm . (3mks)
9. Three people A, B and C can do a piece of work in 45 hours, 40 hours and 30 hours respectively. How long can B take to complete the work when he starts after A and C have worked for 13 hours each.
(3mks)
10. Two line $x+2 y=-1$ and $2 x+3 y=3$ interse of at point T. Find the equation of circle $T$ and radius 5 units giving your answer in the form $\left.\mathrm{x}^{2}+\mathrm{x}\right)+\mathrm{g}+\mathrm{fy}+\mathrm{c}=0$ where g , f , and c are constants. (3mks)
11. The figure below shows a square based pyramid $\mathrm{ABCD} . \mathrm{AV}=\mathrm{BV}=\mathrm{DV}=18 \mathrm{~cm} . \mathrm{AB}=10 \mathrm{~cm}$. calculate the angle between the planes BVC and AVD

## Diagram

12. Find the equation of the normal to the curve $y=x^{3}-2 x^{2}+3 x-1$ at part $(2,5)$
13. The figure below shows a circle with centre $O$ and diameter $A B$ is parallel to $C D$. Given that $A B=$ 8 cm and Chord CD is 6 cm . Calculate the distance of the chord from O to a significant figure. ( 2 mks )
14. A quantity P varies partly as the cube of Q add partly varies inversely as the square of Q . when $\mathrm{Q}=2, \mathrm{P}=108$ and when $\mathrm{Q}=3, \mathrm{P}=25 \mathrm{q}$.find the value of P when $\mathrm{Q}=6$.
15. Solve for y in the following equation below:

$$
\log _{4} y+\log _{y} 4=2
$$

16. The data below shows marks scored by 8 form four students in Rachuonyo district mathematics contest. 44,32,71,52,28,39,46,64. Calculate the mean absolute deviation

## Answer any five questionf in this sections in the spaces provided.

17. The table below show income tax rates $\sigma^{5}$

$\mathrm{An}_{\text {employee exams a monthly basic salary of sh. 30,000 and is entitled to taxable allowances }}$ announting to Ksh. 10,480.
(a)eCalculate the gross income tax
(b) The employee is entitle to a personal tax relief of Ksh. 800 per month. Determine the net tax. ( 2 mks )
(c) If the employee received a $50 \%$ increase in his total income, calculate the parentage increase on the income tax.
18. An aeroplane that moves at a constant speed of 600 knots flies from town $\mathrm{A}(14 \mathrm{oN}, 30 \mathrm{oW})$ southwards to town $\mathrm{B}(\mathrm{XoS}, 30 \mathrm{oW})$ taking $31 / 2$ hrs. it then changes direction and flies along latitude to town C ( $\mathrm{xoS}, \wedge 0 \mathrm{oE}$ ). Given $\pi=35142$ and radius of the earth $\mathrm{R}=6370 \mathrm{~km}$
(a) Calculate
(i) The value of $x$
(ii) The distance between town B and town C along the parallel of latitude in km . (2mks)
(b) D is an airport situated at $(50 \mathrm{~N}, 120 \mathrm{oW})$, calculate
(i) The time the aeroplane would take to fly from C to D following a great circle through the South pole.
(ii) The local time at D when the local time A is 12.20 p.m
19. Three darts players Jane, Kelly and Brony are playing in a completion the probability that Jane, Kelly and Brony hit the bull's eyes is $1 / 5$
(a) Draw a probability tree diagram teshow all the possible outcomes for the players.
(b) Calculate the probability that:
(i) Jane or Brony hit the bull's eye.
(ii) All the three fail to hit the bull's eye.
(iii) Only two fails to hit the bull's eye.
20. The voltage V and the resistance R in certain orductor are correction by the equation $\mathrm{RV}+\mathrm{a}+\mathrm{bv}$ where a and b are constant. The values of $\mathbb{R}$ and V are given is the table below.

| V | 0.25 | 0.13 | 0.00 | 0.06 | 0.05 | 0.04 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| R | 1 | 2 |  |  |  |  |

(a) Re write the above equation in the form $y=m x+c$
(b) Using the above table and equation obtained in (a) above, draw a straight line graph using scale of $1 \mathrm{~cm} 5_{\gamma}$ 日inits
(c) Use your graph to estimate
(i) The value of a
(ii) The value of $b$
21. The fourth, seventh and sixteenth term of and afrithmetic progression are in geometric progression. The sum of the first six terms of the arithmetic progression is 12 .

Determine the
(a) First term and the common diffede of the arithmetic progression.
(b) Common ratio of the geometric progression.
(c) Sum of the first six terms of the geometric progression.
22. Use a ruler and compass only for all construction in this question.
a) (i) Construct a triangle ABC in which $\mathrm{AB}=8 \mathrm{~cm} B C=7.5$ and $\angle \mathrm{ABC}=112 \frac{1}{1^{\circ}} \quad$ (3mks)
b) By shading the unwanted regions show the locus of $P$ within the triangle $A B C$ such that (i) AP $\leq \mathrm{BP}$
(ii) $\mathrm{AP} \geq 3 \mathrm{~cm}$ mark the requiref as P .
c) Construct a normal from C to $\mathrm{m}_{\mathrm{e}}^{\mathrm{C}} \mathrm{e}$ AB produced at D .
d) Locate the locus of $R$ in thessame diagram such that the area of triangle ARB is $3 / 4$ the area of triangle ABC .
23. Sarger makes two types of wedding cakes. Twipes A and B. type A requires 200 g of flour and 80 g of cooking oil. Type B requires 400 g of flourgind 50 g of cooking oil. On a particular day, they had 16000 g of flour and 400 g of cooking.
(a) If they make $x$ cakes of type $A$ and $Y$ cakes of type $B$, write down inequalities in $x$ and $y$ to represent the above conditions?
(b) Graph the inéqualities in (a) above.
(c) The profit on type A cake is sh. 30 and the profit n type B cake in sh. 40. Determine the number of cakes of each type he should make to maximize profits.
(2mks)
24. A ball is thrown upward and its height after toseconds is $S$ metres, where $S=30 t-5 t^{2}$

Find
a) The greatest height reached be ball and the time when it is reached.
b) The time it returns to the original level.
c) Its velocity after 4 seconds.
d) The acceleration when $\mathrm{t}=1.8$ seconds

