NAME: ....   ADM NO: ....

SCHOOL: ....   DATE : ....

CANDIDATE'S SIGNATURE:.....................

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST 2016
TIME: 2½ HOURS

FORM 3

Kenya Certificate of Secondary Education (KCSE)
MATHEMATICS
PAPER 2
TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES

a) Write your **Name, Index Number** and **School** in the spaces provided at the top of this page.
b) **Sign** and write the **date** of examination in the spaces provided above.
c) This paper contains **TWO** sections: section I and section II
d) Answer **all** the questions in section I and any **FIVE** questions from section II.
e) **All** answers and working must be written on the question paper in the spaces provided below each question.
f) Show all the **steps** in your calculations, giving your answers at each stage in the spaces below each question.
g) Marks **may be** given for **correct** working even if the answer is wrong.
h) Non-programmable silent electronic calculators and KNEC mathematical tables **may be** used except where stated otherwise.

FOR EXAMINER'S USE ONLY:

Section I

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

Section II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

Answer ALL the Questions in this section in the spaces provided.

1. Use tables of squares, square roots and reciprocal to evaluate to 3 decimal places the questions below. (4mks)

$$\frac{10}{\sqrt{0.625}} + (1.64)^2$$

2. Three bells for night shifts at a factory ring at intervals of 18 minutes, 30 minutes and 42 minutes. The three bells rang together at 11.40p.m. Find the time the three bells will ring after 11.40p.m. (3mks)

3. A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

Currency	Buying (Ksh)	Selling (Ksh)
1 Euro	147.56	148.00
1 US dollar	94.22	94.50

A tourist arrived in Kenya with 11155 Euros. He converted all the Euros to Kenya Shillings at the bank. He spent Ksh.1,130,200.50 while in Kenya and converted the remaining Kenya shillings into US dollars at the bank. Find the amount in dollars that he received correct to 2 decimal places. (3mks)

4. A two digit number is such that the sum of the digits is 12. When the digits are reversed the number exceeds the original number by 9. Calculate the original number. (3mks)

5. Halima and Musa both stood as candidates for the same constituency. $\frac{7}{9}$ of those who voted supported Halima, who won the seat with 2490 votes more than Musa. If $\frac{7}{25}$ of the registered voters did not vote at all, how many registered voters were there in the constituency? (4mks)

6. The capacity of a computer is 40 megabytes where one megabyte is 1.0×10^3 kilobytes. 1 kilobyte is 1.024×10^3 bytes. Express the capacity of 10000 computers found in Madgaster in bytes. (3mks)

7. Factorise $x^2(x-1) - 16(x-1) + (95.4^2 - 4.6^2)$ (3mks)

8. Solve the simultaneous equations: (4mks)
   Log (x+y) = 0
   2 log x = log (y+1)

9. Simplify and give your answer in form of $a + b\sqrt{c}$ (3mks)

$$\frac{\sqrt{5}}{3\sqrt{15} - 2\sqrt{10}}$$

10. Given that a = 2.7, b = 3.4, c = 9.8 and d = 3.0, find the relative error in the following: (4mks)

$$\frac{c}{d} - \frac{b}{a}$$

11. Use complete the square method to solve the quadratic equations: (4mks)

$$\frac{x-1}{2} + \frac{x+3}{4} = \frac{1}{x-1}$$

12. Two similar cubes have surface area 64cm^2 and 144cm^2. Calculate the volume of the larger cube given the volume of the smaller cube is 56cm^2. (3mks)

13. A school bought 40 text books at sh. 9500. Some books cost sh. 200 each and the rest 300 eac[h] Find the number of text books bought at sh. 200. (3mks)

14. Three lorries each making five trips per day, transport 2500 crates from a factory to a distributor in two days. How many lorries each making six trips per day are needed to transport 10,000 such crates in one day. (4mks)

15. Solve for x in $2^{2x+3} - 6\begin{pmatrix} x \\ 2 \end{pmatrix} + 1 = 0$ (3mks)

16. A number is such that when divided by 27, 30 or 45 the remainder is always 3. Find the smallest value of n. (4mks)

17. A right circular cylinder of height 12cm and radius 7cm is filled with water. A heavy circular solid wire of height 9cm and radius 6cm is lowered with its vertex downwards and the axis vertical into the cylinder until the cone rest on the rim of cylinder. Find:-

    (a) The volume of the water that spills over from the cylinder. (4mks)

    (b) The height of the water in the cylinder after the cone has been removed. (3mks)

    (c) That water that remained in the cylinder is made to fill an empty similar cone. Calculate the volume of water that remained in the cylinder after filling the cone. (3mks)

18. (a) In 14 years time, Mercy will be twice as old as her son, Nathan. 4 years ago the sum of the ages was 30. Find how old Mercy was when Nathan was born. (5mks)

(b) A point P (-2,5) is mapped onto $P^{1'}$(1,9) by translation T1. If P1' is mapped onto $P^{11"}$ by translation T2 given by $\begin{pmatrix} -4 \\ -1 \end{pmatrix}$. Find the co-ordinates $P^{11"}$ and a single transformation that maps I to $P^{11"}$. (5mks)

19. Three hundred and sixty litres of a homogeneous paint is made by mixing three paints A, B, and C The ratio by volume of paint A to paint B is 3:2 and paint B to paint C is 1:2. Paint A costs sh. 180 per litre, paint B sh.240 per litrre and paint C sh. 127.50 per litre. Determine:

(a) The volume of each type of paint in the mixture. (5mks

(b) The amount of money spent in making one litre of the mixture. (3mks)

(c) The percentage profit made by selling the mixture at sh.221 per litre. (2mks)

20. A piece of wire was folded into a rectangle whose dimensions are such that the length is 3cm longer than its width. The area of the rectangle so formed is 28cm².
 (a) Determine:-
  (i) The dimensions of the rectangle. (4mks)

  (ii) The perimeter of the rectangle. (2mks)

 (b) The wire can also be folded into a circle. Take $\left(\frac{22}{7}\right)$. Find the radius of the circle formed, hence calculate its area. (4mks)

21. Kirugo bought 5 Biology and 6 Agriculture books for Sh. 2440. Mukangu bought 7 Biology and Agriculture books for Sh. 3560. Using X to represent the cost of one Biology book and Y to represent the cost of one Agriculture book.

(a)   Form two simultaneous equations in x and y.   (2mks)

(b)   Find the price of one Biology and one Agriculture book.   (4mks)

(c)   Weithaga bought 36 biology and 20 agriculture books from the same shop. How much did he pay?   (2mks)

(d)   Akinyi bought the same number of books as Weithega from the same shop but she was given a discount of 5% on total cost. How much did he pay for the books?   (2mks)
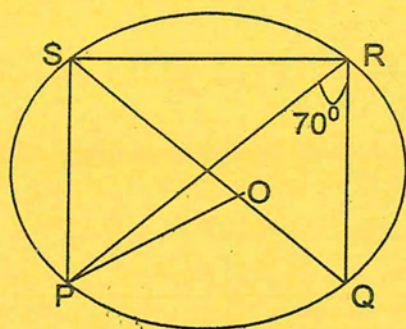
22. (a) Find the equation of a straight line passing through the point (3,2) and (-3,6) giving your answer in form of $\dfrac{x}{a} + \dfrac{y}{b} = 1$ where a and b are constants. (4mks)

(b) State the co-ordinates of points A and B at which the line in (a) above crosses the x-axis and y-axis respectively. (3mks)

(c) Using the information in (a) and (b) above, find the area of the triangle AOB where O is the origin. (3mks)

23. a

Giving reasons for your answer, find the value of angle:-

   (a) PRS   (2mks)

   (b) POQ   (2mks)

   (c) RPS   (2mks)

   (d) PSR   (2mks)

   (e) Reflex POS   (2mks)

24. If $x^2+y^2 = 29$ and $x+y=3$
   (a)   Without solving for x and y, determine the values of:-
       (i) $x^2+2+y+y^2$ (2mks)

       (ii)   12xy   (2mks)

       (iii) $x^2+y^2 - 2xy$ (2mks)

       (iv) $x - y$ (2mks)

   (b)   Solve for x and y if:
       x + y = 3
       x – y = 7