

Name.....

Index No...../.....

School.....

Date

Candidate's Signature.....

121/2

MATHEMATICS

Paper 2

KCSE MOCKS 2017

Time: 2 ½ Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. This paper consists of two sections: Section I and Section II.
3. Answer ALL questions in section I and ONLY FIVE questions from section II
4. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
5. Marks may be given for correct working even if the answers are wrong.
6. 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

Section II

17	18	19	20	21	22	23	24	TOTAL

**GRAND
TOTAL**

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

SECTION 1 (50 MARKS)

Answer **ALL** the questions in this section

1. Use a calculator to evaluate $\frac{(0.52)^3 \times \sqrt{4.17}}{3.58911}$ and give the answer correct to 5 significant figures. (2mks)
2. Given that $OA = 6p - 4q$, $OB = 20 - 14q$ and $AB = m(2p + 5q)$, Find the value of m . (3mks)
3. Evaluate $5\cos^2 \theta + 2 = 3\sin^2 \theta - 2\cos \theta$ given that $0^\circ \leq \theta \leq 360^\circ$ (4mks)
4. A school bursar wishes to obtain the sum of the following amounts of money paid in as school fees for three students by the CDF: Ksh 10860, Ksh 49105 and Ksh 7352. the bursar estimates the sum by first rounding each of the amounts to 3 significant figures.
- a) Determine the estimated sum (2mks)

b) Determine the percentage error in this estimate (2mks)

5. Make t the subject of the formula $k = \sqrt[3]{\frac{t + q^2}{2t}}$ (3mks)

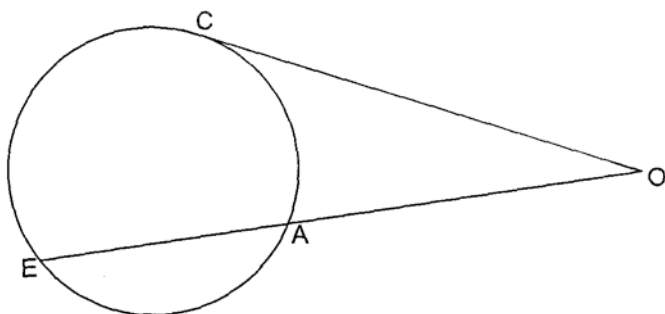
6. In the triangle XYZ, $XY = 2\text{cm}$, $YZ = (2\sqrt{3} - 1)\text{cm}$ and angle $YXZ = 60^\circ$. Determine $\sin(\hat{XZY})$, giving your answer in the form $\frac{m + \sqrt{3}}{n}$, where m and n are integers. (4mks)

7. a) Expand and simplify $(2x + y)^5$. (1mk)

b) Using the first four terms of the expansion to evaluate 6.02^5 . (2mks)

8. A circle centre is the point $C(2,3)$ passes through a point $P(a,b)$. a point $M(-2, \frac{-5}{2})$ is the mid-point of the line CP .
- a) Calculate the coordinates of P . (1mk)
- b) Determine the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$ (3mks)
9. Determine the population of a town four years ago if the present population is 800 000 and the annual population growth rate of the town is 5% (2mks)
10. A is matrix $\begin{bmatrix} 5 & 3 \\ 1 & 7 \end{bmatrix}$ and I is the 2×2 identity matrix. Determine the values of h and k for which $A^{-1} = hI + kA$. (3mks)

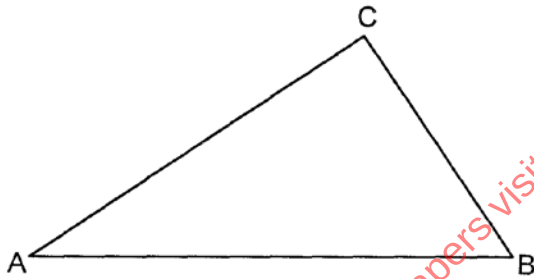
11. In the figure above OC is the tangent to the circle. If OE = 8cm and OC = 6cm. find EA. (2mks)



12. Determine the equation of the tangent to the curve $y = \frac{4x^3 + 4}{x^2}$ at the point $x = 2$. (3mks)

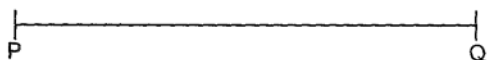
13. A quantity D is directly proportional to Y and inversely proportional to the square of X . If Y is double and X is increased by 20%, find the ratio of the new value of D to the original value of D in the form $a:b$ where a and b are integers. (3mks)

14. On triangle ABC below, draw a circle touching the side BC , and AC and AB produced. (3mks)



15. Two large and one small pump can fill a swimming pool in 4 hours. One large and three small pumps can also fill the swimming pool in 4 hours. How many hours will it take 4 large and 4 small pumps. (3mks)

16. The line PQ below is 6cm long. On one side of the line,
- Draw the locus of T such that the area of triangle PTQ = 12cm^2
 - Determine two points on the locus obtained in part a) above such that angle PTQ = 70° and label them as T_1 and T_2 . (2mks)



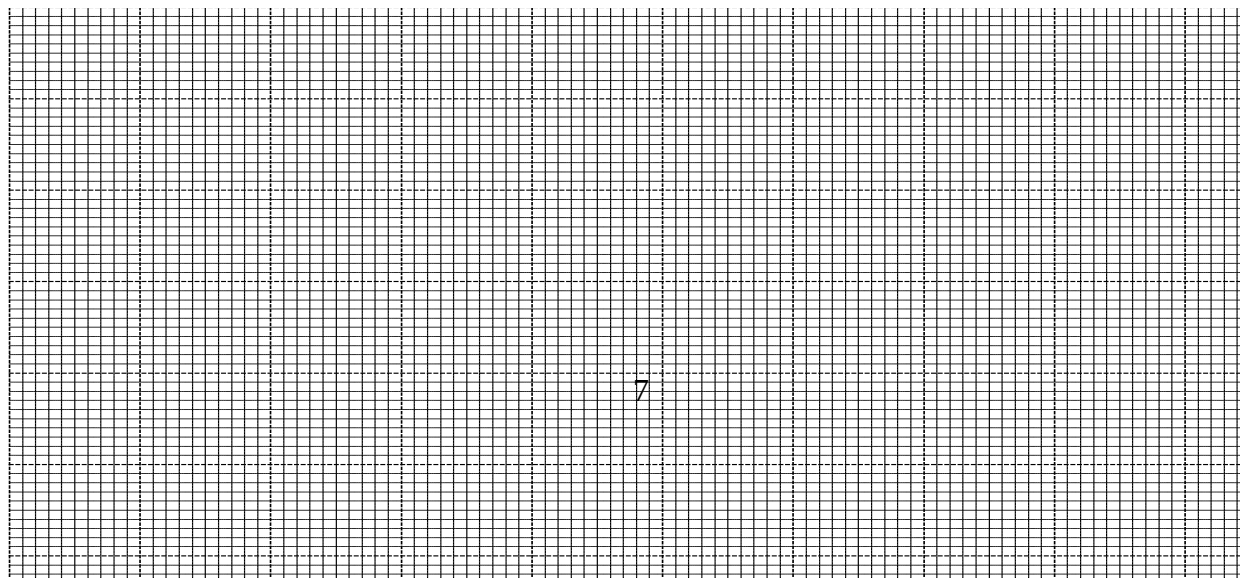
SECTION II (50 MARKS)

Answer any FIVE questions from this section

17. a) Fill the table below for the function $y = x^3 + 4x^2 - x - 6$, for $-5 \leq x \leq 3$. (2mks)

x	-5	-4	-3	-2	-1	0	1	2	3
y	-26		6			-6			

- b) On the grid provided draw the graph of $y = x^3 + 4x^2 - x - 6$ for $-5 \leq x \leq 3$.
 Use a scale of 1cm represent 1 unit horizontally
 1cm represent 5 units vertically



c) Use your graph to solve the following equations:

i) $x^3 + 4x^2 - x - 6 = 0$ (2mks)

ii) $3x^3 + 12x^2 - 15x - 21 = 0$ (3mks)

18. The table below shows the current taxation rates in Kenya

Monthly Taxable Income	Tax Rate in Each Shillings
For taxable income under Kshs. 10165	10%
For taxable income from Kshs. 10165 but under Kshs. 1741	15%
For taxable income from Kshs 19741 but under Kshs. 29317	20%
For taxable income from Ksh. 29317 but under Kshs. 38893	25%
For taxable income from Kshs. 38893 and above	30%

A member of parliament's monthly earnings are as follows: Basic salary Kshs. 300 000, commuted mileage allowance of Kshs. 75 000, entertain allowance Ksh. 60 000, extraneous allowance Ksh. 30 000, house allowance Kshs. 70,000, car maintainance allowance Kshs 247 000. he is entitled to a personal relief of Kshs. 1162 every month.

a) If before the promulgation of the new constitution all the MP's allowances were tax free, calculate the PAYE the MP's used to pay (6mks)

- b) In the new constitution all the MP's are taxed just like the other Kenyans. Calculate the percentage increase in the MP's PAYE after the new law was passed. (4mks)

19. The first three consecutive terms of a geometric progression are 3^{2x+1} , 9^x and 81 respectively.

- a) Calculate the value of x (3mks)

- b) Find the common ratio of the series (2mks)

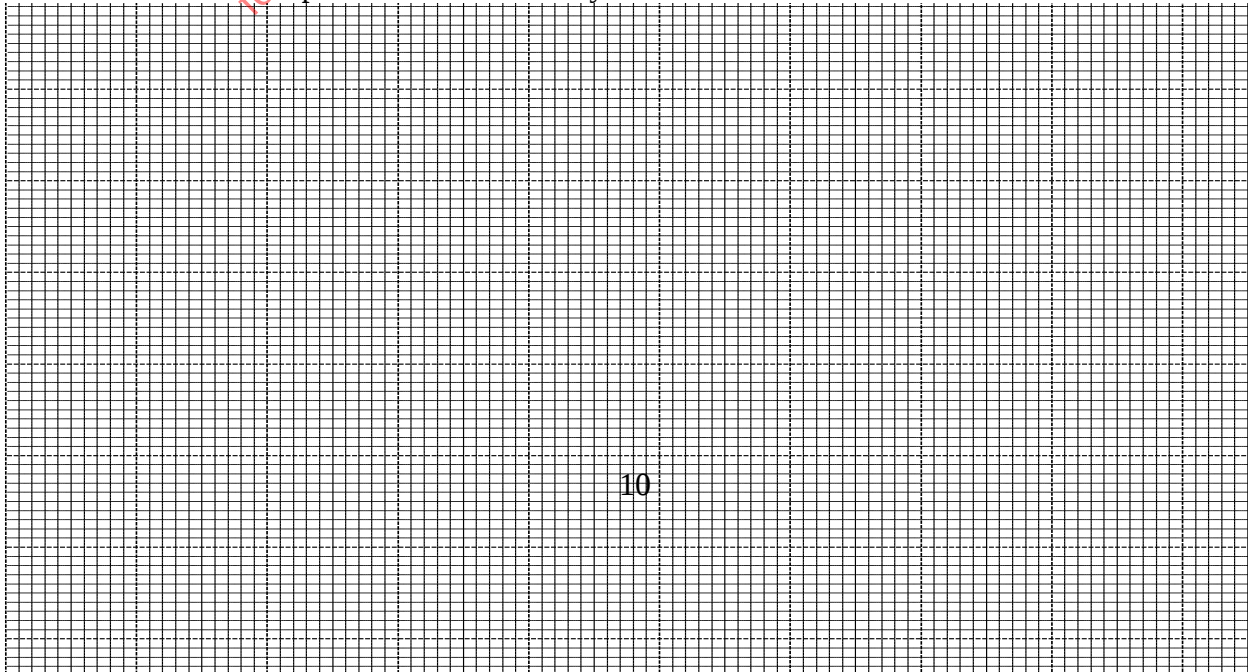
c) Calculate the sum of the first 10 terms of this series (2mks)

d) Given that the first and the seventh terms of this G.P. form the first two consecutive terms of an arithmetic sequence, calculate the sum of the first 20 terms of this sequence. (3mks)

20. a) Complete the table below, giving your values to 2 decimal places (2mks)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
$2\cos x - 1$			0		-2		-3		-2	-1	0		1
$\sin x$	0			1		0.50	0			-1			0

b) Draw the graph of $y = 2\cos x - 1$ and $y = \sin x$ on the grid provided below (4mks)
 Use the scale 1cm represent 30° horizontal
 2 cm represent 1 unit vertically



- c) Use the graph to solve:
- i) $2\cos x - 1 = -1.5$ (1mk)
 - ii) $2\cos x - \sin x = 1$ (2mks)
- d) State the amplitude of the wave $y = 2\cos x - 1$ (1mk)

21. A globe representing the earth has a radius of 0.5m. point A(0° , 10°W), B (0° , 35°E), P(60°N , 110°E) and Q(60°N , 120°W) are marked on the globe.

- a) Find the length of arc AB, leaving your answer in term of π (3mks)

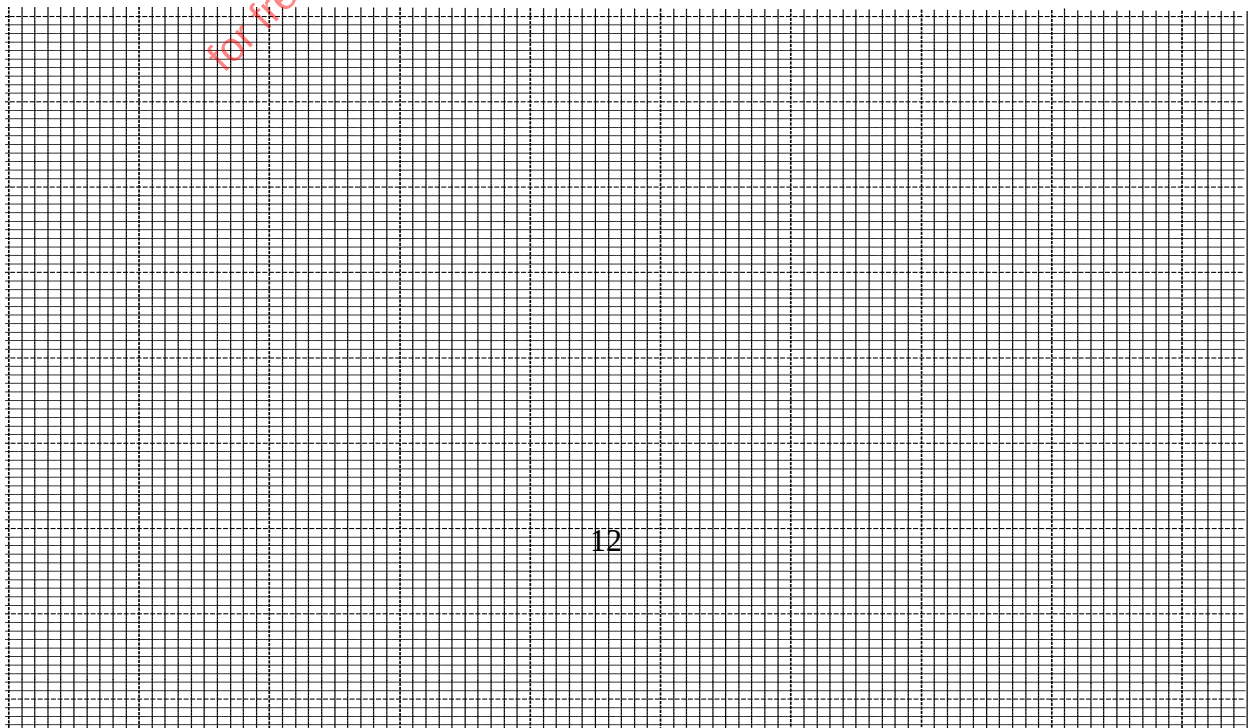
- b) If O is the centre of the latitude 60°N , find the area of the minor sector OPQ (4mks)

- c) Of the local time at Q is 10.30 a.m. on Monday, Determine the local time and day at P. (3mks)

22. Lengths of 100 mango leaves from a certain mango tree were measured to the nearest centimeter and recorded as per the table below,

Length in cm	No. of leaves
10 to 12	3
13 to 15	16
16 to 18	36
19 to 21	31
22 to 24	14

- a) On the grid provided draw a cumulative frequency graph to represent this data. (5mks)



- b) Use your graph to estimate
i) The median length of the leaves (2mks)

- ii) The number of leaves whose lengths lie between 13cm and 17cm. (3mks)

23. A bag contains blue, green and red pens of the same type in the ratio 8:2:5 respectively. A pen is picked at random without replacement and its colour noted.

- a) Determine the probability that the first pen picked is
i) Blue (1mk)

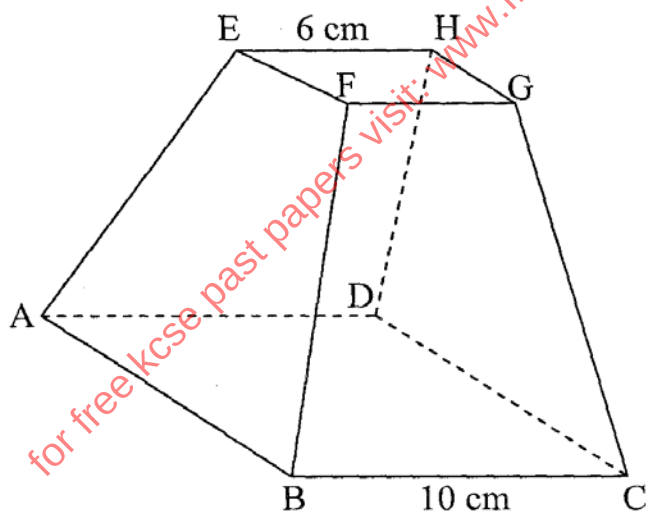
- ii) Either green or red. (2mks)

- b) Using a tree diagram, determine the probability that
i) The first two pens picked are both green (4mks)

- ii) Only one of the first pens picked is red.

(3mks)

24. The figure below represent a solid frustum. The faces ABCD and EFGH are parallel squares of sides 10cm and 6 cm respectively. Each of the slanting edges AE, BF, CG and DH are equal to 4cm.



Determine:

- a) The length of the projection of AE on the plane ABCD

(2mks)

b) The angle between the line AE and the plane ABCD (2mks)

c) The angle between the plane BCGF and ABCD (4mks)

d) The total surface area of the frustum. (2mks)