

Name: Class:

Date: Adm No:

121/2
MATHEMATICS
PAPER 2

TIME: 2 HOURS 30 MINUTES

ST.CECILIA, NANGINA GIRLS' HIGH SCHOOL.
END YEAR EXAMINATIONS –OCTOBER,
2019
Kenya Certificate of Secondary Education (K.C.S.E.)
FORM THREE

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **admission number**, **Class** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

Question	17	18	19	20	21	22	23	24	TOTAL

GRAND

TOTAL

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Mathematics is excellent, it nurtures

Marks									
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SECTION I (50 MARKS)

Answer all the questions from this section

1. Evaluate without using tables or a calculator the value of

$$\frac{1.33 \times 0.15}{0.19 \times 0.0017}$$

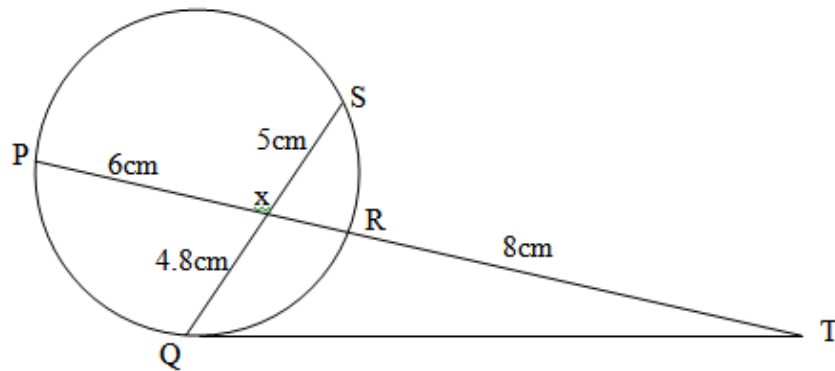
(3marks)

2. Find the percentage error in the total length of four rods measuring 12.5cm, 24.5cm, 12.9cm and 10.1cm all the nearest 0.1cm. (3 marks)

3. In a mixed school there are 900 students, out of these 600 are girls.
(a) Find the ratio of boys to girls. (2marks)

(b) What is the percentage of boys in this school? (1mark)

4. In the figure below QT is a tangent to the circle at Q. PXRT and QXS are straight lines. PX = 6cm, RT = 8cm, QX = 4.8cm and XS = 5cm.

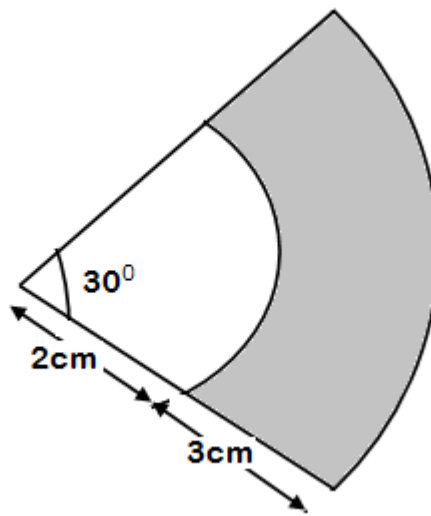


Find the length of QT (3 marks)

5. Given that $x = \sqrt{\frac{tp}{2\mu+p}}$ make p the subject of the formula (3 marks)

6. Solve for x in the equation below: $\log 3(x + 3) = 3 \log 3 + 2$ (3 marks)

7. Find the area of the shaded region in the figure below. (3 marks)



8. Akinyi bought maize and beans from a wholesale. She then mixed the maize the maize and beans in the ratio 4:3. She bought the maize at ksh.21 per Kg and the beans at ksh.42 per Kg. if she was to make a profit of 30%, what should be the selling price of 1Kg of the Mixture. (3 marks)

9. Find the value of t in the equation $\frac{t-1}{3} - \frac{4+t}{4} = 0$ (2 marks)

10. i) Expand and simplify $(1-3x)^5$ upto the term in x^3 (2 marks)

ii) Hence use your expansion to estimate $(0.97)^5$ correct to 4d.p. (2 marks)

11. Solve for x in the equation: $2\cos 4x = -1$ for $0^\circ \leq x \leq 180^\circ$ (3 marks)

12. Rationalize the denominator and simplify $\frac{2\sqrt{5}}{\sqrt{5} + 2}$ (3 marks)

13. Using a ruler and a pair of compass only; Construct triangle ABC in which $AB=5\text{cm}$, $BC=5.9\text{cm}$ and angle $BAC=45^\circ$. Draw an incircle of the triangle ABC and measure its radius. (4 marks)

14. A cold water tap can fill a bath in 10minutes, while a hot water tap can fills it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are opened for 4 minutes. There after, all the three taps are opened. Find how long it takes to fill the bath. (3 marks)

15. Given that $\mathbf{p} = 2\mathbf{i} - 3\mathbf{j} + \mathbf{k}$ and $\mathbf{q} = 3\mathbf{i} - 4\mathbf{j} - 3\mathbf{k}$ find:

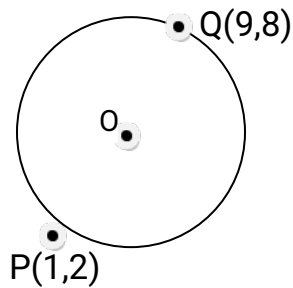
i) $\mathbf{r} = 3\mathbf{p} + 2\mathbf{q}$

(2 marks)

ii) $|\mathbf{r}|$

(2marks)

16. P and Q are the points on the ends of the diameter of the circle center O as shown below.



Determine:

a) The coordinates of O.

(1 mark)

b) The equation of a circle expressing it in form $x^2 + y^2 + ax + by + c = 0$

(2 marks)

SECTION II (50 MARKS)

Answer five questions only from this section

17. The following table shows the rate at which income tax was charged during a certain year.

Monthly taxable income in Ksh.	Tax rate %
0 - 9860	10
9861 - 19720	15
19721 - 29580	20
29581 - 39440	25
39441 - 49300	30
49301 - 59160	35
over 59160	40

A civil servant earns a monthly basic salary of Ksh.35,750 and a monthly house allowance of Ksh.12,500. The civil servant is entitled to a personal relief of Ksh.1,062 per month. Calculate:

a) His monthly Taxable income in Ksh (2 marks)

b) Calculate his net monthly tax in Ksh (5 marks)

c) Apart from the tax the following deduction are also made from his monthly income; WCPS at 2% of the basic salary, Loan repayment Ksh.1,325, NHIF Ksh.480. Calculate his net monthly earning. (3 marks)

18. In a mathematics test, the probability of 3 students, Beryl, Linda and LilyJane passing are $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{5}{6}$ respectively

(a) Draw a tree diagram to represent this information (3 marks)

(b) Use the tree diagram to find the probability that:

(i) All the three students will fail (2 marks)

(ii) At least two students will pass. (3 marks)

(iii) Only one student will pass (2 marks)

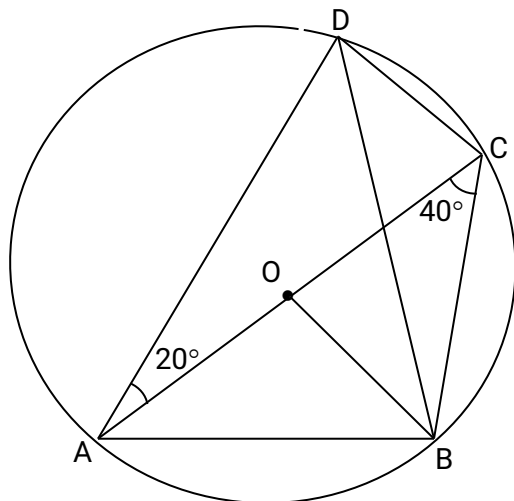
19. Three quantities R, S and T are such that R varies directly as S and inversely as the square of T.

a) Given that $R = 480$ when $S = 150$ and $T = 5$, write an equation connecting R, S and T (4marks)

b) (i) Find the value of R when $S = 360$ and $T = 1.5$ (2marks)

(ii) Find the percentage change in R if S increases by 40% and T decreases by 20%. (4marks)

20. The figure below shows a circle centre O and a cyclic quadrilateral $ABCD$ angle $ACB = 40^\circ$, angle $DAC = 26^\circ$ and AOC is a straight line.



Giving reasons for your answer find the size of:

(a) Angle ADB . (2 marks)

(b) Angle BAC . (2 marks)

(c) Angle ACD . (2 marks)

(d) Angle CBD . (2 marks)

(e) Reflex angle ADB . (2 marks)

21. (a) The first term of an arithmetic progression (AP) is 2. The sum of the first 8 terms of AP is 156.

i) Find the common difference of AP (2 marks)

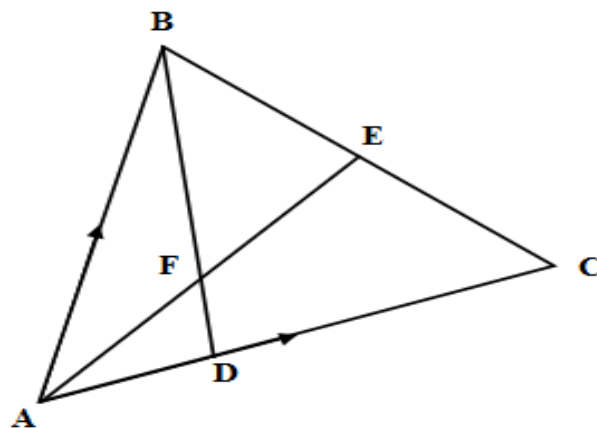
ii) Given that the sum of the first n terms of the AP is 416. Find n (2 marks)

b) The 3rd, 5th, and 8th terms of another AP form the first three terms of a geometric progression (GP). If the common difference of the AP is 3. Find

i) The first term of GP (4 marks)

ii) The sum of the first 9 terms of the GP to 4 s.f (2 marks)

22. In the figure below E is the midpoint of BC. AD: DC 3:2 and F is the meeting point of BD and AE.



- a) If $AB = \mathbf{b}$ and $AC = \mathbf{c}$, find:

i) $\mathbf{BD}$

(2marks)

ii) $\mathbf{AE}$

(2marks)

- b) If $BF = t \mathbf{BD}$ and $AF = n \mathbf{AE}$. Find the value of t and n .

(5marks)

c) State the ratio of BD to BF.

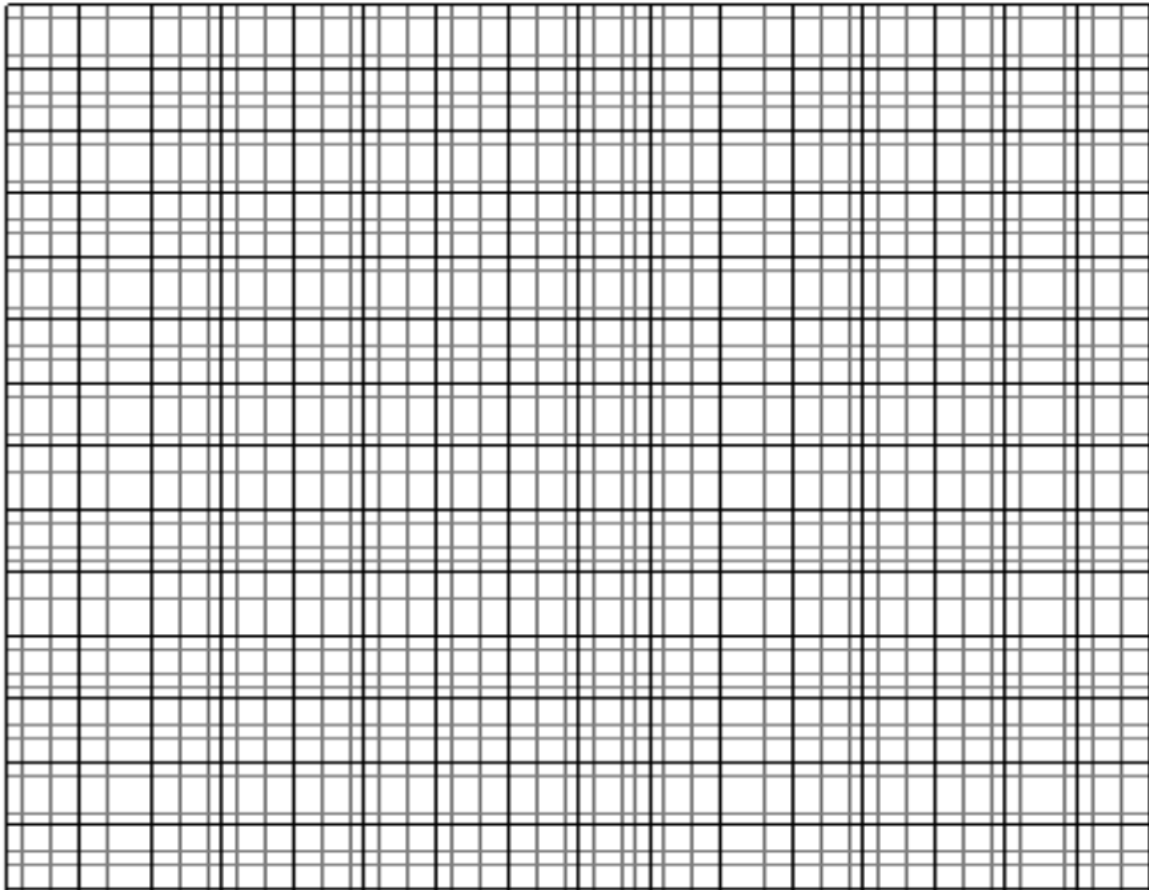
(1mark)

23. Complete the table below for the following function $y = x^3 - 3x^2 - 5x + 7$

(2 marks)

X	-3	-2	-1	0	1	2	3	4	5
$y = x^3 - 3x^2 - 5x + 7$									

b) On the grid provided draw the graph of $y = x^3 - 3x^2 - 5x + 7$ for $-3 \leq x \leq 5$. (3marks)



c) Use the graph to solve the equation $x^3 - 3x^2 - 5x + 7 = 0$

(2 marks)

d) By drawing a suitable line, use the graph in (b) to solve the equation

$$x^3 - 3x^2 - 10x + 17 = 0.$$

(3 marks)

24. (a) Wamulonda bought a camera on hire purchase terms by paying a deposit of Ksh.7, 200 and cleared balance in 24 equal monthly installments each of ksh.1, 250.
- Find the hire purchase price of the camera. (3marks)
 - The hire purchase price of the camera is 24% higher than the cash price. Find the cash price of the camera. (2marks)
 - Eunice took a loan from a financial institution and bought the camera with cash. She repaid the end of the two years. Find the total interest paid by Eunice. (3marks)
- b. A car is worth Ksh.800, 000 when new. It depreciates by 20% every year. How much will it cost after five years. (2marks)

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