KCSE MOCKS

SET 1

MATHEMATICS

FOR MARKING SCHEMES CALL/WHATSAPP 0705525657

A COMPILATION OF MATHEMATICS MOCKS IDEAL FOR KCSE REVISION PURPOSES

MR ISABOKE 0705525657

walimuepublishers@gmail.com

TRIAL 1

NAME……. INDEX

NO……/…….

SCHOOL…… CANDIDATES SIGNATURE……

121/1
MATHEMATICS
2 ½ hours

Instructions to Candidates

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consists of **TWO** sections: **Section I** and **Section II.***
4. *Answer **ALL** the questions in **Section I** and **only five** questions from **Section II**.*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
7. *Marks may be given for correct working even if the answer is wrong.*
8. ***Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.*
9. ***This paper consists of 14 printed pages.***
10. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

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

This paper consists of 14 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing

SECTION 1 (50 MARKS)

Answer all questions in this section

1. Evaluate without using a calculator

   $\frac{¼ + {}^{1}/_{5} \div ½ \text{ of } {}^{1}/_{3}}{}$ (3mks)

   ½ of $({}^{4}/_{5} - ¾ + ½)$

2. Simplify completely.

   $$\frac{3a^2 + 5ab - 2b^2}{9a^2 - b^2}$$ (3mk)

3. Solve for x in the equation.

   $27^x \times 3^{(2x-2)} = 9^{(x+2)}$ (3 marks)

4. Given that $Sin\ \theta = 2/3$ and θ is an acute angle, find without using tables or calculators

   (a) $Tan\ \theta$, giving your answer in surd form. (2mks)

   (b) $Cos\ (90 - \theta)$ (1mk)

5. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines gave out a signal simultaneously. Find the time this will happen again. (3mks)

6. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the full tank in 6 hours. If the three pipes **A**, **B**, and **C** are opened at the same time, find how long it will take for the tank to be full. (3mks)

7. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

	Buying	**Selling.**
US $	65.20	69.10
Sterling Pound (£)	123.40	131.80

(4mks)

8. A straight line through the points A (2,1) and B(4,n) is perpendicular to the line 3y+2x=5. Determine the value of n and the equation. (4mks)

9. Determine the quartile deviation of the set of numbers below. (2mks)

   8, 2, 3, 7, 5, 11, 2, 6, 9, 4

10. Solve the equation $2\cos 2(x + 30^0) = 1$ for $0^0 \leq x \leq 360^0$. (3 marks)

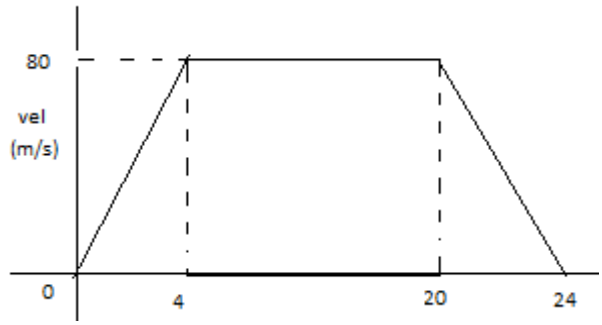
11. Without using tables or calculators, find the value of **t** in

    $\log_8(t + 5) - \log_8(t - 3) = {}^2/_3$ (3mks)

12. Solve for x :$3(x + 2) - \frac{20x - 5}{} > 3\frac{1}{4}$ (3 mks)

13. Three years ago John was four times as old as his son Peter. In five years' time the sum of their ages will be 56. Find their present ages. (3mks)

14. The figure below show a velocity time graph for a wagon.



(a) Find the total distance travelled by the wagon. (2 marks)

(b) For how long did it maintain a constant speed? (1mark)

15. The volumes of two similar solids are $800cm^3$ and $2700cm^3$. If the surface area of the larger one is $2160cm^2$, find the surface area of the smaller figure. (3mks)

16. A ball is in the shape of a sphere. It weighs 125g. The material used to make it has a density of $2.5g/cm^3$. What is the volume of the material to make a dozen such balls? (3 marks)

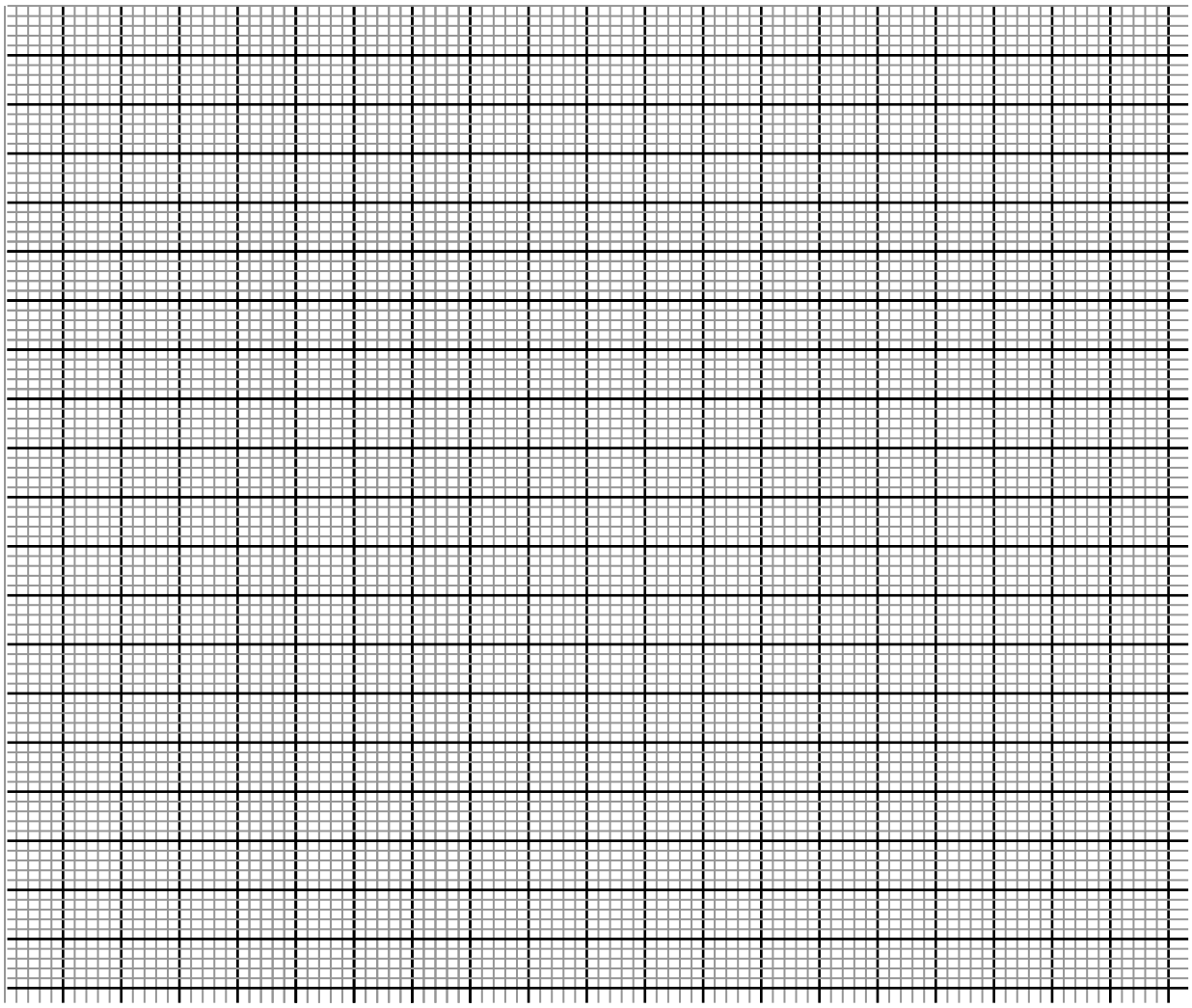
SECTION II (50 MARKS)

Answer any five questions in this section.

17. (a) Complete the table below for the equation $y = x^2 + 3x - 6$ given $-6 \leq x \leq 4$ (2mks)

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

(b) draw the graph of $y = x^2 + 3x - 6$ (3mks)



(c) Use your graph to solve the quadratic equations.

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

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

18. A saleswoman is paid a commission of 2% on goods sold worth over ksh. 100,000. She also paid a monthly salary of ksh. 12,000. In a certain month, she sold 360 handbags at ksh. 500 each.

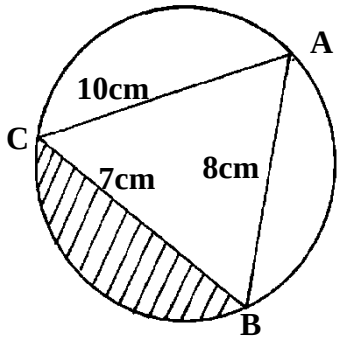
a) Calculate the saleswoman's earnings that month. (3 mks)

b) The following month the sales woman's monthly salary was increased by 10%. Her total earnings that month were ksh. 17600. Calculate:

(i) The total amount of money received from the sales of hand bags that month. (5 mks)

ii) The number of handbags sold that month. (2 mks)

19. The figure below shows a triangle **ABC** inscribed in a circle. **AC** = 10cm, **BC** = 7cm and **AB** = 10cm.

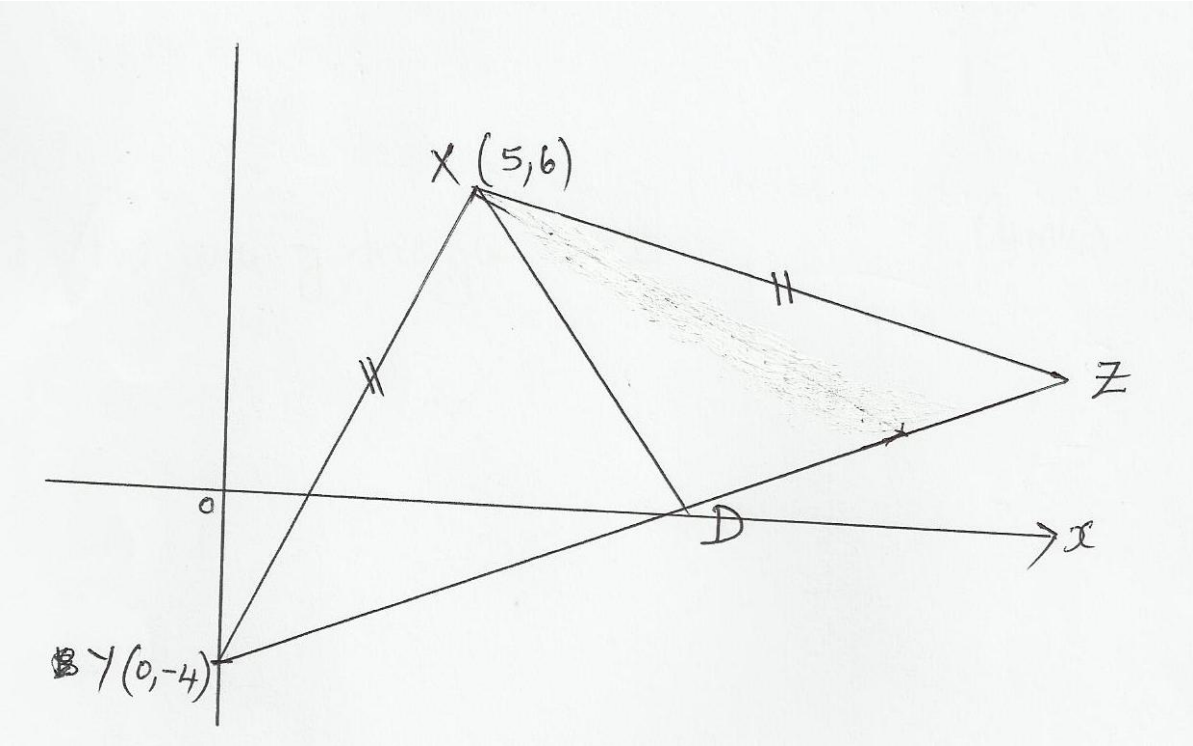


(a) Find the size of angle **BAC**. (2mks)

(b) Find the radius of the circle. (2mks)

(c) Hence calculate the area of the shaded region. (6mks)

20. The diagram below which is not drawn to scale, shows an isosceles triangle XYZ in which XY=YZ. The Coordinates of x and y are (5, 6) and (0, -4) respectively.



Given that the equation of line YZ is y=3/4x – 4 and that the perpendicular from X to YZ meet YZ at D, find.

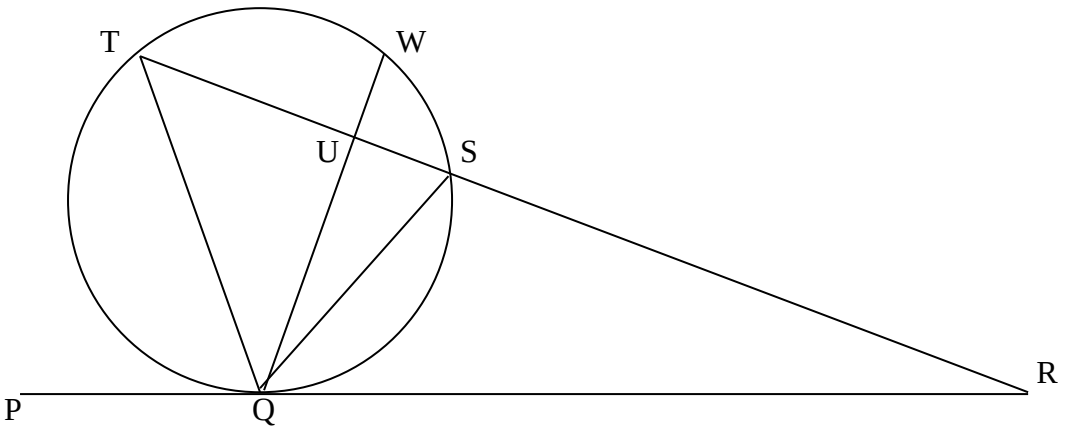
(i) The equation of XD (2 marks)

(ii) The coordinate of D (2 marks)

(iii) The coordinates of Z (2 marks)

(iv) The area of triangle XYZ (4 marks)

21. In the figure below, PQR is a tangent at Q and RST is a straight line. $\angle$ QTU = 50^0, $\angle$ UTW = 33^0 and $\angle$ TRQ = 25^0



Giving reasons in each case, calculate

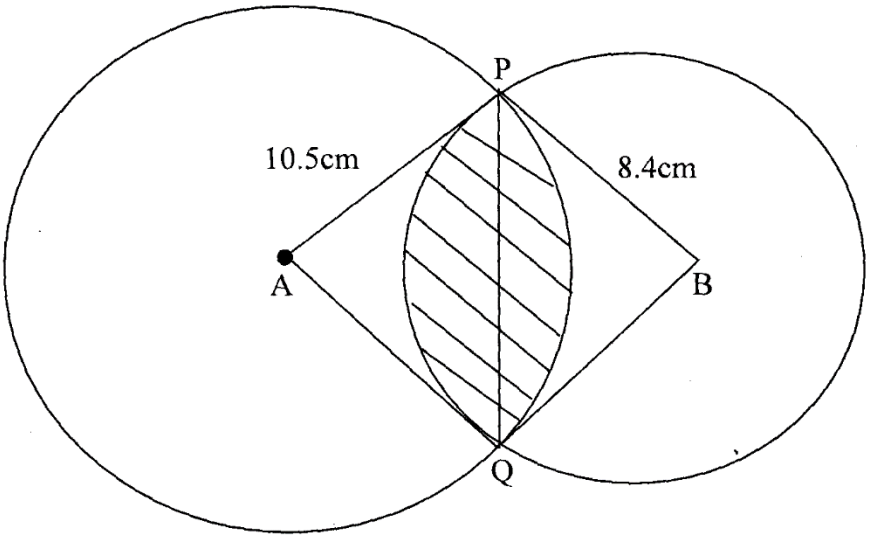
(i) Angle TSQ (3 marks)

(ii) Angle TSW (3 marks)

(iii) Angle TUQ (2 marks)

(iv) Angle PQW (2 marks

22. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.



(a) Calculate angle PAQ. (2 mks)

(b) Calculate angle PBQ. (2 mks)

(c) Calculate the area of the shaded part. (6 mks)

23. A and B are two towns 360 kilometers apart. A bus left **A** at 8.00 am travelling at 60km/h for town **B**.

After forty minutes, a saloon car left **A** travelling in the same direction as the bus at a speed of 80km/h.

a) How far from **B** did the saloon car catch up with the bus?

b) At what time did it catch up with the bus?

c) When the saloon caught up with the bus it got a break - down and had to be repaired before proceeding to **B** at the same speed. If they both reached **B** at the same time, find how long it took to repair the saloon?

24. An arithmetic progression (AP) has the first term a and the common difference d.

(a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d. (1mk)

(b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-

(i) the first term and common difference of the AP. (5mks)

(ii) the sum of the first nine terms of the AP. (2mks)

(iii)The difference between the fourth and the seventh terms of an increasing AP. (2mks)

TRIAL 1

Name……Index No……

121/2
MATHEMATICS
JULY 2018
2½ Hours

JOINT EXAMINATION MOCK 2018

INSTRUCTIONS TO CANDIDATES

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above*
3. *The paper contains **two** sections: **Section I** and **Section II**.*
4. ***All** the questions in **section I** and **strictly any five** questions **from Section II.***
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
7. *Marks may be given for correct working even if the answer is wrong.*
8. *Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except unless stated otherwise.*
9. *This paper consists of **13 printed pages**. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*

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

Section I (50 marks)

1. Use logarithms in all steps to evaluate. (4marks)

$$\frac{2.532 \times 83.45}{\sqrt{0.4562}}$$

2. The sum of the interior angles of two regular polygons of sides n-1 and n are in the ratio of 2:3 Name the polygon with the fewer sides. (3marks)

3. The diameter AB of a circle passes through points A (-4, 1) and B(2, 1). Find the equation of the circle and leave your answer in the form $\chi^2 + y^2 + a\chi + by = c$ where a, b and c are constants.(4 marks)

4. Without using mathematical tables and calculators simplify. (3marks)

$$\frac{2}{3 - \sqrt{7}} - \frac{2}{3 + \sqrt{7}}$$

5. Expand $(2+x)^5$ up to the terms in x^3. Hence approximate the value of $(2.03)^5$. (3marks)

6. The sides of a triangular stool were measured as 8 cm, 10cm, and 15cm. Calculate the % error in the perimeter correct to 2d.p. (3marks)

7Solve for x given that the following is a singular matrix (3mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$

8. The current price of a vehicle is sh. 500,000. If the vehicle depreciates at rate of 12% p.a find the number of years it will take for its value to fall to sh. 180,000. (3 marks)

9 Two variables are such that A is partly constant and partly varies as the square root of B. Given that A = 27 when $B = \frac{1}{4}$ and A = 18; when B = 25, find A when $B = 12\frac{1}{4}$. (3 marks)

10. Determine the amplitude and period of the graph of $y = 6 \sin (\frac{x}{2} - 90^0)$. (2marks)

11. A cylindrical container of radius 14 cm and 7cm is filled with water. If the container was a cube, what would be the base area of the cube? (3marks)

12. Solve the following equation. (3marks)

$1 + \log_5 x = \log_5 12$

13. A law relating some two variables K and L was found to be $KL^n = C$. Make n the subject of the formula. (3marks)

14. Solve the equation below by completing the square method $3x^2 - 7x + 2 = 0$ (3 marks)

15. Maize and millet costs Sh. 45 and Sh. 56 per kilogram respectively. Calculate the ratio in which they were mixed if a profit of20% was made by selling the mixture at 66 per kilogram. (4marks)

16. Given that P = (3i +k) and Q = (2i - k), find $\left|PQ\right|$ (3mk)

Section II (Answer five questions only from this section)

17. The position of two towns are A (30ºS, 20ºW) and B (30ºS, 80ºE) find

(a) the difference in longitude between the two towns. (1 mark)

(b) (i) the distance between A and B along parallel of latitude in km (take radius of the earth as 6370km and $\pi = \frac{22}{7}$). (3 marks)

(ii) in nm. (2 marks)

(c) Find local time in town B when it is 1.45pm in town A. (4 marks)

18. Mr. Johnson is a teacher in Kenya .He earns a basic salary of Sh. 19,620 per month. He is paid a house allowance of Sh. 12,000, a medical allowance of Sh. 2,246 and a commuter allowance of Sh. 4,129 .He is deducted Sh. 1,327 towards a Retirement Benefit's Scheme.
Use the tax rates given below to answer the questions below.

Monthly taxable (shp.m)	Rate of tax (%)
0 – 10,164	10
10,165 – 19,740	15
19,741 – 29,316	20
29,317 – 38,892	25
Over 38,892	30

(a) Calculate the monthly taxable income. (2marks)

(b) Calculate the PAYE he pays to the government if he gets a monthly tax relief of Sh. 1162.
(6marks)

(c) Calculate his net monthly salary (2marks)

19. The table below shows the distribution of ages in years of 50 adults who attended a clinic:-

Age	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	15	11	17	4	2	1

(a) State the medium class (1mk)

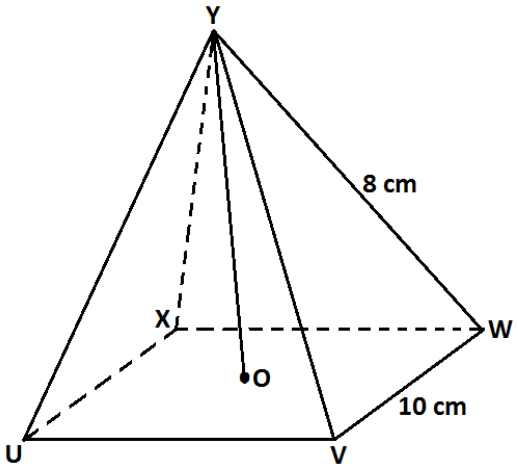
(b) Using a working mean of 45.5, calculate:-

(i) the mean age (3mks)

(ii) the standard deviation (3mks)

(iii) Calculate the 6^{th}decile. (3mks)

20. UVWXY is a right pyramid on a horizontal square base of side 10cm. YU =YV = YW =YX = 8cm.



(a) Calculate the height of the pyramid. (3marks)

(b) The angle between
(i) The slant face YWV and the base UVWX. (2marks)

(ii) YV and the base UVWX. (2marks)

(c) Calculate the angle between the planes UVY and WXY. (3marks)

21The probability that three candidates; Anthony, Beatrice and Caleb will pass an examination are $\frac{3}{4}$, $\frac{2}{3}$ and $\frac{4}{5}$ respectfully. Find the probability that:-

(a) all the three candidates will pass (2mks)

(b) all the three candidates will not pass. (2mks)

(c) only one of them will pass (2mks)

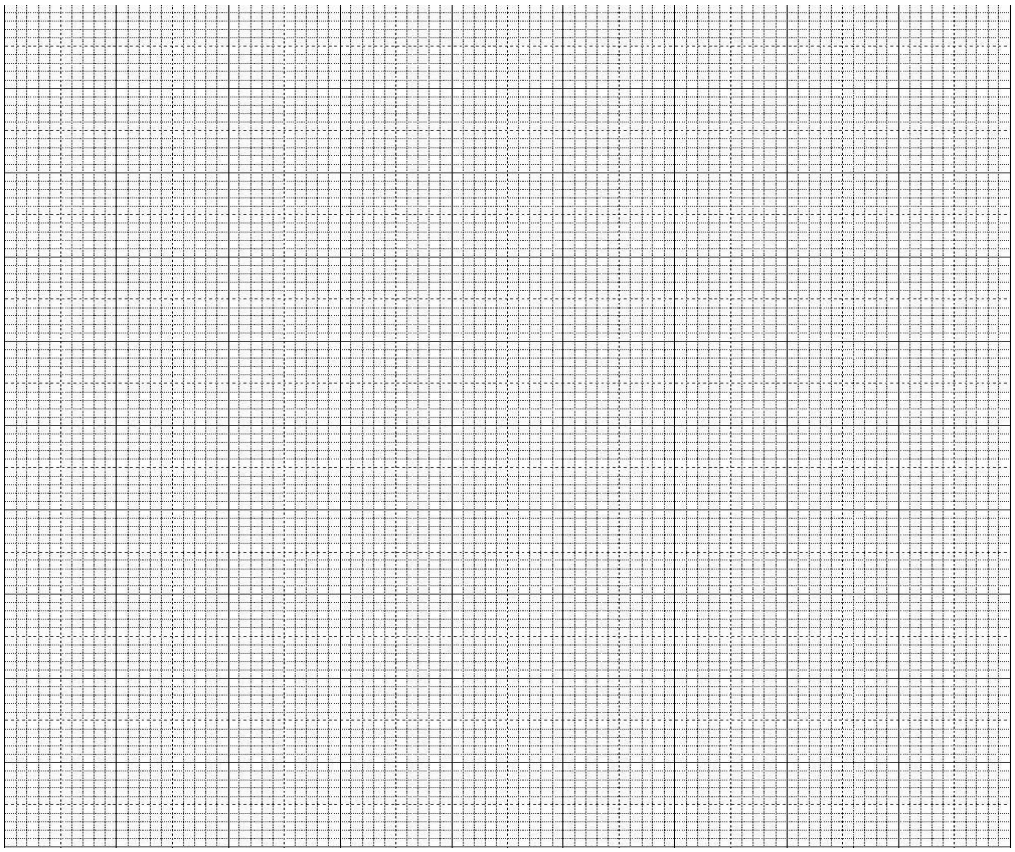
(d) only two of them will pass. (2mks)

(e) at most two of them will pass. (2mks)

22. Complete the table below giving your values correct to 2 d.p. (2marks)

x	0^0	15^0	30^0	45^0	60^0	75^0	90^0	105^0	120^0
$3\cos x^0$	3.00		2.60		1.50		0	-0.78	
$4\sin(2x - 10^0)$		1.37		3.94	3.76		0.69		-3.06

(b) draw the graphs of $y = 3\cos x^0$ and $y = 4\sin(2x - 10^0)$ on the same set of axis on the grid provided. (4marks)



(c) Use your graph to find values of x for which $3\cos x - 4\sin(2x - 10^0) = 0$. (2marks)

(d) State

(i) The amplitude of the graph $y = 3\cos x$. (1mark)

(ii) The period of the graph $y = 4\sin(2x - 10^0)$. (1mark)

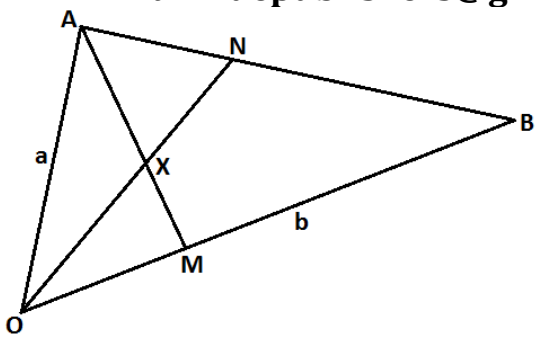
23. Use a ruler and a pair of compasses only all constructions in this question.

(a) Construct the rectangle ABCD such that AB = 7.2cm and BC = 5.6cm. (3mks)

(b) Constructs on the same diagram the locus L_1 of points equidistant from A and B to meet with another locus L_2 of points equidistant from AB and BC at M. measure the acute angle formed at M by L_1 and L_2. (3mks)

(c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region.
Correct to one decimal place. (4mks)

24. In the figure below, M and N are points on **OB** and **BA** respectively such that **OM**: **MB** = 2:3 and **BN:NA** = 2:1. ON and AM intersect at X



(a) Given that **OA** = **a**and **OB** = **b,** Express in terms of **a** and **b**

(i) **ON** **(**2marks)

(ii) **AM** (1mark)

(b) Given that OX = h**ON**and **AX** = k**AM** where h and k are scalars

(i) Determine the constants k and h (5marks)

(ii) The ratio which X divides **AM**. (2marks)

Name……..Adm.No……Class……
...

121/1

END OF TERM 3 EXAM

2020 FORM 4 TERM 1 ENTRY EXAMS

MATHEMATICS PAPER 1

TIME: 2½ HRS.

INSTRUCTION TO STUDENTS:

1. *Write your **name**, **admission number** and **class** in the spaces provided above.*
2. *Write the **date** of examination in spaces provided.*
3. *This paper consists of **two** Sections; Section **I** and Section **II**.*
4. *Answer **ALL** the questions in Section **I** and only **five** questions from Section **II**.*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. *Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.*
7. *Marks may be given for correct working even if the answer is wrong.*
8. *KNEC Mathematical tables **may be** used, except where stated otherwise.*
9. *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
10. ***Candidates should answer the questions in English.***

FOR EXAMINER'S USE ONLY:

SECTION I

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

17	18	19	20	21	22	23	24	TOTAL

SECTION II

GRAND TOTAL

Ensure that all the pages are printed and no question(s) are missing

SECTION 1 (50 marks)

1. Without using a calculator, evaluate. (3mrks)

$$\frac{-8+(-5)\times(-8)-(-6)}{-3+(-8)\div 2\times 4}$$

2. Evaluate without using a calculator (2mrks)

$$\frac{\left(2\frac{3}{7}-1\frac{5}{6}\right)\div\frac{5}{6}}{\frac{2}{3}\ of\ 2\frac{1}{4}-1\frac{1}{7}}$$

3. In fourteen years time, a mother will be twice as old as her son. Four years ago, the sum of their ages was 30 years. Find how old the mother was, when the son was born. (4 mks)

4. A Kenya bank buys and sells foreign currencies as shown below

	Buying (In Kenyan shillings)	Selling (In Kenyan shillings)
1 Hong Kong dollar	9.74	9.77
1 South African rand	12.03	12.11

A tourist arrived in Kenya with 105000 Hong Kong dollars and changed the whole amountto Kenyan shillings. While in Kenya, she spent Kshs. 403,897 and changed the balance to South Africa rand before leaving for South Africa. Calculate the amount, in South African rand that she received. (3 mrks)

5. a) Using a ruler and a pair of compasses only, construct a quadrilateral PQRS in which PQ= 5cm, PS = 3cm, QR = 4cm,$<$PQR = 135°and $<$SPQ is a right angle. (2mrks)

b) The quadrilateral PQRS represents a plot of land drawn to a scale of 1:4000. Determine the actual length of RS in meters. (2mrks)

6. The ratio of goats to cows in a farm is 2:5 while the ratio ofsheeps to cows is 3:4. If there are 15 sheep, how many animals are there in farm farm. (2mrks)

7. Mr.Maina who deals in electronics sells a radio to a customer at Ksh. 1440 after giving a discount 0f 10% but find that he makes a 20% profit. Find the profit Mr. Maina would make if he does not give a discount. (3mrks)

8. use the reciprocal and square table to evaluate to four significant figure, the expression.(3mrks)

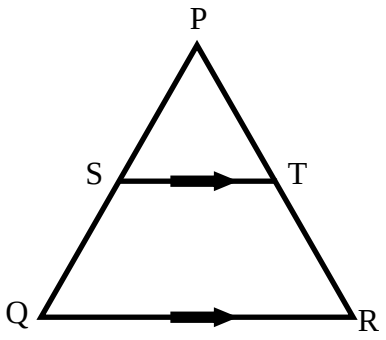
$\frac{1}{0.03654} - 4.151^2$

9. Simplify the following expression completely. (3mrks)

$$\frac{12a^2 - 3b^2}{2a^2 - ab - b^2}$$

10. Given that sin $(x + 60)°$ = Cos $(2x)°$, find tan $(x + 60)°$. (3mrks)

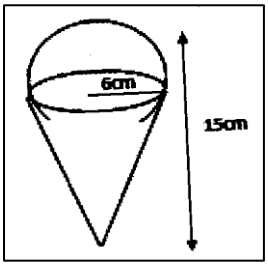
11. The figure below shows triangle PQR in which PR = 12 cm, T is a point on PR such that TR = 4cm. line ST is Parallel to QR



If the area of triangle PQR is 336 cm^2, find the area of the quadrilateral QRTS. (3mrks)

12. A square brass plate is 2 mm thick and has a mass of 1.05 kg. The density of the brass is 8.4 g/cm^3. Calculate the length of the plate in centimeters (3 mks)

13. The diagram below represent a solid made up of a hemisphere mounted on a cone. The common radius is 6 cm and the height of the solid is 15cm.



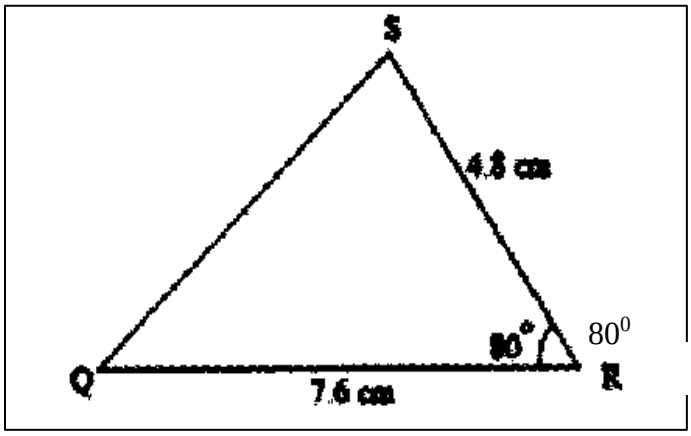
Calculate the external surface of the solid (4 Mrks)

14. Solve the simultaneous inequalities given below and list all the integral values of x (3mks)

$\frac{3-x}{2} \geq \frac{x+1}{3} \geq \frac{2x+1}{-3}$

15. A construction company employs technicians and artisans. On a certain 3 technicians and 2 artisans were hired and paid a total of Ksh9000.

On another day the firm hired 4 technicians and one artisan and paid a total of Ksh 9500. Calculate the cost of hiring two technicians and 5 artisans in a day



16. The figure below is not drawn to scale.

Find correct to 1 decimal place;

(a) Length PQ. (2 mark).

(b) Angle ABC (2 mark)

SECTION II(50 marks)

CHOOSE ANY FIVE QUESTIONS IN THIS SECTION

17. Two lines L_1: 2y - 3x - 6 = 0 and L_2: 3y+x-20 = 0 intersect at point A.

(a) Find the coordinates of A. (3 Mrks)

(b) A third line L_3 is perpendicular to L_2 at point A. Find the equation of L_3 in the form y = mx +c, where m and c are constants. (3 mark)

(c) Another L_4 is parallel to L_1 and passes through (-1, 3). Find the x and y intercepts of L_4. (4 mark)

18. Town B is 180km on a bearing 050^0 from town A. Another town C is on a bearing of 110° from town A and on a bearing of 150° from town B. A fourth town D is 240 km on a bearing of 320° from A.Using scale drawing, such that 1cm rep 30km,

(a) Show the relative position of the towns (4 mks)

(b) Using the diagram, find

(i) Distance AC (2 mrks)

(ii) Distance CD (2 mrks)

(iii) Compass bearing of C from D (2 mrks)

19. The table shows the marks obtained by 40 candidates in an examination

ency					

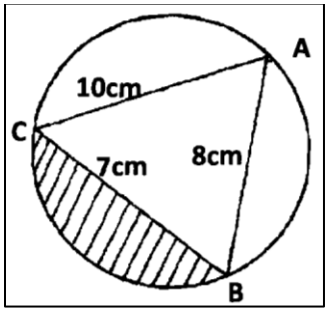
a) Find the value of X (1mk)

b) Calculate the mean mark (2mrks)

c) On the grid provided below draw a histogram to represent the data (4mrks)

d) drawing a straight line on the graph above determine the median mark (3mrks)

20. The figure below shows a triangle **ABC** inscribed in a circle. **AC** = 10cm, BC = 7cm and **AB** = 10cm.

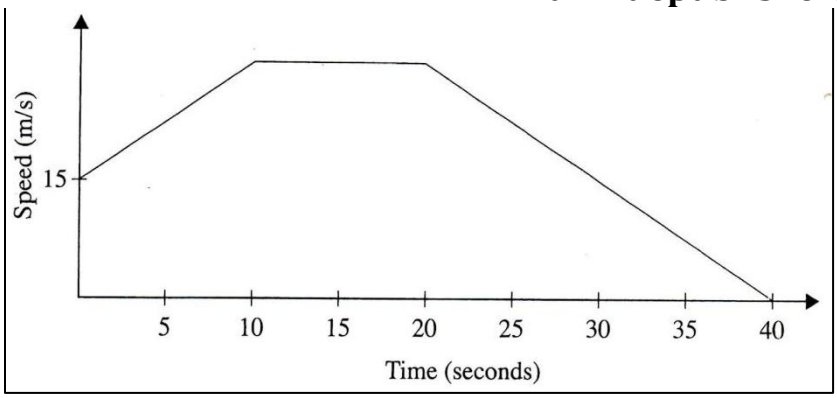


(a) Find the size of angle **BAC**. (3 Mks)

(b) Find the radius of the circle. (2 Mks)

(c) Hence calculate the area of the shaded region. (5 Mks)

21. The figure below represents a speed time graph for a cheetah which covered 825m in 40 seconds.



(a) State the speed of the cheetah when recording of its motion started (1 mk)

(b) Calculate the maximum speed attained by the cheetah (3mks)

(c) Calculate the acceleration of the cheetah in:

(i) The first 10 seconds (2mks)

(ii) The last 20 seconds (1mk)

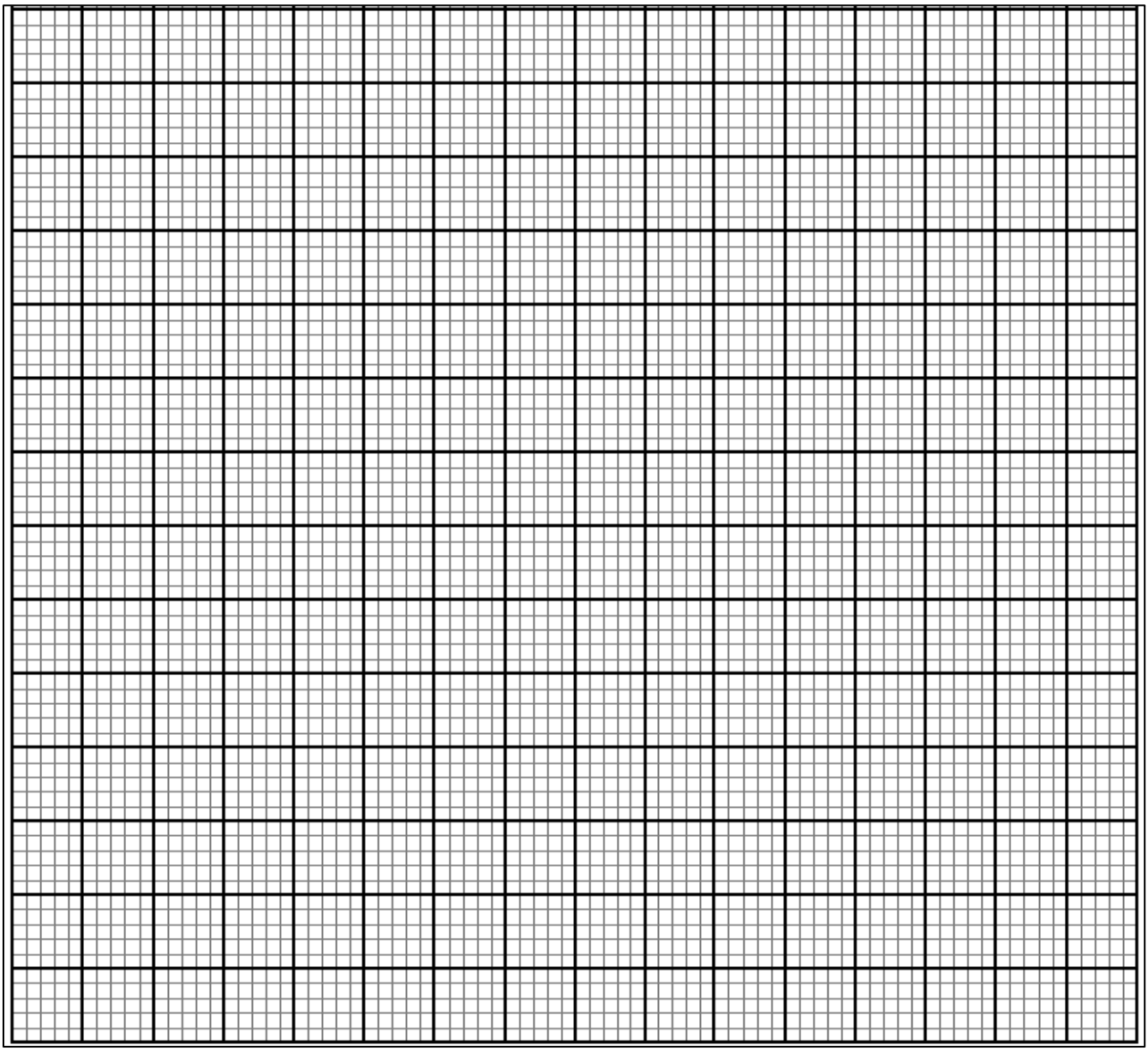
(d) Calculate the average speed of the cheetah in first 20 seconds (3mks)

22. Given the quadratic function $y=3x^2 + 4x - 1$

a) Complete the table below for values of x ranging $-4 \leq x \leq 3$. (2mks)

b) Using the grid provided draw the graph of $y = 3x^2 + 4x - 2$ for $-4 \leq x \leq 3$ (3mks)

c)



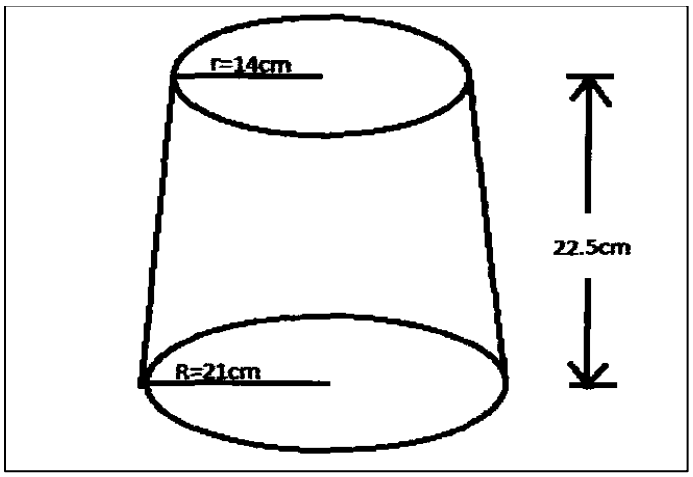
Using the graph, find the solution to the equations.

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

ii) $3x^2+7x+2=0$ (3mks)

23. The diagram represents a solid frustum with base radius 21cm and top radius 14cm. The frustum is 22.5cm high and is made of a metal whose density is 3 g/cm3.

(Take $\pi=\frac{22}{7}$)



a) Calculate

(i) The volume of the metal in the frustum. (5 marks)

(ii) The mass of the frustum in kg. (2 marks)

b) The frustum is melted down and recast into a solid cube. In the process 20% of the metal is lost. Calculate to 2 decimal places the length of each side of the cube.

(3 marks)

24. A saleswoman is paid a commission of 2% on goods sold worth over Ksh 100,000. She is also paid a monthly salary of Ksh 12,000.In a certain month, she sold 360 handbags at Ksh 500 each.

a) Calculate the saleswoman's earnings that month. (3 mks)

b) The following month, the saleswoman's monthly salary was increased by 10%. Her total earnings that month were Ksh 17,600.

Calculate:

i) The total amount of money received from the sales of handbags that month.

(5 mks)

ii) The number of handbags sold that month. (2 Mks)

NAME…….ADM.NO……CLASS……

DATE:……/……./

121/2
2020 FORM 4 TERM 1 ENTRY EXAMS

MATHEMATICS
PAPER 2
TIME: 2½ HRS.

INSTRUCTION TO STUDENTS:

1. *Write your **name**, **admission number** and **class** in the spaces provided above.*
2. *Write the **date** of examination in spaces provided.*
3. *This paper consists of **two** Sections; Section **I** and Section **II**.*
4. *Answer **ALL** the questions in Section **I** and only **five** questions from Section **II**.*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. *Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.*
7. *Marks may be given for correct working even if the answer is wrong.*
8. *KNEC Mathematical tables **may be** used, except where stated otherwise.*
9. *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*
10. ***Candidates should answer the questions in English.***

FOR EXAMINER'S USE ONLY:
SECTION I

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

17	18	19	20	21	22	23	24	TOTAL

SECTION II

GRAND TOTAL

SECTION

11. Use logarithms to evaluate.

$\frac{4.497\ x\ \sqrt{0.3673}}{1-coscos\ 81.53°}$ 3mks

12. The sum of the fifth and sixth term of an AP is 30.If the third term is 5.Find the first term.

3mks

13. Make K the subject of the formula and simplify. 3mks

$$t = \frac{2y + 1}{\sqrt{2ky + k}}$$

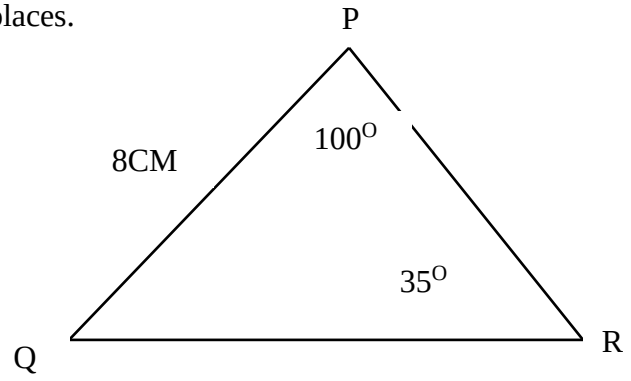
14. Solve for x

$2 - (log\ log\ X)^2 = 3\ log\ log\ X$ -loglog X ^2=3loglog X

3mks

15. The sides of a triangle were measured and recorded as 4cm,6.2cm and 9.50cm.Calculate the percentage error in its perimeter correct to 2 decimal places. 3mks

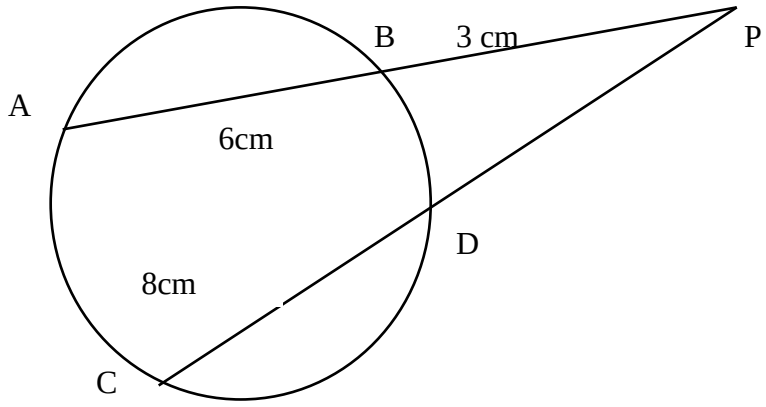
16. The figure below shows a triangle PQR in which PQ=8cm and angle QPR=100^0 and angle PQR=35^0.Calculate to 2 decimal places the length of QR and hence the area of triangle PQR to2 decimal places. 3mks



17. (a) Expand $(1-2x)^6$ up to term in x^3. 2mks

(b) Use the expansion above to evaluate $(1.02)^6$ correct to 4 decimal places. 2mks

18. Find the length of DP in the figure. 3mks



19. Given the matrix $(5-x\ 2\ 3x\ 4)$ has no inverse, find the value of x. 2mks

20. Without using a calculator solve $\frac{\sqrt{252}+\sqrt{72}}{\sqrt{32}+\sqrt{28}}$ leaving your answer in the form $a\sqrt{b+c}$ where a,b and c are integers. 4mks

21. Find the radius as the center of a circle whose equation is

$3x^2 + 3y^2 + 18y - 12x - 9 = 0$ 3mks

22. A new laptop depreciates at 8% per annum in the first year and 12% per year in the second year. If its value at the end of the second year was sh.121,440, calculate its original value. 3mks

23. Given that C varies partly as A and partly as the square of A and that C=20 when A=2 and C=21 when A=3,determine the value of C when A=4. 3mks

24. The size of an interior angle of a regular polygon is 6 ½ times that of its exterior angle determine the number of sides of the polygon. (3 mks)

25. Given that the ration x:y=2:3 find the ratio (5x-2y):(x+y). 3mks

26. Kiprono buys tea costing sh 112 per kilogram and sh.132 per kilogram and mixes them, then sells the mixture at sh.150 per kilogram .If he is making a profit of 25% in each kilogram of the mixture ,determine the ratio in which he mixes the tea. 4mks

SECTION II(ANSWER ONLY FIVE QUESTIONS)

27. Mrs.Langat ,primary school head teacher earns a basic salary of sh.38,300 house allowance of sh.12,000 and radical ,allowance of sh.3,600 every month. She claims a family relief of sh.1172 and insurance relief of 10% of the premium paid. Using tax rates table below.

Taxable income £(p.a)	**Tax (ksh /£)**
1-8800	2
8801-16800	3
16801-24800	5
24801-36800	7
36801-48800	9
Over 48800	10

a. Calculate Mrs.Langats annual taxable income in Kenya pound per annum. 2mks

b. Tax due evenly month from Mrs.Langat. 4mks

c. If the following deductions are made every month from her salary,

w.c p.s 2 % of basic salary
life insurance premium of sh.4600
sacco van repayment of sh.14,200
Calculate

i. the total deductions. 2mks

ii. Her net pay for very month. 2mk

iii.

28. A bag contains 5 red balls, 3 blue balls and 4 yellow balls. Two balls are drawn at random one after the other without replacement.

a. Draw a tree diagram to illustrate his pickings. 2mks

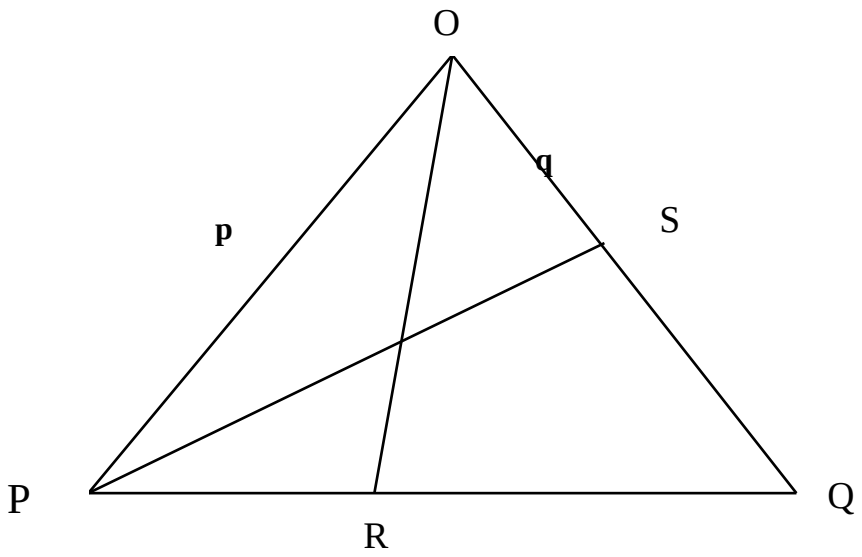
b. Calculate the probability that

i. Both balls picked were red. 2mks

ii. Both balls picked were of the same colour. 3mks

iii. There was no red ball from the two balls picked. 3mks

29. In the triangle given below $\overrightarrow{OP}$= **p** and $\overrightarrow{OQ}$= **q**.R is a point on $\overrightarrow{PQ}$ such that PR:RQ = 1 : 3 and that 5OS= 2OQ.PS and OR intersect at T.



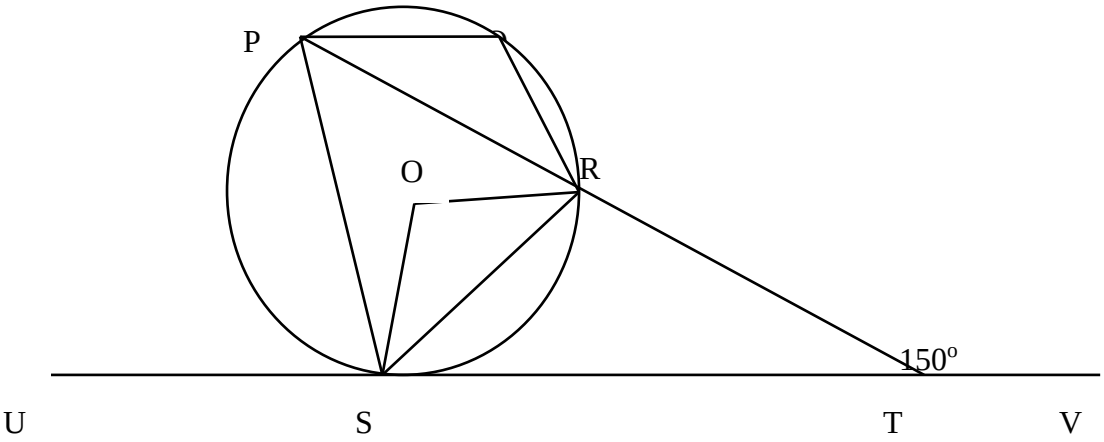
a. Express in terms of **p** and **q**.

(e) $OS \rightarrow$ 1mk

(f) $PQ \rightarrow$ 1mk

b. Given that **OT**=h $\underline{O}$ R and **PT** = k**PS**, determine the values of h and k. 6mks

30. In the figure below,P,Q,R and S are points on the circle centre O. PRT and USTV are straight lines.Line UV is a tangent to the circle at S. $< RST = 50^0$ and $< RTV = 150^0$.



a. Calculate the size of

i. $<$ ORS 2mks\

ii. $< USP$ 1mk

iii. $<$ PQR 2mks

b. Given that RT=7cm and ST=9cm,calculate to 3 significant figures

i. Length of the line PR 2mks

ii. The radius of the circle. 3mks

31. The product of the first three terms of geometric progression is 64.If the first term is a and the common ratio is r;

25. Express r in terms of a 3mks

26. Given that the sum of the three terms is 14

i. Find the values of a and r ,hence write down two possible sequences each upto 4^{th} term. 5mks

ii. Find the sum of the first 5 terms of each sequences. 2mks

32. A water vendor has a tank of capacity18,9000 litres.The tank is being filled with water from two pipes A and B which are closed immediately when the tank is full.Water flows at the rate 150,000cm^3/minute through pipe B.

    a. If the tank is empty ,and the two pipes are opened at the same time,calculate the time it takes to fill the tank. 5mks

    b. On a certain day the vendor opened the two pipes A and B to fill the empty tank.After 25 minutes he opened the outlet tap to supply water to his customer at average rate of 20 litres per minute. Calculate the time it took to fill the tank on that day.
    5mks

33. Three variables p, q and r are such that p varies directly as q and inversely as the square of r.

(a) When p=9, q12 and r = 2.
Find p when q= 15 and r =5 (4mks)

(b) Express q in terms of p and r. (1mks)

(c) If p is increased by 10% and r is decreased by 10%, find;
(i) A simplified expression for the change in q in terms of p and r
(3mks)

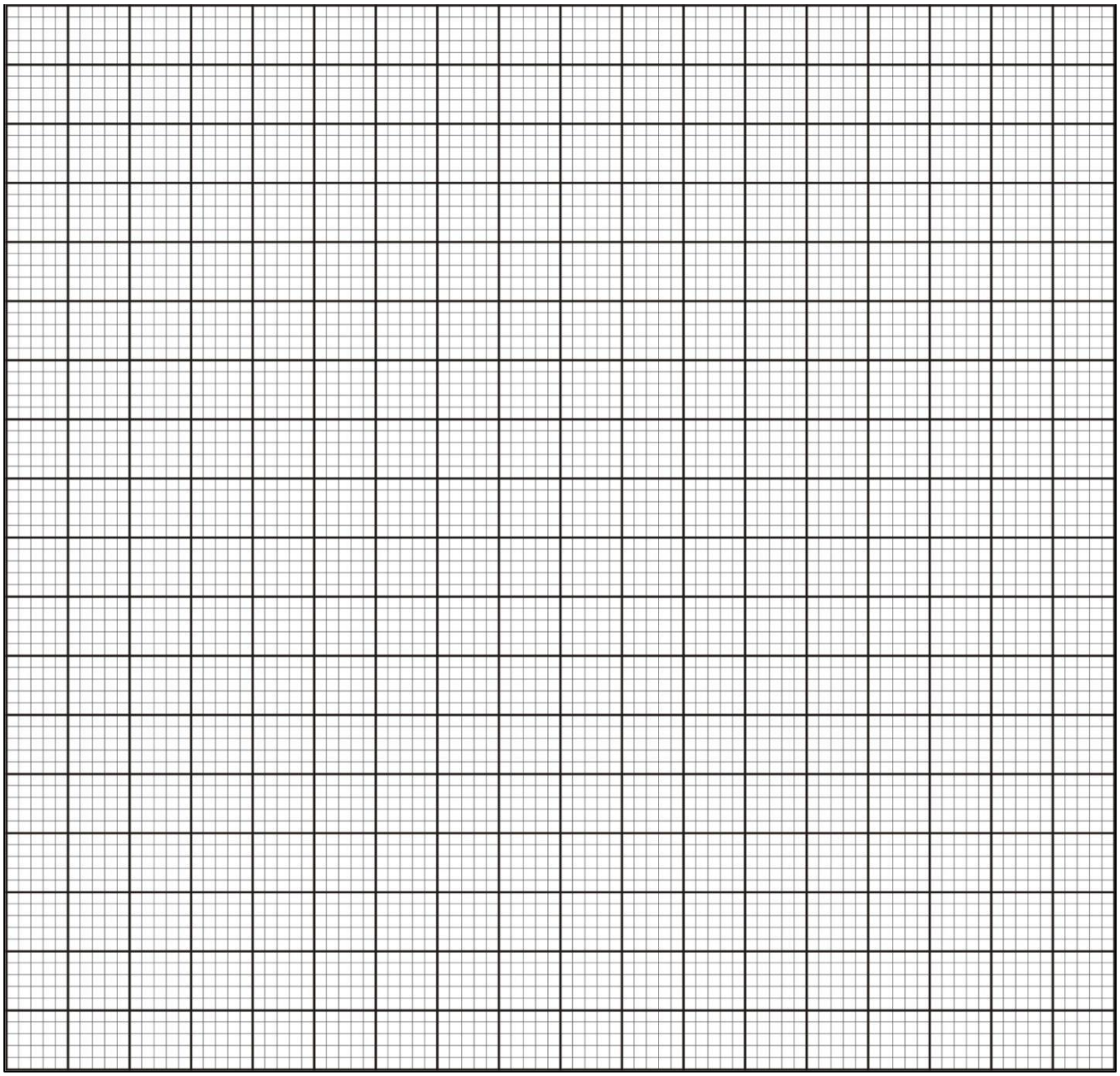
(ii) The percentage change in q. (2mks)

34. The table below shows some values of the curve y = 2cos x and y= 3 sin x.

(iii)Complete the table for values y=2cosx and y=3 sin x, correct to 1 decimal places. 3mks

x	0	30^0	60^0	90^0	120^0	150^o	180^0	210^0	240^0	270^0	300^0	330^0	360^0
y=2cos x	2		1	0			-1.7	-1.7	-1		1	1.7	2
y=3sn x	0	1.5		3	2.6				-2.6			-1.5	0

On the grid provided draw the graphs of y=2 cos x and y= 3sin x for $0^0 \leq x \leq 360^0$ on the same axis. 5mks



a. Use the graph to find the values of x when 2cos x- 3sin x=0. 2mks

b. Use the graph to find the values of y when 2 cos x = 3sin x. 1mk

NAME: …… INDEX NO : ……..

121/1
MATHEMATICS
PAPER 1
TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES

i. **Write your name and Index number in the spaces provided above.**
ii. **This paper consists of two sections: Section I and Section II.**
iii. **Answer all questions in Section I and only Five questions from Section II.**
iv. **Show all the steps in your calculations giving your answer at each stage in the spaces provided below each question.**
v. **Non-programmable silent electronic calculators and KNEC mathematical tables may be used.**

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

SECTION I (50 MKS)
Attempt all questions.

1. Use tables of reciprocal only to evaluate $\frac{1}{0.325}$ hence evaluate : 3 $\frac{0.000125}{0.325}$ (3mks)

2. Two boys and a girl shared some money. The elder got **4/9** of it, the younger boy got **2/5** of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girls share.

(3mks)

3. Annette has some money in two denominations only. Fifty shillings notes and twenty shilling coins. She has three times as many fifty shilling notes as twenty shilling coins. If altogether she has sh. 3,400, find the number of fifty shilling notes and 20 shilling coin. (3mks)

4. The figure below shows a rhombus PQRS with PQ= 9cm and ‹SPQ=60^0 . SXQ is a circular arc, centre P.

S R

P Q

Calculate the area of the shaded region correct to two decimal places (Take Pie= 22/7) (4mks)

5. Solve the equation $2x^2 + 3x=5$ by completing the square method (3mks)

6. Simplify the expression $\frac{3x^2 - 4xy^2 + y}{9x^2 — y^2}$ (3mks)

7. Solve the equation $\mathbf{8x^2 + 2x - 3 = 0}$ hence solve the equation $\mathbf{8Cos^2y + 2Cosy - 3= 0}$
   For the range $0^0 < y < 180^0$ (4mks)

8. Show that the points P(3,4), Q(4,3) and R(1,6) are collinear. (3mks)

9. Solve the inequalities $x \leq 2x + 7 \leq \frac{1}{3}x + 14$ hence represent the solution on a number line. (3mks)

10. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number.
    (3mks)

11. The volume of two similar solid spheres are $4752cm^3$ and $1408cm^3$. If the surface area of the small sphere is $352cm^2$, find the surface area of the larger sphere.
(3mks)

12. Solve for x in the equation $\frac{1}{2}\log_2 81 + \log_2(x - x/3) = 1$
(3mks)

13. A farmer has a piece of land measuring 840m by 396m. He divides it into square plots of equal size. Find the maximum area of one plot.
(3mks)

14. a) find the inverse of the matrix (1mk)

b) Hence solve the simultaneous equation using the matrix method (2mks)
$4x + 3y = 6$
$3x + 5y + 5$

15. In the figure below O is the centre of the circle and $\angle OAB = 20^0$. Find;
    a) $\angle AOB$ (1mk)
    b) $\angle ACB$ (2mks)

A

B

16. Each interior angle of a regular polygon is 120^0 larger than the exterior angle. How many sides has the polygon? (3mks)

SECTION II (50MKS)
Choose any fie questions

17. Three business partners, Bela Joan and Trinity contributed Kshs 112,000, Ksh,128,000 and ksh,210,000 respectively to start a business. They agreed to share their profit as follows:
30% to be shared equally
30% to be shared in the ratio of their contributions
40% to be retained for running the business.

If at the end of the year, the business realized a profit of ksh 1.35 Million. Calculate:

a) The amount of money retained for the running of the business at the end of the year. (1mk)

b) The difference between the amounts received by Trinity and Bela (6mks)

c) Express Joan's share as a percentage of the total amount of money shared between the three partners.
(3mks)

18. Complete the table below for the function $y=x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ (3mks)

X	-5	-4	-3	-2	-1	0	1
X^3	-125	-64			-1	0	8
$6X^2$			54		6	0	
8X	-40		-24	-16		0	8
Y		0	3			0	15

a) Draw the graph of the function $y=x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ (3mks)
(use a scale of 1cm to represent 1 unit on the x-axis . 1cm to represent 5 units on the y-axis)

b) Hence use your graph to estimate the roots of the equation
$X^3 + 5x^2 + 4x = -x^2 - 3x - 1$ (4mks)

19. Three islands P,Q,R and S are on an ocean such that island Q is 400Km on a bearing of 030^0 from island P. island R is 520Km and a bearing of 120^0 from island Q. A port S is sighted 750Km due South of island Q.
    a) Taking a scale of 1cm to represent 100Km, give a scale drawing showing the relative positions of P,Q,R and S.
    (4mks)

Use the scale drawing to:

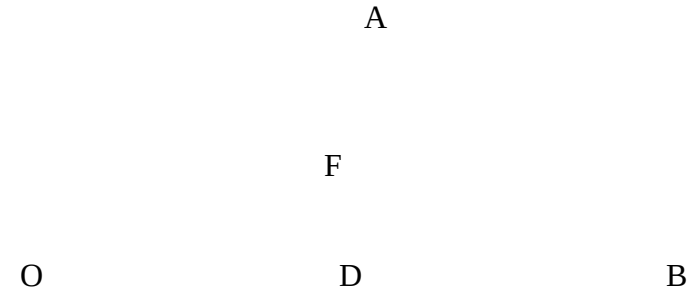
b) Find the bearing of:
    i. Island R from island P (1mk)

    ii. Port S from island R (1mk)

c) Find the distance between island P and R (2mks)

d) A warship T is such that it is equidistant from the islands P,S and R. by construction locate the position of T. (2mks)

20. In the figure below, E is the midpoint of AB, OD:DB=@:3 and f is the point of intersection of OE and AD.



Given OA= a and OB= B

a) Express in terms of a and b
   i. AD (1mk)
   ii. OE 2(mks)

b) Given that AF= sAD and OF= tOE find the values of s and t (5mks)

c) Show that E,F and O are collinear (2mks)

21. A bag contains 5 red, 4 white and 3 blue beads . two beads are selected at random one after another.

a) Draw a tree diagram and show the probability space. (2mks)

b) From the tree diagram, find the probability that;

   i. The last bead selected is red (3mks)

   ii. The beads selected were of the same colour (2mks)

iii. At least one of the selected beads is blue. 3(mks)

22. The table below shows how income tax was charged on income earned in a certain year.

Taxable income per year(Kenyan pounds	Rate shilling per K£
1-3630	2
3631- 7260	3
7261 -10890	4
10891 - 14520	5

Mr. Gideon is an employee of a certain company and earns a salary of ksh.15,200 per month. He is housed by the company and pas a nominal rent of Ksh. 1050 per month. He is married and is entitled to a family relief of ksh. 450 per month.

i. Calculate his taxable income in K£ p.a (2mks)

ii. Calculate his gross tax per month. (4mks)

iii. Calculate his net tax per month (2mks)

iv. Calculate his net salary per month (2mks)

23. The table below shows the distribution of mathematics marks of form 4 candindates in Mavoko Secondary school.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
F	4	7	12	9	15	23	21	5	4

Use the above date to calculate:

a) Mean using assumed mean of 65 (3mks)

b) Median (3mks)

c) Standard deviation (4mks)

24. Coast bus left Nairobi at 8.00am and travelled towards Mombasa at an average speed of 80Km/hr. At 8.30am, Lamu bus left Mombasa towards Nairobi at an average speed of 120 km per hour. Given that the distance between Nairobi and Mombasa is 400Km.: determine:

    i. The time Lamu bus arrived in Nairobi. (2mks)

    ii. The time the two buses met. (4mks)

    iii. The distance from Nairobi to the point where the two buses met. (2mks)

iv. How far coast bus is from Mombasa when Lamu bus arrives in Nairobi (3mks)

NAME…….ADM.NO…….CLASS…….
Date ……

121/2
MATHEMATICS
Paper 2
March /April
2 ½ Hours

Instructions to candidates

1. *Write your **name, admission number** and **class** in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *The paper contains two sections: **Section I** and **Section II**.*
4. *Answer **All** the questions in **section I** and **strictly any five** questions **from Section II.***
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
7. *Marks may be given for correct working even if the answer is wrong.*
8. *Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, unless 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

This paper consists of 16 printed pages .Candidates should check the question paper to

SECTION A (50 MARKS)

Answer all the questions in this section

1. Use logarithm table to evaluate. 4 mks

2. 200 cm^3 of acid is mixed with 300 cm^3 of alcohol. If the densities of acid and alcohol are 1.08g/cm^3 and 0.8 g/cm^3 respectively, calculate the density of the mixture.
3 mks

3. The coordinates of P and Q are P(5, 1) and Q(11, 4) point M divides line PQ in the ratio 2 : 1. Find the magnitude of vector OM. (3 marks)

4. The table below shows income tax rates in a certain year.

Monthly income in Ksh	Tax rate in each Ksh
1 – 9680	10%
9681 – 18800	15%
18801 – 27920	20%
27921 – 37040	25%
Over 37040	30%

In that year, a monthly personal tax relief of Ksh. 1056 was allowed. Calculate the monthly income tax paid by an employee who earned a monthly salary of Ksh 32500.
(4 mks)

5. Make the subject of the formulae. 3mks

6. A line passes through points (2, 5) and has a gradient of 2.
   (a) Determine its equation in the form . 2mks

   (b) Find the angle it makes with x-axis. 1mk

7. A quantity **P** is partly constant and partly varies as the cube of **Q**. When **Q**=1, **P**=23 and when **Q** =2, **P**= 44. Find the value of **P** when **Q** = 5. 3mks

8. The vertices of a triangle are A(1, 2) , B(3, 5) and C(4, 1). The co-ordinates of C' the image of C under a translation vector T are (6, -2).
   (a) Determine the translation vector T. 1mk

   (b) Find the co-ordinates of A' and B' under the translation vector T. 2mks

9. (a) Expand using the binomial expansion. 1mk

   Use the first three terms of the expansion in (a) above to find the value of $(0.98)^4$ correct to nearest hundredth. 2mks

10. Find the centre and radius of a circle with equation:
    $□^2 + y^2 - 6□ + 8y - 11 = 0$ (3mks)

11. Two grades of coffee one costing sh.42 per kilogram and the other costing sh.47 per kilogram are to be mixed in order to produce a blend worth sh.46 per kilogram in what proportion should they be mixed. (3mks)

12. Pipe A can fill an empty water tank in 3 hours while pipe B can fill the same tank in 5 hours. While the tank can be emptied by pipe C in 15 hours. Pipe A and B are opened at the same time when the tank is empty. If one hour later pipe C is also opened. Find the total time taken to fill the tank.
    4 mks.

13. Simplify the expression: 3mks.

14. A business bought 300 kg of tomatoes at Ksh. 30 per kg. He lost 20% due to waste. If he has to make a profit 20%, at how much per kilogram should he sell the tomatoes.
    3mks.

15. Evaluate without using a Mathematical table or a calculator.

$Log_6\ 216 + [Log\ 42 - Log\ 6] \div Log\ 49$ (2mks

	-4	-3	-2	-1	0	1	2	3
	-64							27
	-20							

16. Given that the ratio , find the ratio (3 mk)

SECTION II (50mks)

Answer only *five* questions in this section in the spaces provide

17. Draw the graph of for values of x in the range 5mks

(a) By drawing suitable straight line on the same axis, solve the equations.

i) 1mks

ii) 2mks

iii) 2mks

18. A transformation represented by the matrix $\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$ maps the points A(0, 0), B(2, 0), C(2, 3) and D(0, 3) of the quad ABCD onto $A^1B^1C^1D^1$ respectively.

a) Draw the quadrilateral ABCD and its image $A^1B^1C^1D^1$. (3mks)

b) Hence or otherwise determine the area of $A^1B^1C^1D^1$. (2mks)

c) Another transformation $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ maps $A^1B^1C^1D^1$ onto $A^{11}B^{11}C^{11}D^{11}$.
Draw the image $A^{11}B^{11}C^{11}D^{11}$. (2mks)

d) Determine the single matrix which maps $A^{11}B^{11}C^{11}D^{11}$ back to ABCD. (3mks)

19. In the figure **below** (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and angle CAB = 50°.

Calculate (to 2d.p.)

(a) the length BC. (3 marks)

(b) the size of angle ABC. (3 marks)

(c) size of angle CAD. (3 marks)

(d) Calculate the area of triangle ACD. (2 marks)

20. Three variables P, Q and R are such that P varies directly as Q and inversely as the square of R.

a) When P = 18, Q = 24 and R = 4.
Find P when Q = 30 and R = 10. (3mks)

(b) Express P in terms of Q and R. (1mk)

(c) If Q is increased by 20% and R is decreased by 10% find:
(i) A simplified expression for the change in P in terms of Q and R. (3mks)

(ii) The percentage change in P. (3mks)

21. A surveyor recorded the following information in his field book after taking measurement in metres of a plot.

	To E	
	1000	
	880	320 to D
720 to F	640	
	480	600 to C
240 to G	400	
	200	400 to B
	From A	

(a) Sketch the layout of the plot. 4 mks.

(b) Calculate the area of the plot in hectares. 6mks

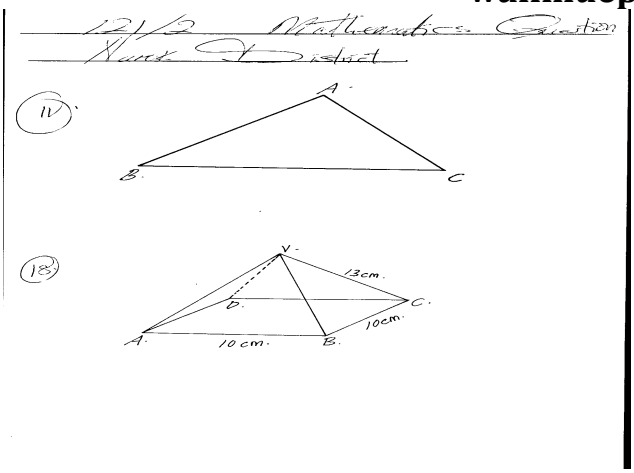
22. A line L passes through points (-2, 3) and (-1,6) and is perpendicular to a line P at (-1,6).
    a) Find the equation of L. (2 mks)

    b) Find the equation of P in the form ax + by = c, where a, b and c are constant. (2 mks)

    c) Given that another line Q is parallel to L and passes through point (1,2) find the x and y intercepts of Q. (3 mks)

    d) Find the point of intersection of lines P and Q. (3 mks)

23. The figure below shows a square ABCD point V is vertically above middle of the base ABCD. AB = 10cm and VC = 13cm.



Find;

(a) the length of diagonal AC (2mks)

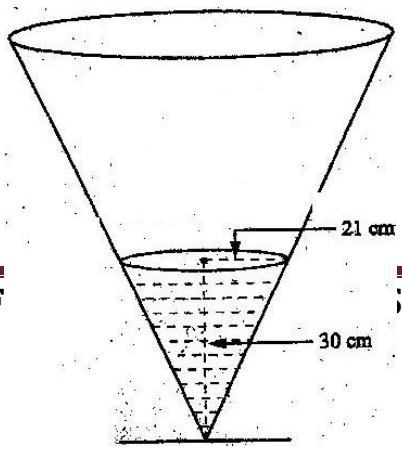
(b) the height of the pyramid (2mks)

(c) the acute angle between VB and base ABCD. (2mks)

d) the acute angle between BVA and ABCD. (2mks)

e) the angle between AVB and DVC. (2mks)

24. The diagram below represents a conical vessel which stands vertically. The which stands vertically,. The vessels contains water to a depth of 30cm. The radius of the surface in the vessel is 21cm. (Take □=22/7).



a) Calculate the volume of the water in the vessels in cm^3 3mks

b) When a metal sphere is completely submerged in the water, the level of the water in the vessels rises by 6cm.
Calculate:

(i) The radius of the new water surface in the vessel; (2mks)

(ii) The volume of the metal sphere in cm^3 (3mks)

(iii) The radius of the sphere. (3mks)

NAME…… ADM Number……..

Candidate's Class……

121/1
MATHEMATICS
JULY 2018
2 ½ hours

walimuepublishers@gmail.com

JOINT EXAMINATION MOCK 2018

121/1

MATHEMATICS

JULY 2018

2 ½ hours

Instructions to Candidates

11. *Write your name and index number in the spaces provided above.*
12. *Sign and write the date of examination in the spaces provided above.*
13. *This paper consists of **TWO** sections: **Section I** and **Section II.***
14. *Answer **ALL** the questions in **Section I** and **only five** questions from **Section II**.*
15. *All answers and working must be written on the question paper in the spaces provided below each question.*
16. ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
17. *Marks may be given for correct working even if the answer is wrong.*
18. ***Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.*
19. ***This paper consists of 14 printed pages.***
20. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

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

This paper consists of 14 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

SECTION 1 (50 MARKS)

Answer all questions in this section

2. Evaluate without using a calculator

$\frac{1}{4} + \frac{1}{5} \div \frac{1}{2}$ of $\frac{1}{3}$ (3mks)

$\frac{1}{2}$ of $(\frac{4}{5} - \frac{3}{4} + \frac{1}{2})$

2. Simplify completely.

$$\frac{3a^2 + 5ab - 2b^2}{9a^2 - b^2}$$ (3mk)

3. Solve for x in the equation.

$27^x \times 3^{(2x-2)} = 9^{(x+2)}$ (3 marks)

4. Given that $Sin\ \theta = 2/3$ and θ is an acute angle, find without using tables or calculators

(a) $Tan\ \theta$, giving your answer in surd form. (2mks)

(c) $Cos\ (90 - \theta)$ (1mk)

5. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines gave out a signal simultaneously. Find the time this will happen again. (3mks)

6. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the full tank in 6 hours. If the three pipes **A**, **B**, and **C** are opened at the same time, find how long it will take for the tank to be full. (3mks)

7. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

	Buying	**Selling.**
US $	65.20	69.10
Sterling Pound (£)	123.40	131.80

(4mks)

8. A straight line through the points A (2,1) and B(4,n) is perpendicular to the line 3y+2x=5. Determine the value of n and the equation. (4mks)

9. Determine the quartile deviation of the set of numbers below. (2mks)

8, 2, 3, 7, 5, 11, 2, 6, 9, 4

10. Solve the equation $2\cos 2(x + 30^0) = 1$ for $0^0 \leq x \leq 360^0$. (3 marks)

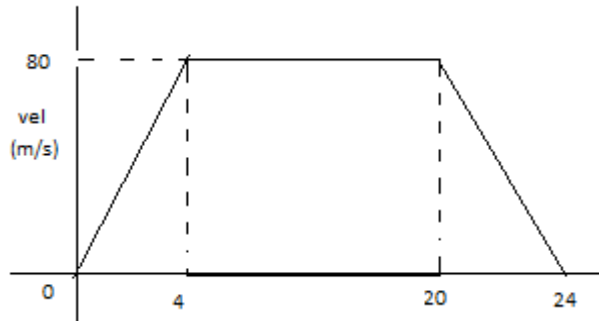
11. Without using tables or calculators, find the value of **t** in

$\log_8(t + 5) - \log_8(t - 3) = {}^2/_3$ (3mks)

13. Solve for x :3(x + 2) - $\frac{20x - 5}{}$ > 3 ¼ (3 mks)

13. Three years ago John was four times as old as his son Peter. In five years' time the sum of their ages will be 56. Find their present ages. (3mks)

14. The figure below show a velocity time graph for a wagon.



(a) Find the total distance travelled by the wagon. (2 marks)

(b) For how long did it maintain a constant speed? (1mark)

15. The volumes of two similar solids are $800cm^3$ and $2700cm^3$. If the surface area of the larger one is $2160cm^2$, find the surface area of the smaller figure. (3mks)

16. A ball is in the shape of a sphere. It weighs 125g. The material used to make it has a density of $2.5g/cm^3$. What is the volume of the material to make a dozen such balls? (3 marks)

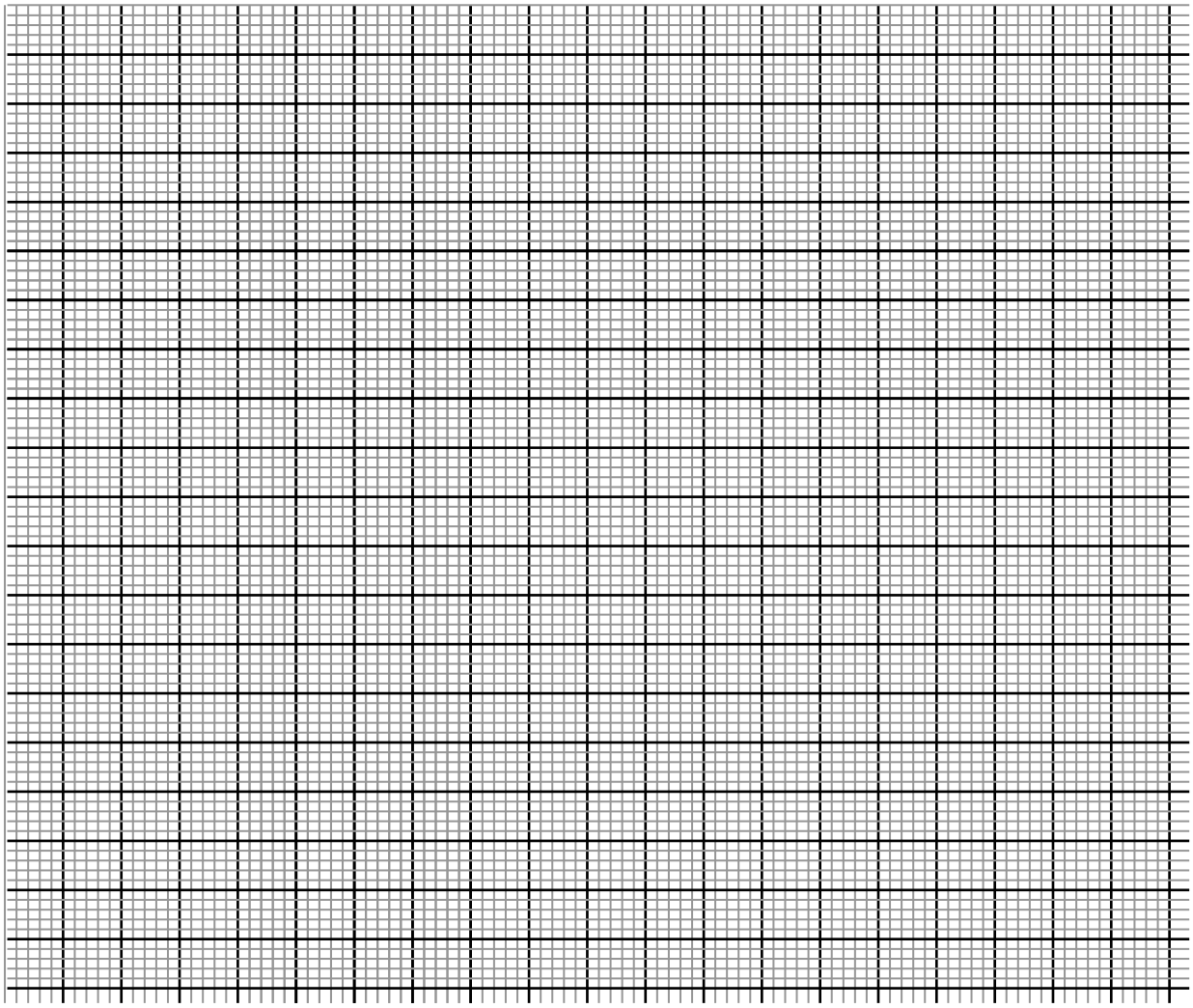
SECTION II (50 MARKS)

Answer any five questions in this section.

17. (a) Complete the table below for the equation $y = x^2 + 3x - 6$ given $-6 \leq x \leq 4$ (2mks)

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

(b) draw the graph of $y = x^2 + 3x - 6$ (3mks)



(c) Use your graph to solve the quadratic equations.

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

(iv) $x^2 + 3x - 2 = 0$ (3mks)

18. A saleswoman is paid a commission of 2% on goods sold worth over ksh. 100,000. She also paid a monthly salary of ksh. 12,000. In a certain month, she sold 360 handbags at ksh. 500 each.

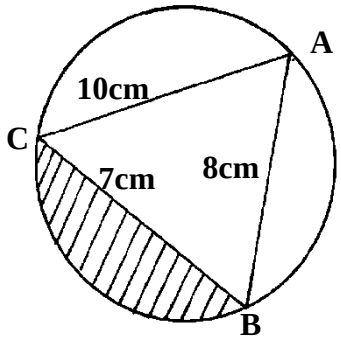
a) Calculate the saleswoman's earnings that month. (3 mks)

b) The following month the sales woman's monthly salary was increased by 10%. Her total earnings that month were ksh. 17600. Calculate:

(i) The total amount of money received from the sales of hand bags that month. (5 mks)

ii) The number of handbags sold that month. (2 mks)

19. The figure below shows a triangle **ABC** inscribed in a circle. **AC** = 10cm, **BC** = 7cm and **AB** = 10cm.

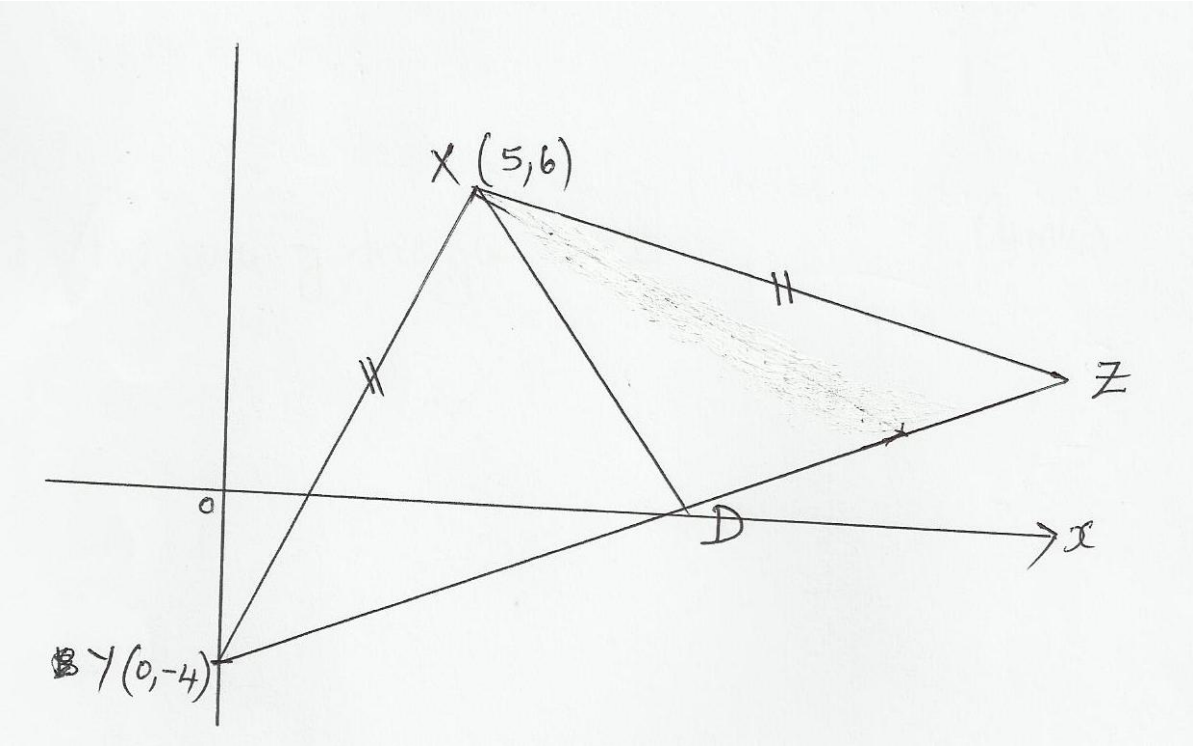


(a) Find the size of angle **BAC**. (2mks)

(b) Find the radius of the circle. (2mks)

(c) Hence calculate the area of the shaded region. (6mks)

20. The diagram below which is not drawn to scale, shows an isosceles triangle XYZ in which XY=YZ. The Coordinates of x and y are (5, 6) and (0, -4) respectively.



Given that the equation of line YZ is y=3/4x – 4 and that the perpendicular from X to YZ meet YZ at D, find.

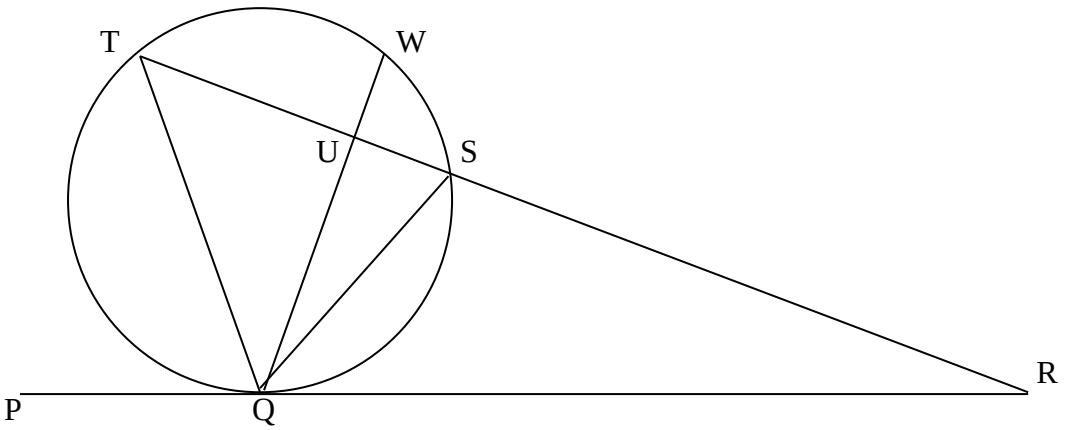
(v) The equation of XD (2 marks)

(vi) The coordinate of D (2 marks)

(vii) The coordinates of Z (2 marks)

(viii) The area of triangle XYZ (4 marks)

21. In the figure below, PQR is a tangent at Q and RST is a straight line. $\angle$ QTU = 50^0, $\angle$ UTW = 33^0 and $\angle$ TRQ = 25^0



Giving reasons in each case, calculate

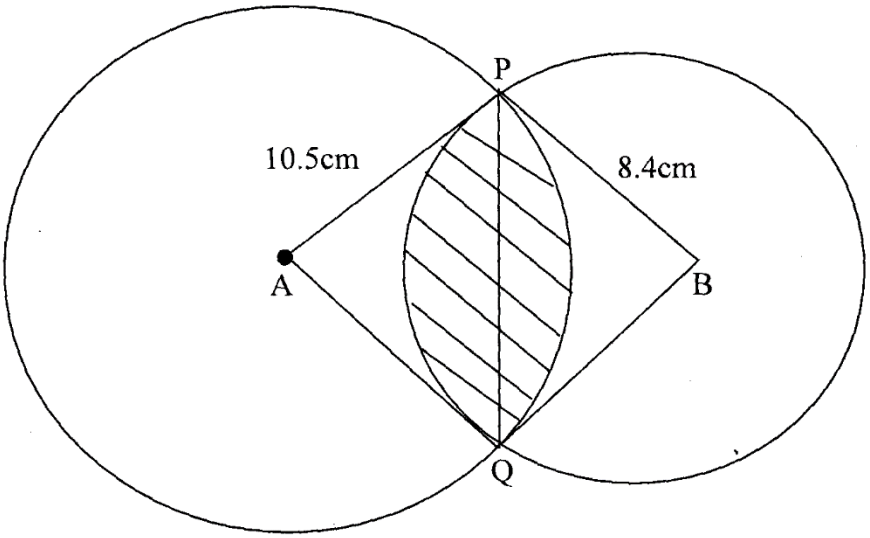
(i) Angle TSQ (3 marks)

(ii) Angle TSW (3 marks)

(iii) Angle TUQ (2 marks)

(iv) Angle PQW (2 marks

22. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.



(a) Calculate angle PAQ. (2 mks)

(b) Calculate angle PBQ. (2 mks)

(c) Calculate the area of the shaded part. (6 mks)

23. A and B are two towns 360 kilometers apart. A bus left **A** at 8.00 am travelling at 60km/h for town **B**.

After forty minutes, a saloon car left **A** travelling in the same direction as the bus at a speed of 80km/h.

c) How far from **B** did the saloon car catch up with the bus?

d) At what time did it catch up with the bus?

c) When the saloon caught up with the bus it got a break - down and had to be repaired before proceeding to **B** at the same speed. If they both reached **B** at the same time, find how long it took to repair the saloon?

24. An arithmetic progression (AP) has the first term a and the common difference d.

(a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d. (1mk)

(b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-

(i) the first term and common difference of the AP. (5mks)

(ii) the sum of the first nine terms of the AP. (2mks)

(iii)The difference between the fourth and the seventh terms of an increasing AP. (2mks)

Name……Index No……

121/2
MATHEMATICS
JULY 2018
2½ Hours

walimuepublishers@gmail.com

JOINT EXAMINATION MOCK 2018

INSTRUCTIONS TO CANDIDATES

10. *Write your name and index number in the spaces provided above.*
11. *Sign and write the date of examination in the spaces provided above*
12. *The paper contains **two** sections: **Section I** and **Section II**.*
13. *Answer **All** the questions in **section I** and **strictly any five** questions **from Section II.***
14. *All answers and working must be written on the question paper in the spaces provided below each question.*
15. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
16. *Marks may be given for correct working even if the answer is wrong.*
17. *Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except unless stated otherwise.*
18. *This paper consists of **13 printed pages**. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*

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

Section I (50 marks)

1. Use logarithms in all steps to evaluate. (4marks)

$$\frac{2.532 \times 83.45}{\sqrt{0.4562}}$$

2. The sum of the interior angles of two regular polygons of sides n-1 and n are in the ratio of 2:3 Name the polygon with the fewer sides. (3marks)

3. The diameter AB of a circle passes through points A (-4, 1) and B(2, 1). Find the equation of the circle and leave your answer in the form $\chi^2 + y^2 + a\chi + by = c$ where a, b and c are constants.(4 marks)

4. Without using mathematical tables and calculators simplify. (3marks)

$$\frac{2}{3 - \sqrt{7}} - \frac{2}{3 + \sqrt{7}}$$

5. Expand $(2+x)^5$ up to the terms in x^3. Hence approximate the value of $(2.03)^5$. (3marks)

6. The sides of a triangular stool were measured as 8 cm, 10cm, and 15cm. Calculate the % error in the perimeter correct to 2d.p. (3marks)

7Solve for x given that the following is a singular matrix (3mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$

8. The current price of a vehicle is sh. 500,000. If the vehicle depreciates at rate of 12% p.a find the number of years it will take for its value to fall to sh. 180,000. (3 marks)

9 Two variables are such that A is partly constant and partly varies as the square root of B. Given that A = 27 when $B = \frac{1}{4}$ and A = 18; when B = 25, find A when $B = 12\frac{1}{4}$. (3 marks)

10. Determine the amplitude and period of the graph of $y = 6 \sin (\frac{x}{2} - 90^0)$. (2marks)

11. A cylindrical container of radius 14 cm and 7cm is filled with water. If the container was a cube, what would be the base area of the cube? (3marks)

12. Solve the following equation. (3marks)

$1 + \log_5 x = \log_5 12$

13. A law relating some two variables K and L was found to be $KL^n = C$. Make n the subject of the formula. (3marks)

14. Solve the equation below by completing the square method $3x^2 - 7x + 2 = 0$ (3 marks)

15. Maize and millet costs Sh. 45 and Sh. 56 per kilogram respectively. Calculate the ratio in which they were mixed if a profit of20% was made by selling the mixture at 66 per kilogram. (4marks)

16. Given that P = (3i +k) and Q = (2i - k), find $\left|PQ\right|$ (3mk)

Section II (Answer five questions only from this section)

17. The position of two towns are A (30ºS, 20ºW) and B (30ºS, 80ºE) find

(a) the difference in longitude between the two towns. (1 mark)

(c) (i) the distance between A and B along parallel of latitude in km (take radius of the earth as 6370km and $\pi = \frac{22}{7}$). (3 marks)

(ii) in nm. (2 marks)

(c) Find local time in town B when it is 1.45pm in town A. (4 marks)

18. Mr. Johnson is a teacher in Kenya .He earns a basic salary of Sh. 19,620 per month. He is paid a house allowance of Sh. 12,000, a medical allowance of Sh. 2,246 and a commuter allowance of Sh. 4,129 .He is deducted Sh. 1,327 towards a Retirement Benefit's Scheme.
Use the tax rates given below to answer the questions below.

Monthly taxable (shp.m)	Rate of tax (%)
0 – 10,164	10
10,165 – 19,740	15
19,741 – 29,316	20
29,317 – 38,892	25
Over 38,892	30

(a) Calculate the monthly taxable income. (2marks)

(b) Calculate the PAYE he pays to the government if he gets a monthly tax relief of Sh. 1162.
(6marks)

(c) Calculate his net monthly salary (2marks)

19. The table below shows the distribution of ages in years of 50 adults who attended a clinic:-

Age	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	15	11	17	4	2	1

(a) State the medium class (1mk)

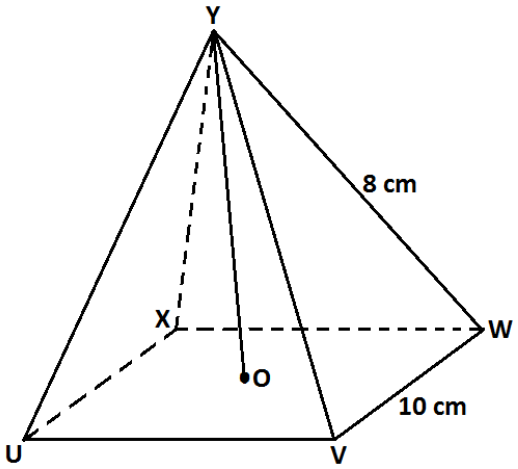
(b) Using a working mean of 45.5, calculate:-

(i) the mean age (3mks)

(ii) the standard deviation (3mks)

(iii) Calculate the 6^{th}decile. (3mks)

20. UVWXY is a right pyramid on a horizontal square base of side 10cm. YU =YV = YW =YX = 8cm.



(a) Calculate the height of the pyramid. (3marks)

(b) The angle between
(i) The slant face YWV and the base UVWX. (2marks)

(ii) YV and the base UVWX. (2marks)

(c) Calculate the angle between the planes UVY and WXY. (3marks)

21The probability that three candidates; Anthony, Beatrice and Caleb will pass an examination are $\frac{3}{4}$, $\frac{2}{3}$ and $\frac{4}{5}$ respectfully. Find the probability that:-

(a) all the three candidates will pass (2mks)

(b) all the three candidates will not pass. (2mks)

(c) only one of them will pass (2mks)

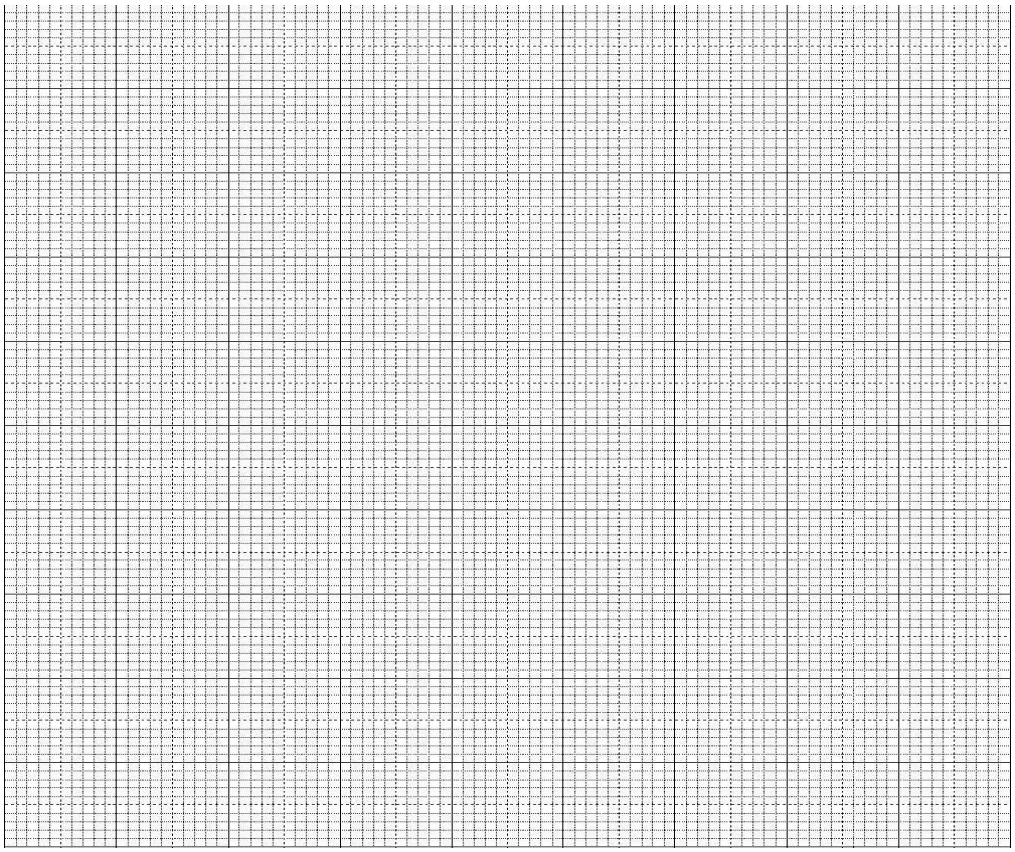
(d) only two of them will pass. (2mks)

(e) at most two of them will pass. (2mks)

22. Complete the table below giving your values correct to 2 d.p. (2marks)

x	0^0	15^0	30^0	45^0	60^0	75^0	90^0	105^0	120^0
$3\cos x^0$	3.00		2.60		1.50		0	-0.78	
$4\sin(2x - 10^0)$		1.37		3.94	3.76		0.69		-3.06

(b) draw the graphs of $y = 3\cos x^0$ and $y = 4\sin(2x - 10^0)$ on the same set of axis on the grid provided. (4marks)



(c) Use your graph to find values of x for which $3\cos x - 4\sin(2x - 10^0) = 0$. (2marks)

(d) State

(i) The amplitude of the graph $y = 3\cos x$. (1mark)

(ii) The period of the graph $y = 4\sin(2x - 10^0)$. (1mark)

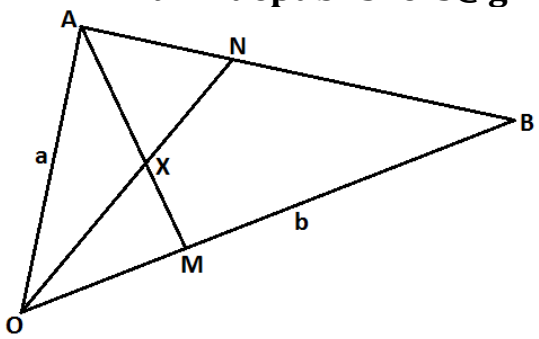
23. Use a ruler and a pair of compasses only all constructions in this question.

(a) Construct the rectangle ABCD such that AB = 7.2cm and BC = 5.6cm. (3mks)

(b) Constructs on the same diagram the locus L_1 of points equidistant from A and B to meet with another locus L_2 of points equidistant from AB and BC at M. measure the acute angle formed at M by L_1 and L_2. (3mks)

(c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region.
Correct to one decimal place. (4mks)

24. In the figure below, M and N are points on **OB** and **BA** respectively such that **OM**: **MB** = 2:3 and **BN:NA** = 2:1. ON and AM intersect at X



(a) Given that **OA** = **a**and **OB** = **b,** Express in terms of **a** and **b**

(i) **ON** **(**2marks)

(ii) **AM** (1mark)

(b) Given that OX = h**ON**and **AX** = k**AM** where h and k are scalars

(i) Determine the constants k and h (5marks)

(ii) The ratio which X divides **AM**. (2marks)

NAME…….INDEXNO……

SCHOOL……SIGNATURE……DATE……

121/1

MATHEMATICS

JULY/AUGUST 2020

2 ½ HOURS

Kenya Certificate of Secondary Education -2020

MATHEMATICS ALT 'A'

PAPER 1

2 ½ HOURS

Instructions to candidates

i. Write your name and index number in the spaces provided above.
ii. Answer ALL questions in section 1 and only five questions in sec II
iii. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
iv. Marks may be given for correct working even if the answer is wrong.
v. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

For examiners use only

Section 1

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

Section I (50mks)Answer all questions in this section

1. Evaluate the following (3mks)

$$\frac{\frac{2}{3}-1\frac{1}{4}+\frac{5}{6}}{\frac{2}{7}+3\frac{1}{5}of\ \frac{7}{8}\div\frac{6}{11}-\left[5\frac{1}{3}+\frac{9}{10}\right]}$$

2. Use square roots, reciprocal and square table to evaluate to 4 significant figures the expression (4mks)

$$(0.06458)^{\frac{1}{2}} + \left(\frac{2}{0.4327}\right)^2$$

3. Solve the following inequalities and represent the solution on a single number line (3mks)

3-2x<5

4-3x≥-8

4. The point A, B and C lie on a straight line. The position vectors of A and C are 2i+3j+9k and 5i-3j+4k respectively; B divides AC internally in the ratio 2:1.find

35. Position vector of B (2 marks)

36. Distance of B from the origin .(1mark)

5. Without using tables, evaluate $\frac{0.51\times 5700}{6.8\times 0.0095}$ giving your answer in standad form (3marks)

6. If the interior angle of a regular polygon is m^0 and each exterior angle is $\left(\frac{m-36}{3}\right)^0$ .calculate the sum of the interior angles. (3mks)

7. Simplify $\frac{p^2-2pq+q^2}{p^3-pq^2+p^2q-q^3}$ (3marks)

8. A straight line passes through the points (-3,-4) and is perpendicular to the line whose equation is 3x+2y=11 and intersect the x axis and y axis at point A and B respectively. Find the length of AB. (4 marks)

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

	BUYING (KSHS)	SELLING (KSHS)
1Euro	147.56	148.00
1U.S Dollar	74.22	74.50

An American arrived in Kenya with 20,000 Euros. He converted all the Euros into Kenyan Shillings at the bank. He spent Kshs.2,510,200 while in Kenya and converted the remaining Kenya shillings into U.S Dollars at the bank. Find the amount in dollars that he received.

(3mks)

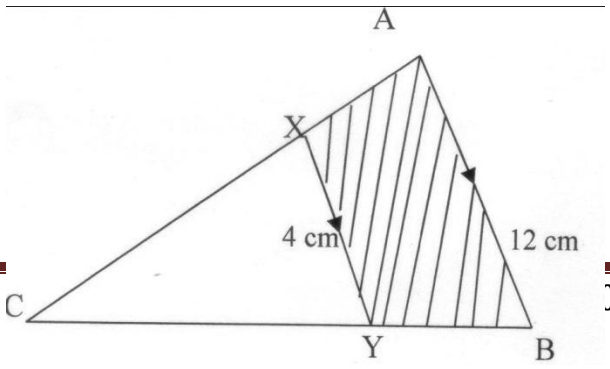
10. A farmer has a piece of land measuring 840m by 396m. He divides it into square plots of equal size. Find the maximum area of one plot (3marks)

11. Given that $\cos A = \frac{16}{25}$, without using mathematical table or calculator find:

(iv) Sin A (2marks)

(v) Tan(90-A) (1marks)

12. In the figure below, line AB and XY are parallel.



If the area of the shaded region is $36cm^2$, find the area of triangle CXY (3marks)

13. A liquid spray of mass 384g is packed in a cylindrical container of internal radius 3.2 cm. Given that the density of the liquid is $0.6g/cm^3$, calculate to 2 dp the height of the liquid in the container (3marks)

14. (a) Find the inverse of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ (1marks)

b) Hence solve the simultaneous equation using the matrix method (2mks)

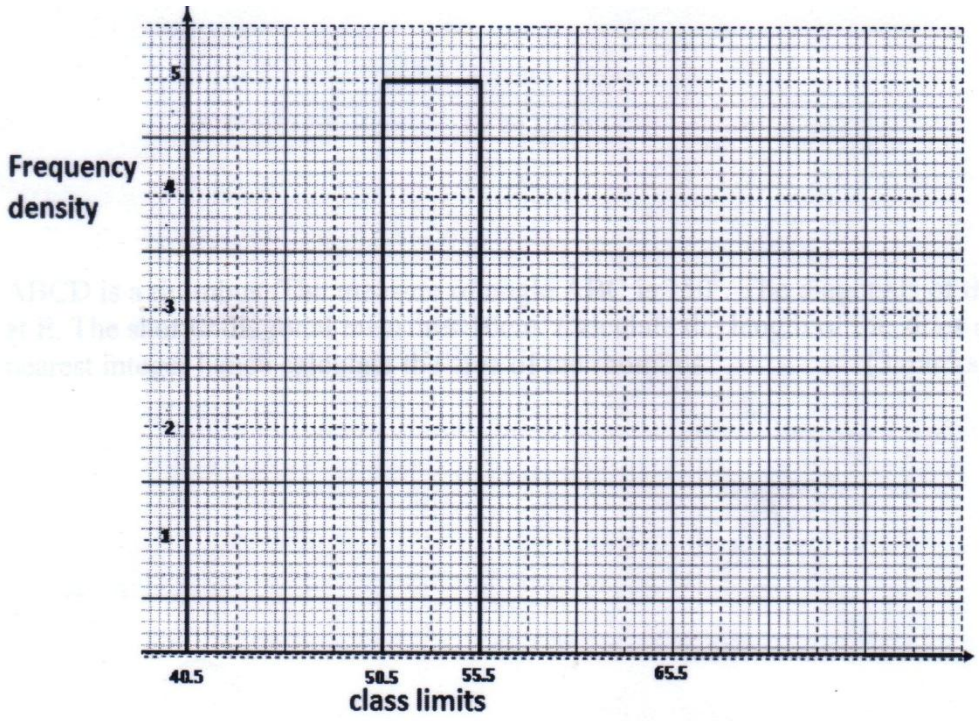
$4x + 3y = 6$

$3x + 5y = 5$

15. Evaluate: (3marks)

$$\frac{\left(\frac{1}{27}\right)^{\frac{1}{3}} \times (256)^{\frac{1}{2}} \times 3^{6}}{(729)^{-1} \times 72^{2}}$$

16. The following data was obtained from the mass of a certain animals. Complete the table and the histogram below. (3marks)



SECTION II 50mks.Answer any five question in the section

17. A circular lawn is surrounded by a path of uniform width of 7m.the area of the path is 21% that of the lawn.

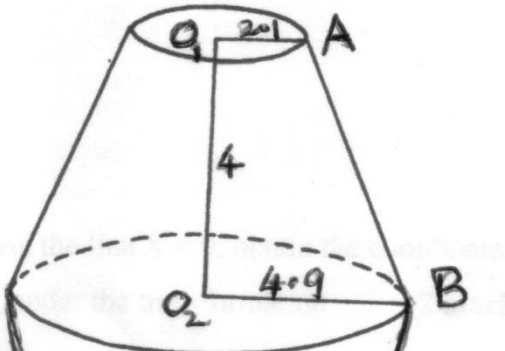
iv. Calculate the radius of the lawn (4 marks)

v. Given further that the path surrounding the lawn is fenced on both sides by barbed wire on posts at intervals of 10 metres and 11 metres on the inner and outer sides respectively. calculate the total number of posts required for the fence (4 marks)

vi. Calculate the total cost of the posts if one post cost sh 105 (2mks)

18 The diagram below represents a solid consisting of a hemispherical bottom and a conical frustum at the top. O_1O_2=4cm, O_2B=R=4.9cm

O_1A=r=2.1cm

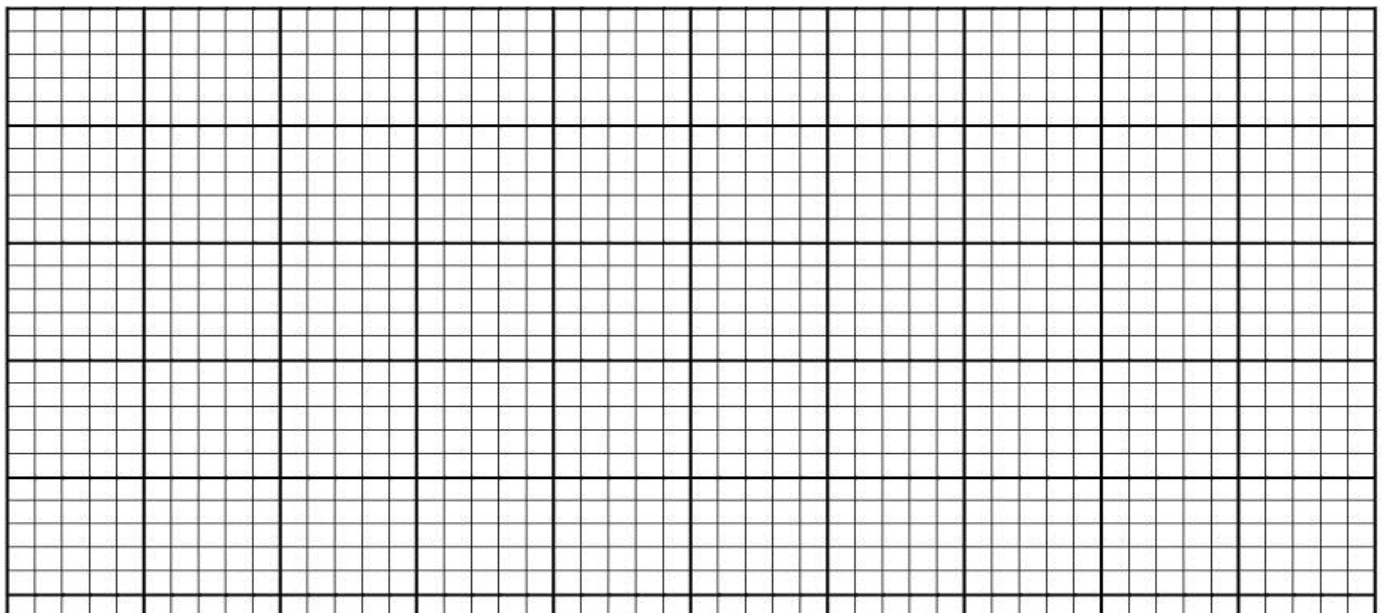


c. Determine the height of the chopped off cone and hence the height of the bigger cone.
(3mks)

b) Calculate the surface area of the solid. (7mks)

19 The coordinates of a triangle ABC are A(1, 1) B(3, 1) and C (1, 3).

(a) Plot the triangle ABC. **(1 mark)**



(b) Triangle ABC undergoes a translation vector $\begin{pmatrix}2\\2\end{pmatrix}$.Obtain the image of A' B' C‘ under the transformation, write the coordinates of A' B' C'. **(2 marks)**

(c) A' B' C' undergoes a reflection along the line X = 0, obtain the coordinates and plot on the graph points A" B" C", under the transformation **(2 marks)**

(d) The triangle A" B" C”, undergoes an enlargement scale factor -1, center origin. Obtain the coordinates of the image A"' B"' C"'. **(2 marks)**

(e) The triangle A"' B"' C"' undergoes a rotation center (1, -2) angle 120^0. Obtain the coordinates of the image A^{iv} B^{iv} C^{iv}. **(2 marks**

(f) Which triangles are directly congruent? **(1 mark)**

20. Using a ruler and compasses only, construct a triangle ABC such that BC=8 cm, angle ABC=60^0 And angle BAC=45^0

c. on the Same diagram ,measure the length of: (5 marks)
   i)AC

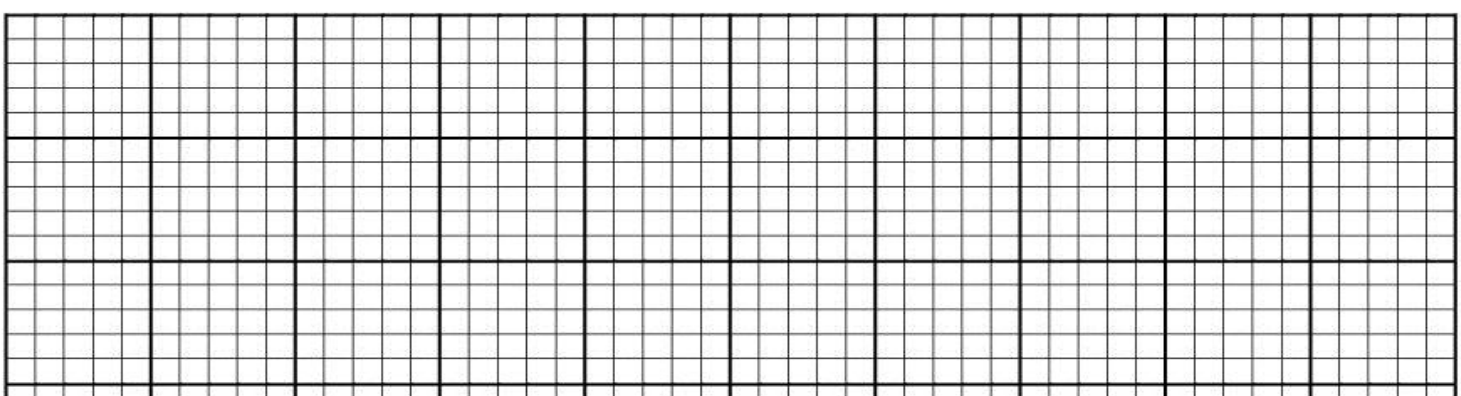
   ii)BC

d. Draw the circumcircle of the triangle ABC.(2mks)
e. Construct the locus of a point P within the triangle by shading the unwanted region inside the circumcircle such that the following condition are satisfied: (3 marks)
   i)P is closer to A than B

   ii) Angle PAB=angle PAC

21. 21 a) Draw the graph of the function below on the grid provided

$y = 2x^2 – 7x – 2$ for the values of $-1 \leq X \leq 6$ (5mks)



b) From your graph determine the roots of the function. $2x^2 - 7x - 2 = 0$.(1mk)

c) By drawing a suitable graph of function $y = 2x - 7$ on the same axis, solve the simultaneous equations $y = 2x^2 - 7x - 2$ and $y = 2x - 7$. (4mks)

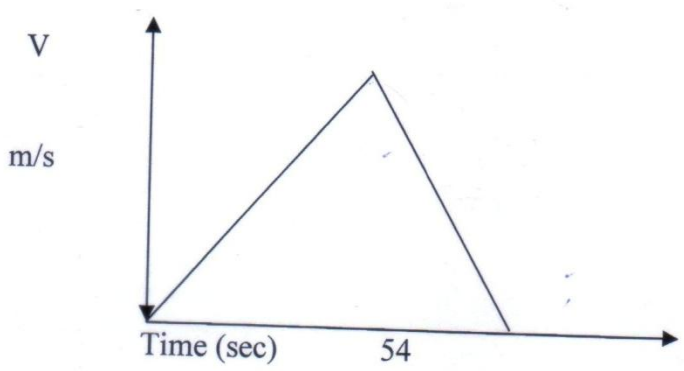
22. Eunice bought oranges worth ksh 45, while Sharon spent the same amount of money but bought at a discount of 75 cent per orange.

iv. If Eunice bought an orange at sh x, write down a simplified expression for the total number of orangers bought by Eunice and Sharon. (3mks)

v. If Sharon bought 2 more oranges then Eunice, find how much each spent on an orange (5mks)

vi. Find the total number of oranges bought by Eunice and Sharon (2mks)

23.a) The figure blew shows a velocity time graph of an object which accelerate from rest to a velocity Vm/s then decelerate to rest in a total of 54 seconds. If the whole journey is 810m



(g) Find the value of V (2mks)

(h) Hence find:

i) The value of t when the particle is instantaneously at rest (2mks)

ii) The total distance travelled by the particle during the first 4 seconds. (2mks)

iii) The maximum velocity attained by the particle (2mks)

24. Auma, Hasssan and Kamau competed in a game of darts. Their probabilities of hitting the targets are $\frac{2}{5}, \frac{1}{5} and \frac{3}{10}$ respectively.

a) Draw a probability tree diagram to show all the possible outcome (2mks)

b) Calculate the probability that:

i) No one hit the target (2mks)

ii) Only one of them hit the target (2mks)

iii) At least one of them hit target (2mks)

iv) At least one of them missed the target (2mks)

NAME…….INDEXNO……

SCHOOL……SIGNATURE……DATE……

121/2

MATHEMATICS

2 ½ HOURS

Kenya Certificate of Secondary Education -2020

MATHEMATICS ALT 'A'

PAPER 2

2 ½ HOURS

Instructions to candidates

a. Write your name and index number in the spaces provided above.
b. Answer ALL questions in section 1 and only five questions in sec II
c. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
d. Marks may be given for correct working even if the answer is wrong.
e. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

For examiners use only

Section 1

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

SECTION I

Answer all questions in this section in the space provided

1. Use logarithms correct to 4 decimals place to evaluate (3mks)

$$\sqrt{\frac{0.3698\sin 56}{2.548}}$$

2. Solve the equation

$$\log_8(x+5)-\log_8(x-3)=\frac{2}{3}$$ (3mks)

3. If $\frac{\sqrt{14}}{\sqrt{7}-\sqrt{2}}+\frac{\sqrt{14}}{\sqrt{7}+\sqrt{2}}=a\sqrt{7}+b\sqrt{2}$ find the value of a and b where a and b are rational numbers.

(3mks)

4. Given the arithmetic sequence 4, 11, 18… Find

c) The common difference (1mks)

d) The sum of the first ten terms (2mks)

5. a) Expand $\left(1-\frac{x}{5}\right)^8$ up to the term in x^4 (2mks)

b) Hence evaluate $(0.95)^8$ (2mks)

6. **A** quantity **P** is partly constant and partly varies as the cube of **Q.** If **P**=25 when **Q**=1, **P**=44 when **Q**=2. Find the value of **P** when **Q**=5 (3mks)

7. Make P the subject of the formula

$$R = \sqrt{\frac{3T(P-T}{P}}$$ (3MKS)

8. Solve for θ in the range $0^0 \leq \theta \leq 360^0$ given that $\sin 2\theta = -\sqrt{3}\cos 2\theta$ (3mks)

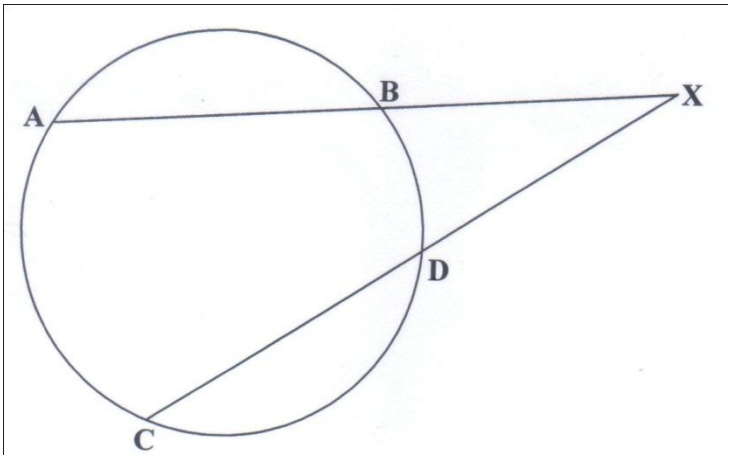
9. T is a transformation represent by the matrix $\begin{bmatrix} 5x & 2 \\ -3 & x \end{bmatrix}$. Under T, a square of area $10cm^2$ is mapped onto a square of area $110cm^2$find the value of x. (3mks)

10. The gradient function of curve that passes through the point (-1,-1) is 2x+3.find the equation of the curve. (3mks)

11. $2x^2+2y^2-6x+10y+9=0$ is the equation of a circle. Find the radius and the center of the circle. (4mks)

12. In what proportion must tea costing sh 76 and sh 84 per kg be mixed to produce tea costing sh 81 per kg (3mks)

13. Chords AB and CD of a circle meet at X (3mks)



If **AB**=8cm, **BX**=5cm and **DX** =6cm. Calculate the length of chord **CD** to 2 dp (3mks)

14. A dam containing 4158m^3 of water is to be drained. A pump is connected to a pipe of radius 3.5 cm and the machine operates for 8 hours per day. Water flows at the pipe at the rate of 1.5m per second. Find the number of days it takes to drain the dam (3mks)

15. Solve the equation below (3mks)

$7^{2x} - 8 \times 7^{x} + 7 = 0$

16. $\frac{2}{3}$ is truncated to 2 d.p calculate the percentage error in doing so (3mks)

SECTION II(answer any five question)

Answers any five equation in this section

17. A businessman obtained a loan of ksh 450,000 from a bank to buy a matatu valued at the same amount. The bank charges interest at 24% per annum compounded quarterly

(i) Calculate the total amount of money the businessman paid to clear the loan in one and half years (4mks)

(j) The average income realised from the matatu per day was ksh 1500. The matatu worked for 3 years at an average of 280 days per year. Calculate the total income from the matatu, for the three years.
(2mks)

(k) During the three years, the value of the matatu depreciated at the rate of 16%per annum. If the businessman sold the matatu at its new value, calculate the total profit he realised by the end of three years.
(4mks)

18.a) i) Taking the radius of the earth ,R=6370km and $\pi=^{22}/_{7}$,calculate the shortest distance between the two cities P(60^0N,29^0) and Q(60^0N,31^0E) along the parallel of latitude. (3mks)

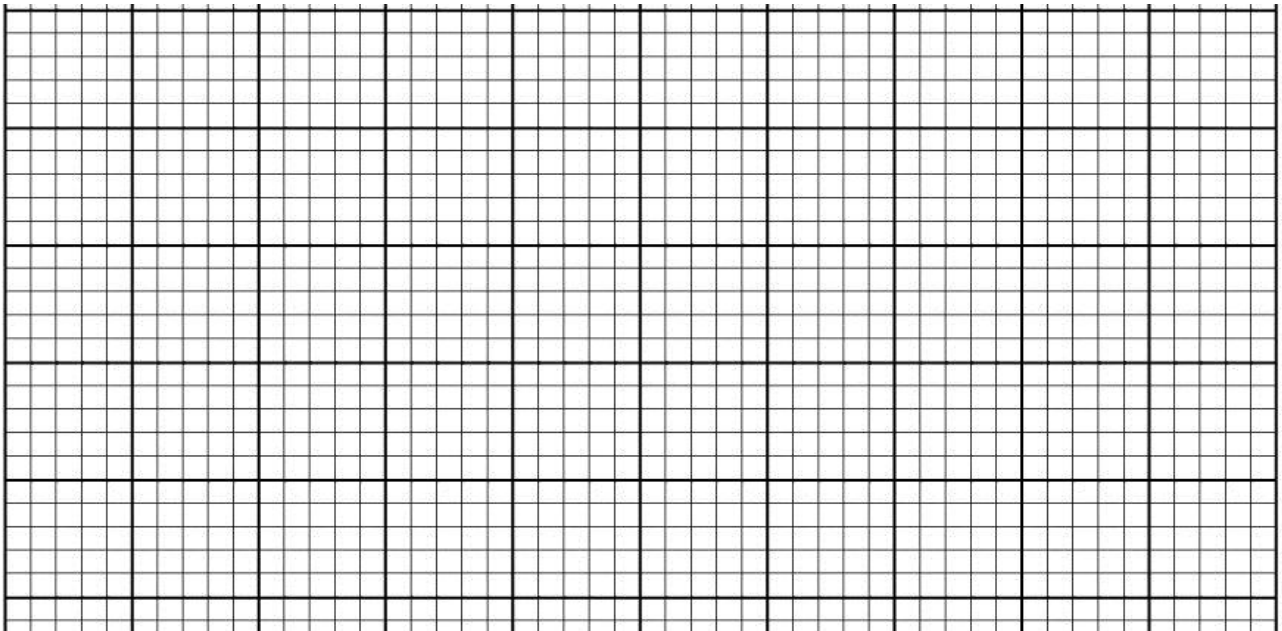
ii)If it is 1200hrs at P ,what is the local time at Q. (3mks)

iii) An aeroplane flew due south from a point A (60^0N,45^0E) to a point B. The distance covered by the aeroplane was 8000km determine the position of B. (4mks)

19. (a) Fill the table below for the curves given by y = 3 sin (2χ + 30°) and y = Cos 2χ for χ values in the range $O^0 \leq \chi \leq 180°$. (2mks)

χ	0°	15°	30°	45°	60	75°	90°	120°	150°	180°
y = 3 Sin (2χ + 30°)	1.50	2.60		2.60	1.50	0.00	-1.50			-2.60
y = Cos 2χ	1.00	0.87	0.50		-0.50	-0.87		-0.87	-0.50	

(b) Draw the graphs of y = 3 Sin (2χ + 30°) = Cos 2χ on same axes. (2mks)



(c) Use your graph to solve the equation 3 Sin $(2\chi + 30°)$ - Cos $2\chi=0$. (2mks)

c. Determine the following from your graph:

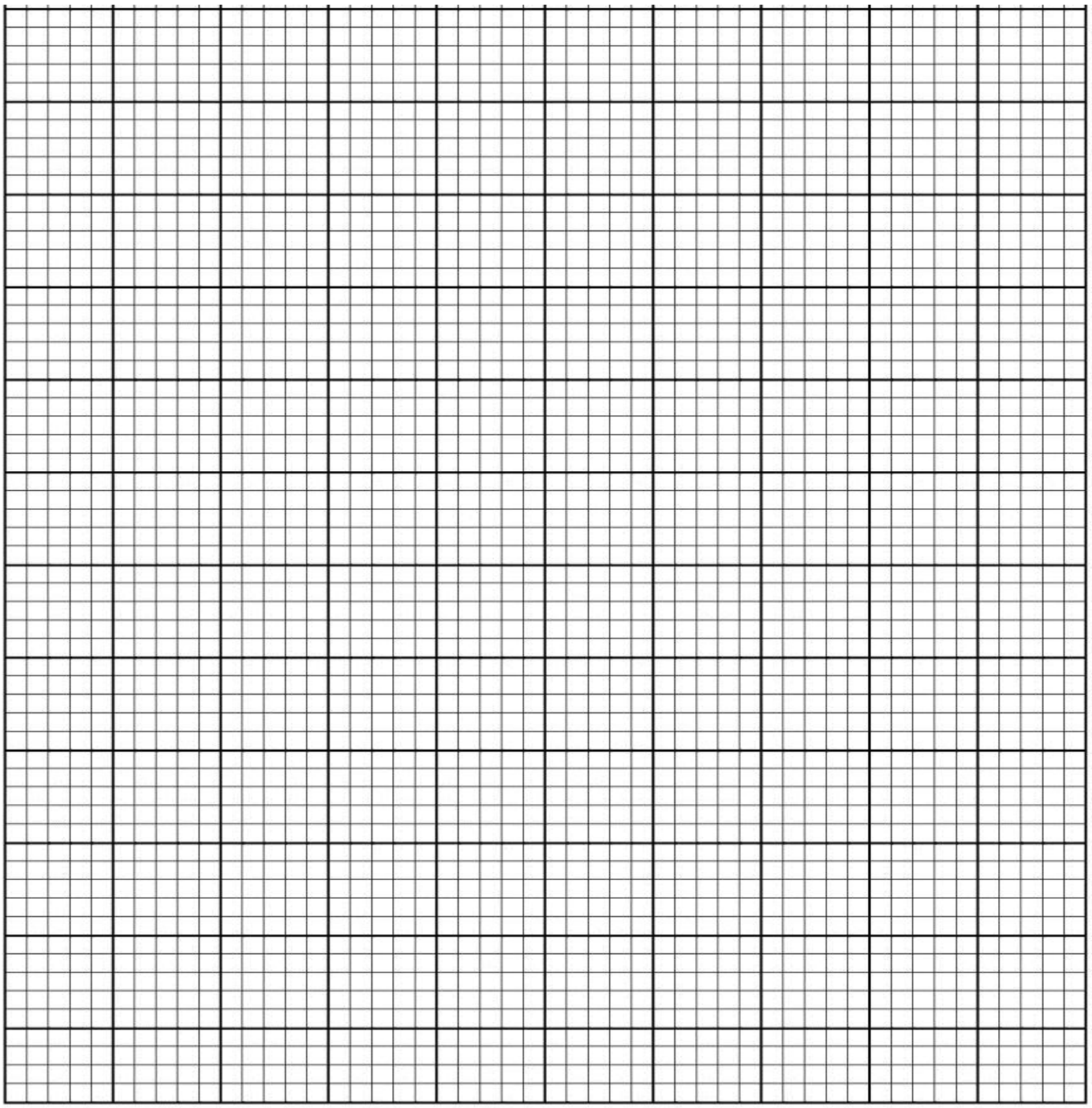
(i) Amplitude of $y = 3 \text{ Sin } (2\chi + 30°)$. (1mk)

(ii) Period of $y = 3 \text{ Sin } (2\chi + 30°)$. (2mks)

(iii) Phase difference for $y = 3 \text{ Sin } (2\chi + 30°)$. (1mk)

20. Draw a cumulative frequency curve for the following data which shows the marks obtained by 80 form four students in a school. (5mks)

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
frequency	3	5	5	9	11	15	14	8	6	4

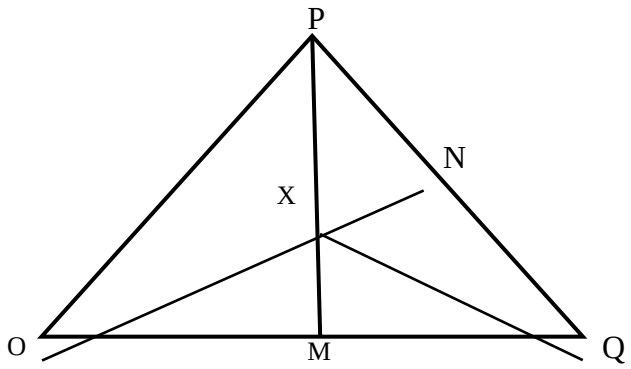


Use your graph to find:

vi. The lower quartileQ1), median(Q2) and upper quartile(Q3) (3mks)

vii. The pass mark if 85% of these student are to pass (2mks)

21. The diagram below shows triangle **OPQ** in which M and N are points on **OQ** and **PQ** respectively such that **OM**= $\frac{2}{3}$ **OQ** and **PN**= $\frac{1}{4}$ **PQ**. Lines PM and ON meet at X.



Given that vector **OP** =**p** and vector **OQ**=**q** Express the following in terms of **p** and **q**

c. Vector **PQ** (1mk)

d. Vector **PM** (2mks)

e. Vector **ON** (1mk)

By expressing vector **OX** in two different ways, determine the values of h and k such that vector **OX**=k**ON** and ,**PX**=h**PM**

i) Express **OX** in term of p and q in two different ways. (2mks)

ii) Find the value of h and k (2mks)

iii) Find the ratio **PX: XM** (1mks)

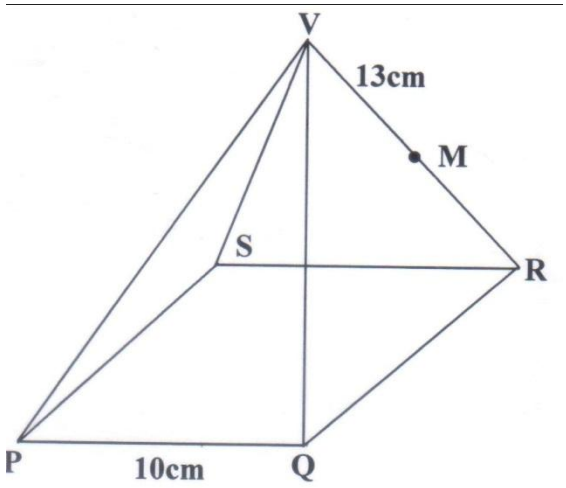
22. a) The first term of an arithmetic progression (AP) is 2.The sum of the first 8 terms of AP is 256.
i) Find the common difference of AP (2mks)

37. Given that the sum of the first n terms of the AP 416. Find n (2mks)

b) The 3^{rd}, 5^{th} and 8^{th} terms of another AP forms the first three terms of a geometric progression (GP).If the common difference of the AP is 3
Find
d. The first term of GP (4mks

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

23. In the figure below, VABCD is a right pyramid on a square base. Point V is vertically above the middle of the base. PQ = 10cm, VR = 13cm.M is the midpoint of VR.



Find

vii. (i) The length PR. (2mks)

d. The height of the pyramid (2mks)

(b) The angle between

(i) VR and the plane PQRS. (2mks)

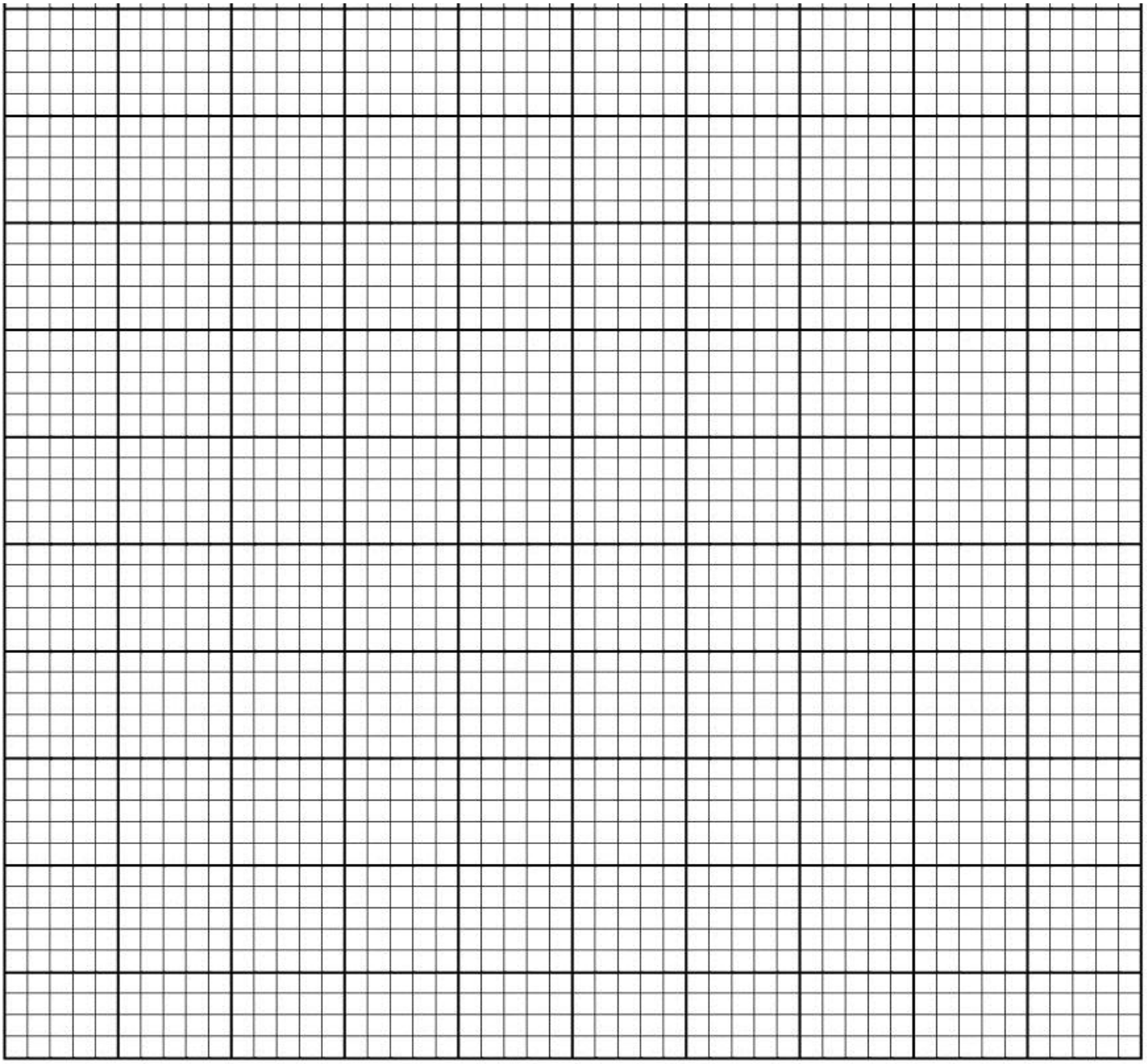
(ii) The angle between MR and base PQRS. (2mks)

(iii) The planes QVR and PQRS. (2mks)

24. The vertices A (-2, -2), B (-4, -1), C (-4, -3) and D (-2, -3) is under a transformation by matrix $E=\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$

a)i)find the coordinate of $A^1B^1C^1D^1$ (2mks)

ii) Another matrix $S=\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ transforms $A^1B^1C^1D^1$. Find the coordinate of $A^{11}B^{11}C^{11}D^{11}$ (2mks)



b) Matrix R=$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ further gives $A^{11}B^{11}C^{11}D^{11}$ a transformation .find the coordinate of $A^{111}B^{111}C^{111}D^{111}$ and plot on the graph provided (2mks)

c) Find the matrix representing the transformation mapping the image found in (a) (ii) above back to the object ABCD. (2mks)

d) **A**(2,2) **B**(2,0) and **C**(3,2) are coordinate of the vertices of triangle ABC. Triangle ABC undergoes a shear factor 3 parallel to x axis. Determine the coordinates of $A^1B^1C^1$. (2mks

NAME …… ……INDEX NO ……..……

SCHOOL.……CANDIDATE'S SIGN……...……

DATE……..

121/1
MATHEMATICS ALT. A
Paper 1
JULY-AUGUST, 2018
Time: 2 ½ Hours

SHARP FOCUS EVALUATION EXAM 2018

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

121/1
MATHEMATICS ALT. A
Paper 1
JULY-AUGUST, 2018
Time: 2 ½ Hours

INSTRUCTION TO CANDIDATES

a) Write your name and Index number in the spaces provided above.
b) Sign and write the date of examination in the spaces provided above.
*c) The paper consists of **two** sections. **Section I** and **Section II.***
*d) Answer **ALL** the questions in Section I and any **FIVE** questions in Section II.*
e) Show all the steps in your calculations, giving your answer at each stage in the spaces provided below each question.
f) Marks may be given for correct working even if the answer is wrong.
g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used

except where stated otherwise.

h) Candidates should answer the questions in English.

i) This paper consists of 16 printed pages.

j) Candidates must check the question paper to ascertain that all pages are printed as indicated and that no question(s) is/are missing.

FOR EXAMINER'S USE

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

SECTION I (50 Marks)

Answer all the question in this section in the spaces provided

1. If $\underset{\sim}{a} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$, $\underset{\sim}{b} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, and if $2\,2\underset{\sim}{a} + k\underset{\sim}{b} = \begin{pmatrix} -6 \\ 8 \end{pmatrix}$ determine the value of k. (3 mks)

2. Solve for x given that $\frac{x-3}{3} = 4 - \frac{x-2}{2}$ (3 mks)

3. Solve the inequalities and represent information on a number line -7 + x +<3x+2<4(x-5)(3 mks)

4. Evaluate using logarithms correct to 4 significant figures $\sqrt{\frac{72.84 \times 1.64}{(1.52)^2}}$ (4 mks)

5. The sum interior angles of a regular polygon is 24 times the size of the exterior angle.
   (a) Find the number of sides of the polygon. (3 mks)

(b) Name the polygon. (1 mk)

6. If $\tan\theta = \frac{8}{15}$ find the value of $\frac{\sin\theta - \cos\theta}{\cos\theta + \sin\theta}$ without using a calculator or tables. (3 mks)

7. From the top of a cliff 90m high the angle of depression of a boat in the sea is 26.2^0. Calculate how far the boat is from the foot of the cliff. (3 mks)

8. Make S the subject of the formula. (3 mks)

$w = \sqrt[3]{\frac{s+t}{S}}$

9. A town P is 200km west of Q, town R is distance of 80km on a bearing of 049^0 from P, town S is due East of R and north of Q. Determine the bearing of S from P. (use scale drawing 1cm rep 20km)

10. Calculate the area of triangle ABC for which AB=8cm and BC=6cm and BC=4cm. (3 mks)

11. Solve the pair of simultaneous equation using elimination method. (3 mks)

12. Solve for x given $27 \times 3^x = (3^x)^x$ (3 mks)

13. Evaluate without using a calculator or a maths table.

$\frac{\sqrt{144000}}{\sqrt[3]{216}}$ (3 mks)

14. Expand and simplify (2 mks)

$(x + 2y)^2 - (2y - 3)^2$

15. The mass of solid cone of radius 14cm and height 18cm is 4.62kg. Find its density in g/cm^3 (3 mks)

16. A minor are of a circle subtends an angle of 105^0 at the centre of the circle. If the radius of the radius of the circle is 8.4cm radius. Find the length of the major arc. (Take $\pi = \frac{22}{7}$) (3 mks)

SECTION II (50 Marks)

Answer any five question in this section in the spaces provided

17. The table below gives a field book showing the results of a survey of a section of a piece of land between A and H on the stream. All measurements are in metres.

(a) Draw a sketch of the land. (2 mks)

(b) Calculate the area of this piece of land. (8 mks)

18. The equation of a curve is given by $y=x^3 -4x -3x$.

(a) Find the value of y when x= -1 (1 mk)

(b) Determine the stationary points of the curve. (5 mks)

19. The table below gives the marks scored by a group of students in an exam.

Marks	15-19	20-24	25-29	30-34	35-39	40-44
No. of students	3	4	X	10	9	7

(a) Given that the mean mark was 32-0, find the value of x. (4 mks)

(b) State the modal class (1 mk)

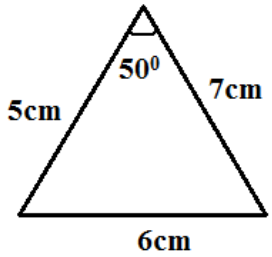
(c) Determine median mark. (3 mks)

(c) Find the equation of the normal to the curve at x=1 (4 mks)

(d) The range (2 mks)

20. (a) Use a ruler and a pair of compasses only to construct a triangle ABC in which AB=4.6cm, BC=5cm and < ABC=60^0. Measure AC. Drop a perpendicular from B to meet AC at N. Measure BN. Hence, calculate the are of triangle ABC. (7 mks)

(b) Find the area of the triangle below. (3 mks)



21. Three trees E, S and T are the vertices of a triangular field. R is 300m from S on a bearing of 300^0 and T is 480m directly south of R.

(a) Using scale of 1cm rep 60m draw a diagram to show the position of the trees. (3 mks)

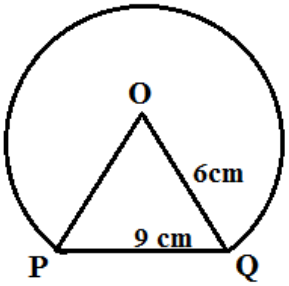
(b) Use the diagram to determine

(i) The distance between T and S in metres (2 mks)

(ii) The bearing of T from S (1 mk)

(c) Find the area of the field in hectares to 1d.p (4 mks)

22. In the fig below, O is the centre of a circle while radius is 6cmm and PQ is 9cm.



(a) Calculate the area of the major segment (7 mks)

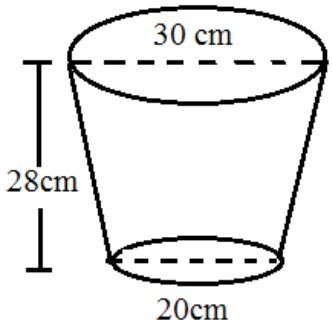
(b) Find the area of a triangle XYZ with sides 7cm, 9cm and 11cm long. (3 mks)

22. Draw the graph of function $y=-x^2+4x-1$ for $-1 \leq x \leq 5$ (5 mks)
On the axes, draw the graph of $y=2x-3$ (1 mks)
Use the graph to solve the following equations

(a) $x^2 - 4x + 1 = 0$ (2 mks)

(b) $x^2 - 2x - 2 = 0$ (2 mks)

24. The diagram below shows an open bucket with top diameter 30cm and bottom diameter 20cm. The height of the bucket is 28cm. $\left(\pi = \frac{22}{7}\right)$



(a) The capacity of the bucket in litres. (5 mks)

(b) Area of the metal sheet required to make 100 such buckets. (5 mks)

NAME …… ……INDEX NO ……..……

SCHOOL.……CANDIDATE'S SIGN……...……

DATE……..

121/1
MATHEMATICS ALT. A
Paper 1
June/July, 2018
Time: 2 ½ Hours

SHARP FOCUS EVALUATION EXAM 2018

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

121/1
MATHEMATICS ALT. A
Paper 1
June/July, 2018
Time: 2 ½ Hours

INSTRUCTION TO CANDIDATES

a) Write your name and Index number in the spaces provided above.
b) Sign and write the date of examination in the spaces provided above.
*c) The paper consists of **two** sections. **Section I** and **Section II.***
*d) Answer **ALL** the questions in Section I and any **FIVE** questions in Section II.*
e) Show all the steps in your calculations, giving your answer at each stage in the spaces provided below each question.
f) Marks may be given for correct working even if the answer is wrong.
g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used

except where stated otherwise.

h) Candidates should answer the questions in English.

i) This paper consists of 16 printed pages.

j) Candidates must check the question paper to ascertain that all pages are printed as indicated and that no question(s) is/are missing.

FOR EXAMINER'S USE

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

SECTION I (50 Marks)

Answer all the question in this section in the spaces provided

1. Simplify $\frac{\sqrt{5}}{\sqrt{5}-2}$ by rationalizing the denominator leaving the answer in the form $a+b\sqrt{c}$ (3 mks)

2. Solve the equation $\text{Log}_{10}(6x-2) - 1 = \text{Log}_{10}(x-3)$ (3 mks)

3. Find the percentage error in the calculation of volume of a sphere of radius 7.2cm. (4 mks)

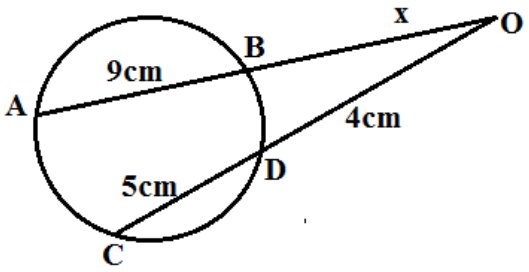
4. A point P divides the line RT in the ration -2:5. Find the coordinates of P given R(3,1) and T (6, -5). (3 mks)

5. Make A the subject of the formula $-B=\sqrt{\frac{A^2+2C}{A^2}}$ (3 mks)

6. In what ratio will coffee grade A costing shs 90 per kg are mixed with coffee grade B costing sh 60 per kg so that a profit of 25% is realized by selling the mixture at sh 80 per kg. (3 mks)

7. A transformation is represented by the matrix $R=\begin{pmatrix} x & -3 \\ 2 & 5x \end{pmatrix}$. R maps an object of area 10cm^2 onto an image of area 110cm^2. Find the possible values of x. (3 mks)

8. Find the value of x in the figure below. (5 mks)



9. Write down the first four terms of the expansion of $(1+3x)^9$. Hence find the value of $(1.003)^9$ correct to 5 s.f (4 mks)

10. Solve the equation $\sin\vartheta=\frac{\sqrt{3}}{2}$ *for* $0^0\le\vartheta\le360^0$ (2 mks)

11. The equation of a circle is given by $x^2 + 4x + y- 2y -4 =0$. Determine the centre and radius of the circle. (3 mks)

12. A man sold a motor cycle at sh 84000. The rate of depreciation was 5% per annum. Calculate the value of the motor cycle after 3 yrs to 1 d.p (3 mks)

13. Use logarithms tables to evaluate $\sqrt[3]{\frac{36.15\times 0.02575}{1.958}}$ (4 mks)

14. The position of a point A (47^0N, 25^0E) and B(47^0N, 70^0E). Find the distance between A and B in km. Take radius of earth as 6370km. (3 mks)

15. A quantity Y is partly constant and partly varies inversely as X. Given that Y=10 when X=1.5 and x=1.5 and Y=20 when X=1.25 find the equation connecting x and y.

16. A bag contains 5 red, 4 white and 5 blue beads. Three beads are selected at random without replacement fluid the probability that the beads selected were red, white and blue in that order. (3 mks)

SECTION I (50 Marks)

Answer any 5 question in this section in the spaces provided

17. The table below shows income tax rates.

Monthly taxable pay in KE	Rate of tax in ksh per pound
1-435	2
436-970	3
971-1505	4
1506-2040	5
excess over 2040	6

Mr. Munira earns a monthly salary of ksh 30000 and taxable allowances amounting to 5980.

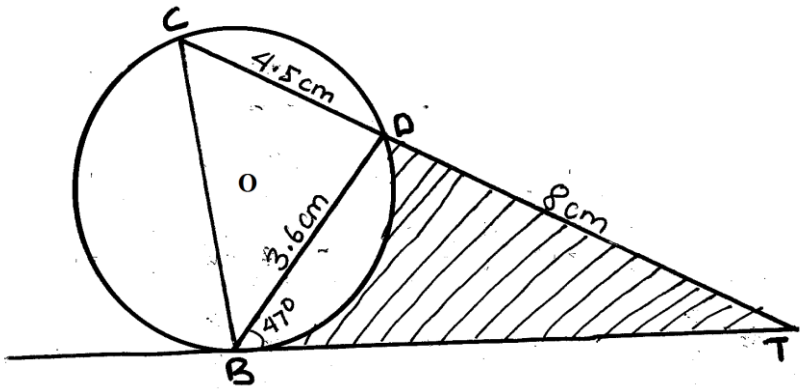
(a) Calculate his taxable income in KE (2 mks)

(b) Calculate his monthly tax (4 mks)

(c) If he entitled to a tax relief of ksh 800, determine his net tax. (1 mk)

(d) If he pays NHIF of sh 320 and NSSF of h 240 per month fluid his net salary. (3 mks)

18. The figure below is a circle centre O. ABT is a tangent to the circle at B and chord CD =4.5cm, BD = 3.6cm and DT=8cm



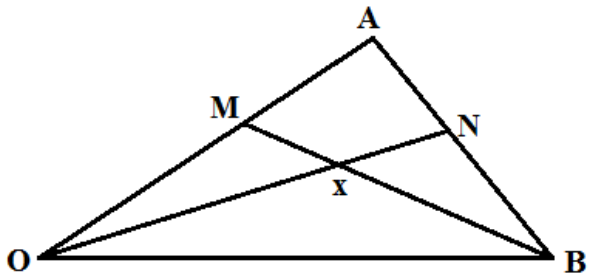
Calculate

(a) The length of BT (3mks)

(b) The radius of he circle (3 mks)

(c) The area of the shaded region (4 mks)

19. The diagram below shows triangle OAB in which N is the midpoint of AB and M is a point on OA such that OM:MA =2:1. Lines ON and BM meet at x such that OX = hON and Mx= kMB



(a) Gives that $\vec{OA} = \underset{\sim}{a}$ and $\vec{OB} = \underset{\sim}{b}$ express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$

(i) AB (1 mk)

(ii) $\vec{ON}$ (1 mk)

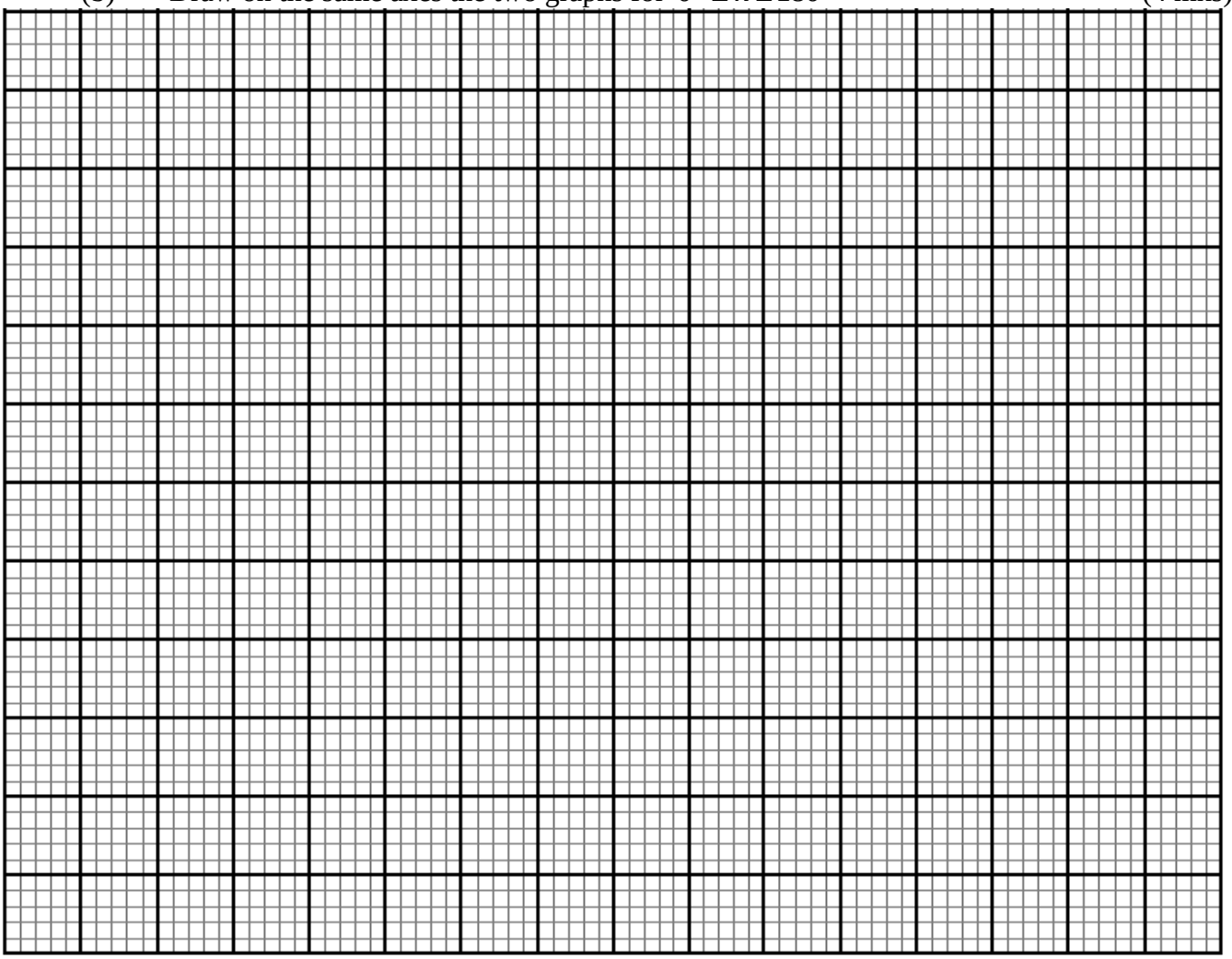
(iii) BM (2 mks)

(b) By expressing $\vec{OX}$ in two different ways, determine the values of h and k (6 mks)

20. (a) Complete the table below giving your values correct to 1d.p (2 mks)

X^0	0	30	60	90	120	150	180
cos 2x	1.0		-0.5	-1.0		0.5	
Sin $(x+30)^0$	0.5		1.0		0.5	0	

(b) Draw on the same axes the two graphs for $0^0 \leq x \leq 180^0$ (4 mks)



(c) Find the period of y=cos 2x (1 mk)

(d) Solve the equation

(i) Sin (x+30) = cos 2x (2 mks)

(ii) cos 2 = 0.6 using the two graph (1 mk)

21. The table below shows the distribution of masses of pupils in a contain academy.

Mass(kg)	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
No. of pupils	1	5	9	11	20	20	19	8	4	3

(a) State the class size (1 mk)

(b) Using 47 as the assumed mean calculate,

(i) The mean mass (4 mks)

(ii) The standard deviation the masses. (5 mks)

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

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

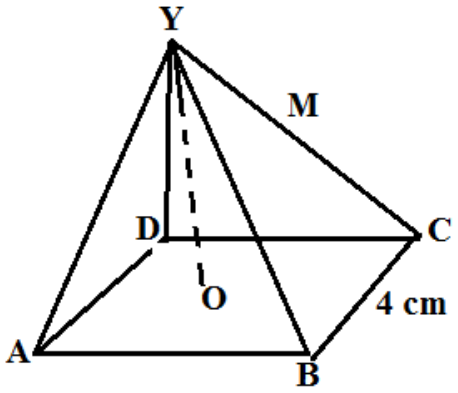
(ii) Given that the sum of the first n terms of the AP is 416 find n. (2 mks)

(b) The third, fifth and eight terms of another AP form the first three consecutive term of a geometric progression (G.P). If the common difference of the AP is 5. Find

(i) The first term of the GP (4 mks)

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

23. The figure below shows a right angled pyramid with vertex V and edges VA, VB, VC, VD each 10cm long. The base ABCD is a rectangle of length 8cm and width 4cm and M is the midpoint of CV.



Calculate:

(i) The vertical height of the pyramid (3 mks)

(ii) The angle between the planes VBC and the base ABCD (2 mks)

(iii) The angle between the planes VBC and VAD (3 mks)

(iv) The volume of the pyramid (2 mks)

24. A particle moves in a straight line such that its displacement from A after time t seconds is given by the equation $S=2t^3 – 7t^2 + 7t -2$

Determine;

(a) Its displacement when t=3 sec (2 mks)

(b) Its velocity when t=5 (3 mks)

(c) The values of t when the particle is momentarily at rest. (3 mks)

(d) The acceleration when t=2 (2 mks)

SUNSHINE SCHOOL

FORM 4
MATHEMATICS
PAPER 1
PRE-MOCK I – MARCH 2018
TIME: 2 ½ HOURS

NAME…….ADMIN NO…….CLASS..……..

INSTRUCTIONS TO CANDIDATES

1. Write your Name, Adm. No and Class in the spaces provided on the top of this page.
2. This paper contains two sections: Section I and II.
3. All answers and workings must be written on the question paper in the spaces provided below each question.
4. Answer all question in section I and only 5 questions in section II.
5. Negligence and slovenly work will be penalized.
6. Electronic calculators and mathematical tables may be used.

For Examiners 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

SECTION 1

1. Use logarithms to evaluate (4mks)

$$\frac{16.92^2 \ x \ \sqrt{0.6318}}{327.5}$$

2. Solve the equation (3mks)

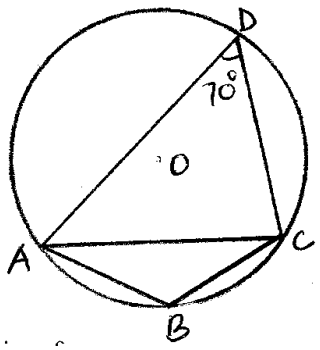
$$6^{2x+1} = 2^{3X+1}$$

3. Evaluate using tables of reciprocals, squares and cubes. (4mks)

$$\frac{\sqrt[3]{0.0008}}{0.375} - \frac{10}{37.5^2}$$

4. A student requires $x = {}^5/_9$ and $y = {}^5/_3$ in decimal form. He truncates the values to 3 significant figures. Determine the percentage error in the quotient ${}^y/_x$ using the truncated values.
(4mks)

5. In the figure below O is the centre of circle ABCD. <ADC = 70°. AD = AC.



Find the size of

i) <ABC (1mk)

ii) <DAO (2mks)

6. If tan θ = $\frac{24}{25}$, find without using tables or calculator, the value of

$$\frac{Tan\ \theta - Cos\ \theta}{Cos\ \theta + Sin\ \theta}$$ (2mks)

7. Point $P^1(5,6)$ is the image of point P $(-1,-4)$ under a rotation of 180° about point Q(x,y). Find the co-ordinates (x,y) (2mks)

8. Find the area of Δ ABC with sides 8cm, 9cm, and 10cm (3mks)

9. Simplify $\frac{15x^2 + xy - 6y^2 - (3x+2y)(2x-y)}{2y-3x}$ (3 mks)

10. A scale on a map is 1:2000. A circular piece of land for growing maize has a radius of 7cm on the map. Calculate the actual area in hectares of this piece of land. (Take $\Pi = \frac{22}{7}$) (3mks)

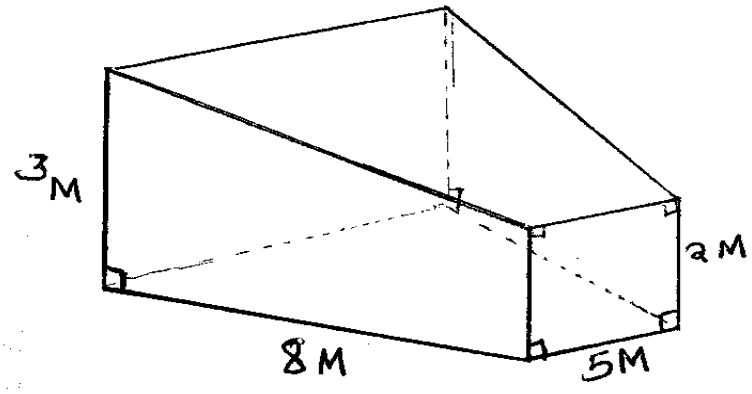
11. The internal and external radii of spherical shell are 6 cm and 9 cm respectively. Calculate the volume of the material of the shell. (4 mks)

12. The masses of two similar bars of soap are 343 g and 1331 g. If the surface area of the smaller bar is 196 cm^2. Calculate the surface area of the larger bar (3mks)

13. A perpendicular line is draw from point P(3,4) so that it meets line 3 y = 2x + 12 at point Q. Find the exact co-ordinates of point Q (3mks)

14. Two tractors A and B travel between two towns 120km apart. Tractor A has an average speed of 10km/h more than tractor B and takes 1 hour less than tractor B. Find the respective speeds of the two tractors. (3mks)

15. Find the surface area of the figure given below, which is completely closed. (3mks)



16. Vector **r** has a magnitude of 14 and is parallel to vector **s**. Given that **s** = 6**i** – 2**j** + 3**k**, express vector **r** in terms of **i, j** and **k** (3mks)

SECTION 11 (50MKS)

17. (i) A particle moves in a straight line in such a way that its distance, S meters after t seconds is given by the equation

$S = \frac{t^3}{3} - 3t^2 + 5t$, find the times when:

a) the particle is stationery (3mks)

b) Its velocity is 5 m/s (2mks)

c) Its acceleration is 10 m/s^2 (2mks)

(ii) Find the equations of the tangent and normal to the curve y = $2x^2$ + 1 at the point where x = 2 (3mks)

18. A triangle whose vertices are A(1,4) B(2,1) and C(5,2) is given the following transformations.
    i) A reflection along the line y = x to $A^1B^1C^1$
    ii) $A^1B^1C^1$ is given a rotation of a positive quarter turn about the origin $A^{11}B^{11}C^{11}$
    iii) $A^{11}B^{11}C^{11}$ is given an enlargement of linear scale factor -2 about (1,2) to $A^{111}B^{111}C^{111}$

    a) Using the grid provided, plot the triangle ABC and its image $A^1B^1C^1$ (3mks)

    b) Locate the image $A^{11}B^{11}C^{11}$ from the grid hence state its co-ordinates. (3mks)

    c) Find the co-ordinates of $A^{111}B^{111}C^{111}$ hence plot it on the grid (4mks)

19. Three machines A, B, and C are set to work together. A working alone takes 6hrs to complete the work, B takes 8hrs while C takes 12 hrs.

a) Find the time taken by A, B &C to complete the work while working together(3mks)

b) All the three machines started working at the same time, 40 mins later machine A broke down B and C continued for another 1 hr before B ran out of fuel and therefore stopped working for 20 mins while C continued. If B resumed working after 20mins
Find

i) The function of work left after machine A broke down. (2mks)

ii) The fraction of work done by C working alone for 20 mins. (2mks)

iii) The total time taken for the work to be completed. (3mks)

20. In a Δ OAB, M and N are points on OA and OB respectively, Such that OM:MA = 2:3 and ON:NB = 2:1. AN and BM intersect at X. Given that OA = a and OB = b

a) Express in terms of a and b (2mks)
i) BM

ii) AN

b) Taking BX = tBM an AX = LAN where t and h are scalars, find two Expressions of OX (4mks)

c) Find the values of t and h (4mks)

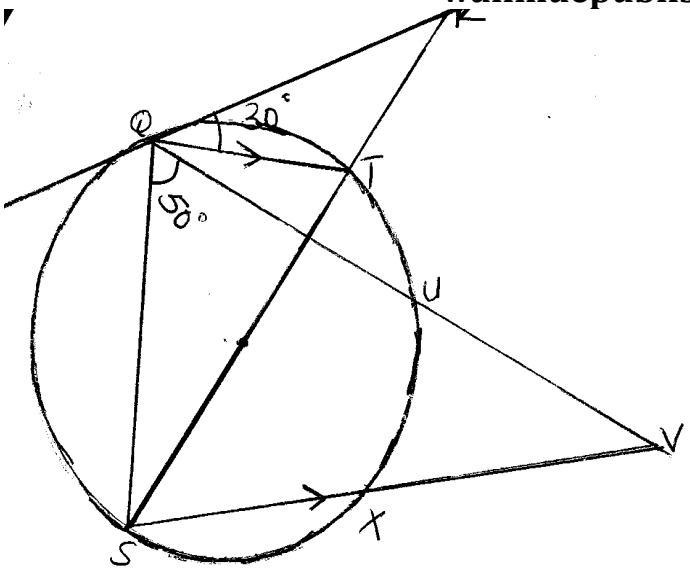
21. Two variables quantities p and Q are connected by the equation $p = KQ^n$ where K and n are constants. The following table gives the values of p and Q.

P	2.29	3.16	3.98	4.57	5.01	6.31	8.71
Q	2.0	3.16	3.98	5.25	6.31	8.32	12.59

(a) Find a linear equation connecting P and Q.

(b) Using a graph, draw a straight line and use it to estimate the values of K and n.
(8 mks)

22.



In the figure above PQR is a tangent to the circle at Q. ST is a diameter and STR and QUV are straight line QT is parallel to SV. Angle TQR = 30^0 and angle SQV = 50^0. Find the following angle, giving reasons for each answer.

(a) QST (2 mks)

(b) QRT (2 mks)

(c) QVS (2 mks)

(d) USV (2mks)

(e) QTS (2 mks)

23. Two points A and B lie on the circumference of the circle, of the circle of centre O and radius 8 cm, where <AOB = 80^0. Calculate:

(a) The length of the minor arc AB. (2 mks)

(b) The length of the chord AB. (2 mks)

(c) The area of the sector AOB (2 mks)

(d) The area of triangle AOB. (2 mks)

(e) The area of the minor segment of circle cut off by AB. (2 mks)

24. The table below shows the distributions of marks scored in a test by form 4 students in a certain school.

Marks	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No of students	1	5	10	10	19	20	20	8	4	3

(a) Using 62 as a working mean, calculate the actual mean mark. (4 mks)

(b) Calculate the variance of the data above. (4 mks)

(c) Calculate the standard deviation. (2 mks)

SUNSHINE SCHOOL

FORM 4
MATHS PAPER 2
PREMOCK I - MARCH 2018
TIME: 2 ½ HOURS

NAME…….ADMIN NO……CLASS……

INSTRUCTIONS TO CANDIDATES

7. Write your Name, Adm. No and Class in the spaces provided on the top of this page.
8. This paper contains two sections: Section A and B.
9. All answers and workings must be written on the question paper in the spaces provided below each question.
10. Negligence and slovenly work will be penalized.
11. Electronic calculators and mathematical tables may be used.

For Examiners 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

SECTION 1 (50 MARKS)

1. a) Expand $(1 + 2x)^6$ upto the term with x^4 (1mk)

b) Hence use your expansion to evaluate $(0.2)^6$ (2mks)

2. The quantity y varies partly as x and partly as the square of x. When x = 2, y = 14 and when X = 5 y = 65. Express y in terms of X. Hence find y when X = -2 (4mks)

3. Solve for P in the equation:
$\text{Log}_3 (2p + 8) - \log_3 P = 1 + \log_3 2$ (3mks)

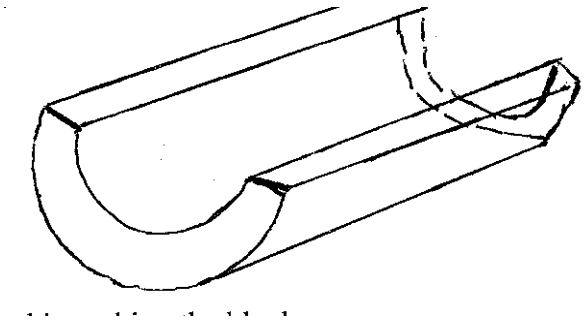
4. Solve the trigonometric equation (3mks)
$2\,\text{Sin}^2\theta - \text{Sin} - \frac{1}{2} = 0$ for $0° \leq \theta \leq 360°$

5. The fifth term of an arithmetic progression is 11 and the twenty fifth term is 51. Calculate the first term and the common difference of the progression (3mks)

6. Solve the inequality, illustrate your solution on a number line and state the integral values of x

$4 - 3x < X + 12 \leq -\frac{3X+29}{2}$ (3mks)

7. The diagram below represents a semi-circular block of metal with a semi-circular groove removed. The block is1.2m long and the radii of the block and the groove are 14cm and 7 cm respectively



Calculate the volume of metal used in making the block (3mks)

8. In an agricultural research centre, the length of sample of 50 maize cobs were measured and recorded as shown.

Length (cm)	8-10	11-13	14-16	17-19	2-0-22	23-25
No. of cobs	4	7	11	15	8	5

Calculate the median (3mks)

9. Winnie bought maize and millet flour from a vendor. She then mixed them in the ration 4:3. She bought the maize flour at Kshs 41 per kg and the millet flour as Ksh 61 per kg. If she was to sell and make a profit of 20%. What should be the selling price of 1kgof the mixture? Give your answer to the nearest 10 cent (3mks)

10. Kamau wishes to purchase not less then 10 items comprising books and pens only. A book cost shs 20 and a pen shs 10 Kamau has shs 220 to spend. For all the inequalities form the given conditions (3mks)

11. An employee of a certain company earns a monthly basic salary of Kshs 29400. He is entitled to a monthly house allowance of Kshs 40,000 and medical allowance of Kshs 3,588 per month. He is entitled to a personal relief of Ksh 1162 per month. Using the tax table below .Calculate his net tax per month. (4mks)

Taxable Income (P.A) in Ke	Rate in shs /KE
1-5808	2
5809 – 11280	
11281 -16752	4
16753 -22224	5
22225 and above	6

12. Simplify:-
$(6x^2 + 7xy + 2y^2)(4x^2 - y^2)^{-1}$ (2mks)

13. John an American tourist arrived in Kenya with 100US$ and converted the whole amount into Kenyan shillings. He spent, shs 39,000 and changed the balance to sterling pound before leaving for United Kingdom. A Kenyan bank buys and sells foreign currencies as shown

	Buying (in kshs)	Selling (in ksh)
1 US Dollar	86.2184	86,3907
1 Sterling pound	136.8041	137,1394

Calculate the amount he received to the nearest sterling pound (4mks)

14. a) Construct triangle PQR such that PQ = 7cm, QR = 5cm and $< PQR = 30°$

b) Construct the focus L_1 of points equidistant from P and Q to meet the locus L2 of points equidistant from Q and R at M. Measure PM.

15. A point P (-2, 5) is mapped onto P^1(1,9) by a translation T1. If P^1 is mapped onto P^1 by a translation T^2 given by $\begin{pmatrix}-4\\-1\end{pmatrix}$. Find the c-ordinates of P^{II} and the translation vector T^1 (3mks)

16. Find the centre and radius of a circle whose equation is (3mks)
$3x^2 + 3y^2$ - 18x + 12y + 39 = 12

SECTION 2 (50 MARKS)

17. a) The current price of a vehicle is shs 500,000. If the vehicle depreciates at a rate of 15% p.a . Find the number of years it will take for its value to fall to shs 180,000. (4mks)

b) The cash price of a cooker is shs 9,000. A customer bought the cooker by paying 15 monthly installments of shs 950 each. Calculate:

a) the carrying charge (3mks)

b) the rate of interest (3mks)

18. a) Given that the matrix A = $\begin{pmatrix} 6 & 5 \\ 4 & 7 \end{pmatrix}$, find the inverse of A^{-1}. (3mks)

b) James sells shirts and vests in his shop. On Monday he sold 4 shirts and 40 vets for a total Kshs. 24,000. On Tuesday he sold 24 shirts and 42 vests for a total of Kshs 18,600

i) Form a matrix equation to represent the information (3mks)

ii) Using A^{-} in (a) above find the price each shirt and each vest (4mks)

19. Kamau, Njoroge and Kariuki are practicing archery. The probability for Kamau hitting the

target is $\frac{2}{5}$, that of Njoroge hitting the target is $\frac{1}{4}$ and that of Kariuki hitting the target is $\frac{3}{7}$. Find the probability that in one attempt;

a) Only one hits the target (2mks)

b) All three hit the target (2mks)

c) None of them hits the target (2mks)

d) Two hit the target (2mks)

e) At least one hits the target (2mks)

20. Two aeroplanes S and T leave airport A at the same time, S flies on a bearing of 060° at 750km/h while T flies on a bearing of 210° at 900km/h.
    a) Using a suitable scale, draw a diagarams to show the positions of aeroplanes after two hours (4mks)

b) Use your diagram to determine

i) The actual distance between the two aeroplanes (2mks)

ii) The bearing of T from S (2mks)

iii) The bearing of S from T (2mks)

21. The bearing of towns P and Q on a horizontal ground from a tower are 050° and 142° respectively. The angle of elevation of the top of the lower from town P is 34°. Given that P is 200m from the top of the tower and Q is 120m from the base of the tower

Determine

a) The height of the tower (3mks)

b) The angle of elevation of the top of the lower from Q (3mks)

c) The distance between the two towns P and Q (4mks)

22. A plane leaves an airport x(41.5°N, 36.4°W) at 9.00a.m and flies due north to airport Y on latitude 53.2°N.
    a) Calculate the distance covered by the plane in Km (3mks)

b) After stopping for 30 mins to refuel at Y, the plane then flies due East to airport 2, 2500km from Y. Find:

i) The position of Z

ii) The time the plane lands at Z if its speed is 500km/h. (Take the value of π as $\frac{22}{7}$ and radius of the earth as 6370Km) (7mks)

23. A triangle has vertices at a(1,2) b(-2,4) and C)3,5)

a) Plot the triangle on the grid provided (1mk)

b) Triangle ABC is mapped onto triangle $A^1B^1C^1$ by a transformation given by M= $\begin{pmatrix} -1 & 1 \\ 0 & 1 \end{pmatrix}$

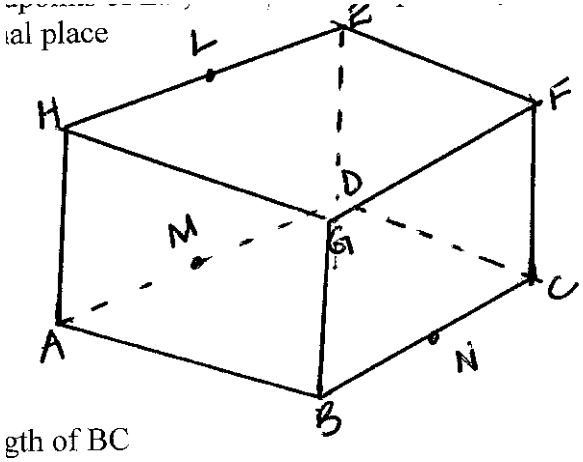
State the co-ordinates of triangle $A^1B^1C^1$ on the same grid plot triangle $A^1B^1C^1$ (3mks)

c) Triangle $A^{11}B^{11}C^{11}$ is the image of triangle $A^1B^1C^1$ under a reflection on the line y = 0. Plot the triangle $A^{11}B^{11}C^{11}$ and state its co-ordinates (2mks)

d) Triangle $A^{11}B^{11}C^{11}$ is further rotated through -90° about (0,0) to obtain triangle $A^{111}B^{111}C^{111}$. Write down the co-ordinated of triangle $A^{111}B^{111}C^{111}$. Plot the triangle on the grid as a &b above

(2mks)

24. The figure below shows a cuboid ABCDEFGH with a square base. The points L,M, and N are the midpoints of EH, AD and BC respectively. AC = 7.5 cm and CF = 10cm. Calculate to 1 decimal place



gth of BC

a) The length of BC (3mks)

b) The length of LN (2mks)

c) The size of angle between the plane EHBC and ABCD (3mks)

d) The angle between the lines CH and the base (2mks)

MATHEMATICS
PAPER 1
PRE- MOCK – MARCH / APRIL 2015
TIME: 2 ½ HOURS

Name…….. Class ….……

Index Number ……..…… **Class Number……**

Instructions to candidates

1. Write your name, index and class number in the spaces provided above.
2. The paper consists of two sections**:** ***section I*** and ***section II*****.**
3. Answer **all** the questions in **section I** and any **five** in **section II**
4. Section I has **sixteen** questions and section two has **eight** questions
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question
7. KNEC Mathematical table and silent non-programmable calculators may be used.

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

1. Evaluate: (3 mks)

$$\left(\frac{\left(1\frac{3}{7}-\frac{5}{8}\right)x\frac{2}{3}}{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}of\ 2\frac{1}{3}}\right)^{-2}$$

2. Mr. Kamau son and daughter needed clothes. The son clothes were costing Ksh 324 while the daughter clothes were costing Ksh 220. Mr Kamau wanted to give them equal amounts of money. Calculate the least amount of money he would spend on the two and how many clothes each will buy. (3 mks)

3. Use reciprocal tables to find the value of $(0.325)^{-1}$ hence evaluate $\frac{\left(\sqrt[3]{0.000125}\right)}{0.325}$, give your answer to 4 s.f. (3 mks)

4. A type of paper is 40cm long, 32 cm wide and 0.8 mm thick. The paper costs sh 10 per m^2. Find the total cost of a pile of such paper of height 4.8m. (4 mks)

5. A square based brass plate is 2mm high and has a mass of 1.05kg. The density of the brass is 8.4 g/cm^3. Calculate the length of the plate in centimeter. (3 mks)

6. Solve for x in the equation: (3 mks)

$$\frac{x-3}{4} - \frac{x+3}{6} = \frac{x}{3}$$

7. A salesman earns 3% commission for selling a chair and 4% commission for selling a table. A chair fetches K£ 75. One time, he sold ten more chairs than tables and earned seven thousand, two hundred Kenya shillings as commission. Find the number of tables and chairs sold. (4 mks)

8. Using the three quadratic identities only factorise and simplify: (3 mks)

$$\frac{(x-y)^2-(x+y)^2}{(x^2+y^2)^2-(x^2-y^2)^2}$$

9. Two numbers are in the ratio 3 : 5. When 4 is added to each the ratio becomes 2 : 3. What are the numbers? (3 mks)

10. Given that $\text{Sin}(x + 4^0) = \text{Cos}(3x)^0$. Find $\tan(x + 40^0)$ to 4 s.f. (3 mks)

11. In a regular polygon, the exterior angle is $^1/_3$ of its supplement. Find the number of sides of this polygon. (3 mks)

12. Find the area of a segment of a circle whose arc subtends an angle of 22 $\frac{1}{2}^0$ on the circumference of a circle, radius 10cm. (3 mks)

13. An airplane leaves point A (60^0S, 10^0W) and travels due East for a distance of 960 nautical miles to point B. determine the position of B and the time difference between points A and B. (3 mks)

14. Mr. Onyango's piece of land is in a form of triangle whose dimensions are 1200M, 1800M and 1500M respectively. Find the area of this land in ha. (Give your answer to the nearest whole number). (3 mks)

15. Two men each working for 8 hours a day can cultivate an acre of land in 4 days. How long would 6 men, each working 4 hours a day take to cultivate 4 acres? (3 mks)

16. Find the equation of a straight line which is perpendicular to the line $8x + 2y - 3 = 0$ given that they intersect at $y = 0$ leaving your answer in a double intercept form. (3 mks)

SECTION B

17. (a) Use the mid-ordinate rule to estimate the area bounded by the curve $y = x + 3x^{-1}$, the x-axis, lines $x = 1$ and $x = 6$. (4 mks)

(b) Find the exact area of the region in (a) above. (3 mks)

(c) Calculate the percentage error in area when mid-ordinate rule is used. (3 mks)

18. A car whose initial value is Ksh 600,000 depreciates at a rate of 12% p.a. Determine:
    (a) Its value after 5 years. (4 mks)

    (b) Its value of depreciation after 5 years. (2 mks)

    (c) The number of year it will take for the value of the car to be Ksh 300,000 (3 mks)

19. A square whose vertices are P (1,1) Q (2,1) R(2,2) and S (1,2) is given an enlargement with centre at (0,0). Find the images of the vertices if the scale factors are: (3 mks)
    (i) -1

    (ii) ½

(iii) 3

(b) If the image of the vertices of the same square after enlargement are P^1 (1,1), Q^1 (5,1), R^1(5,5) and S^1 (1,5) find:

(i) the centre of enlargement (2 mks)

(ii) the scale factor of the enlargement (2 mks)

20. On the graph paper provided plot the point P (2,2) Q (2,5) and R (4,4).

(a) Join them to form a triangle PQR. (1 mk)

(b) Reflect the triangle PQR in the line X = 0 and label the image as P^1 Q^1 R^1. (2 mks)

(c) Triangle PQR is given a translation by vector. T $\begin{pmatrix}2\\2\end{pmatrix}$ to P^{11} Q^{11} R^{11}. Plot the triangle P^{11} Q^{11} R^{11}. (3 mks)

(d) Rotate triangle P^{11} Q^{11} R^{11} about the origin through -90^0. State the coordinates of P^{111} Q^{111} R^{111}. (3 mks)

(e) Identify two pair of triangles that are direct congruence. (1 mk)

21. Three warships P, Q and R are at sea such that ship Q is 400 km on a bearing of $N30^0$ E from ship P. ship R is 750 km from ship Q and on a bearing of $S60^0E$ from ship Q. an enemy warship is sighted 1000 km due south of ship Q.

(a) Use scale drawing to locate the position of ships P, Q, R and S. (4 mks)

(b) Find the compass bearing of: (2 mks)
   (i) Ship P from ship S
   (ii) Ship S from ship R

(c) Use scale drawing to determine: (2 mks)
   (i) The distance of S from P
   (ii) The distance of R from S

(d) Find the bearing of: (2 mks)
   (i) Q from R
   (ii) P from Q

22. The table below shows the amount in shillings of pocket money given to students in a particular school.

Pocket money (Kshs)	201 – 219	220 – 229	230 – 239	240 – 249	250 – 259	260 – 269	270 – 279	280 – 289	290 – 299
No. of students	5	13	23	32	26	20	15	12	4

(a) State the modal class. (1 mk)

(b) Calculate the mean amount of pocket money given to these students to the nearest shilling. (4 mks)

(c) Use the same axes to draw a histogram and a frequency polygon on the grid provided. (5 mks)

23. Given that points X (0,-2), Y (4, 2) and Z (x,6);

(a) Write down the column vector $\overrightarrow{XY}$. (1 mk)

(b) (i) Find $\left|\overrightarrow{XY}\right|$ leaving your answer in index form. (3 mks)

(ii) Given that $\left|\overrightarrow{XZ}\right|$ = 11.3170, find the coordinates of Z. (3 mks)

(c) Find the mid-point of the line YZ. (3 mks)

24. A bus and a matatu left Voi from Mombasa, 240 km away at 8.00 am. They travelled at 90 km/h and 120 km/h respectively. After 20 minutes the matatu had a puncture which took 30 minutes to mend. It then continued with the journey.
(a) How far from Voi did the catch up with the bus. (6 mks)

(b) At what time did the matatu catch up with the bus? (2 mks)

(c) At what time did the bud reach Mombasa? (2 mks)

MATHEMATICS
PAPER 2
PRE- MOCK – MARCH / APRIL 2015
TIME: 2 ½ HOURS

Name…….. Class ….……

Index Number ……..…… **Class Number……**

Instructions to candidates

8. Write your name, index and class number in the spaces provided above.
9. The paper consists of two sections**:** ***section I*** and ***section II*****.**
10. Answer **all** the questions in **section I** and any **five** in **section II**
11. Section I has **sixteen** questions and section two has **eight** questions
12. All answers and working must be written on the question paper in the spaces provided below each question.
13. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question
14. KNEC Mathematical table and silent non-programmable calculators may be used.

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

25. Without using logarithm tables or calculator, solve $3^{2x+3} - 28\,(3^x) + 1 = 0$. (3 mks)

26. Use a mathematical table to evaluate: (3 mks)

$$\left(\frac{4.28\ x\ 0.01677}{\tan 20}\right)^{\frac{1}{5}}$$

27. Simply and leave answer in surd form. (3 mks)

$$\frac{-9}{\sqrt{13}+\sqrt{3}} - \frac{5}{\sqrt{3}-\sqrt{13}}$$

28. The sides of triangles were measured and recorded as 8.4 cm, 10.5 cm and 15.3. Calculate the percentage error in perimeter correct to 2 d.p. (3 mks)

29. Simplify: (3 mks)

$$\frac{\log 16 + \log 81}{\log 8 \ + \ \log 27}$$

30. Simplify the expression: (4 mks)

$$\frac{(-36+ 9x^2)+ (-6y+3xy)}{3x-6}$$

31. Given that $\frac{x\,(x^2-1)}{x+1}$, find dy/dx at the point (2,4). (3 mks)

32. (a) Expand and simplify the expression $\left(10 + \frac{2}{x}\right)^5$ (2 mks)

(b) Use the expression in (a) above to find the value of 14^5. (1 mk)

33. John buys and sells rive in packets. He mixes 30 pockets of rive A costing sh 400 per packet with 50 packets of another kind of rive B costing sh 350 per packet. If he sells the mixture at a gain of 20%, at what price does he sell a pocket? (3 mks)

34. A chord of AB of length 13cm subtends an angle of 670 at the circumference of a circle centre O. find the radius of the circle. (3 mks)

35. Find the coordinates of the image of a point (5, -3) when its rotated through 180^0 about (3,1). (3 mks)

36. Two points P (-3,-4) and Q (2,5) are the points on a circle such that PQ is the diameter of the circle. Find the equation of the circle in the form $ax^2 + by^2 + cx + dy + e = 0$ where a, b, c and e are constants. (4 mks)

37. Two metal spheres of radius 2.3 cm and 2.86 cm are melted. The molten material is used to cast equal cylindrical slabs of radius 8 mm and length 70mm. If $^1/_{20}$ of the meal is lost during casting. Calculate the number of complete slabs cast. (3 mks)

38. A right pyramid has a rectangular base of 12 cm by 16cm. its slanting lengths are 26 cm. Determine:

    (a) The length of AC (1 mk)

(b) The angle AV makes with the base ABCD. (2 mks)

39. Determine the inverse, T^{-1} of the matrix T $\begin{pmatrix} 4 & 6 \\ 6 & -2 \end{pmatrix}$ hence solve : (3 mks)

2x + 3y = 30
3x – y = 10

40. Use squares, square roots and tables to evaluate: (3 mks)

$3.045^2 + (49.24)^{-1/2}$

SECTION B

41. The table below shows the frequency distribution of diameter for 40 tins in millimeters.

Diameter (mm)	130 – 139	140 – 149	150 – 159	160 – 169	170 – 179	180 – 180
No of tins	1	3	7	13	10	6

Using a suitable working mean calculate:

(a) The actual mean for the grouped lengths. (4 mks)

(b) The standard deviation of the distribution. (6 mks)

42. A $^3/_2$ Bao yearly plan is a school pocket money (SPM) saving scheme requiring 12 months payments of a fixed amount of money on the same data each month. All savings earn interest at a rate of p% per complete calendar month.

    Lewis Kamau decides to invest K£ 30 per month in this scheme as advised by Gumbo and Oteinde 4Q and 4P class governors a.k.a class secretaries and witnesses by very determined mathematics. Martine Mutua Mukumbu (M^3) and makes no withdrawals during the year.

    (a) Show that after 12 compelete calendar months, Lewis first payment has increased in value to K£ 30 r^{12}, where $r = 1 + \frac{P}{100}$ (4 mks)

    (b) Show that the total value, after 12 complete calendar months, of all 12 payments is K£ 30 $r = \frac{r(r^{12}-1)}{(r-1)}$ (3 mks)

    (c) Hence calculate the total interest received during the 12 months when the monthly rate of interest is ½ per cent. (3 mks)

43. A mobile dealer sells phones of two types: Nokia and Motorola. The price of one nokia and one Motorola phone is Ksh 2000 and Ksh 16000 respectively. The dealers wishes to have al least fifty mobile phones. The number of Nokia phones should be atleast the same as those of Motorola phones. He has Ksh 120,000 to spend on phones. If he purchases x Nokia phones and y Motorola phones;
    (a) Write down all the inequalities to represent the above information. (3 mks)

(b) Represent the inequalities in part (a) above on the grid pro\vided. (4 mks)

(c) The profit on a nokia phone is Ksh 200 and that on a Motorola phone is Ksh 300. Find the number of phones of each type he should stock so as to maximize profit. (3mks)

44. The vertices of parallelogram are O (0,0), A (5,0) B (8,3) and C (3,3). Plot on the same axes:

(i) Parallelogram O'A'B'C', the image of OABC under reflection in the line x = 4 (4 mks)

(ii) Parallelogram O''A''B''C'' the image of O'A'B'C' under a transformation described by the matix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ Describe the transformation. (4 mks)

(iii) Parallelogram O'''A'''B'''C''' under the enlargement, centre (0,0) and scale factor ½ (2 mks)

45. A particle moving with acceleration a = (10 –t) m/s^2. When t = 1 velocity V = 2 m/s and when t = 0 displacement S = OM.

    (a) Express displacement and velocity in terms of t.

    (b) Calculate the velocity when t = 35

    (c) What is the displacement when t = 5

    (d) Calculate maximum velocity.

46. (a) Three quantities x, y and t were such that the square root of y varies directly as x and inversely as t. find the percentage change in t if x decreases in ratio 4 : 5 and y increases by 44%. (5 mks)

(b) If y varies as the square root of x and the sum of the vale of y when x = 4 and y = 100 is 2:
(i) Find y in terms of x (3 mks)

(ii) Find x correct to one d.p when y = 14 (2 mks)

47. Use a ruler and pair of compasses only in this question. ABC is a fixed triangle in which AB = AC = 6 cm and angle BAC = 90^0. Show clearly on a two dimensional drawing the locus of Q in each case below.
(a) When Q is equidistant from both lines CA and CB. (5 mks)

(b) When the area of triangle ABC = areas of triangle QBC. (5 mks)

48. Two fair dice are tossed once. The event A and B are defined as follows:
A: the score on the two dices are the same
B: at least one die shows a 4.

(a) Draw a probability space representing the tossing. (2 mks)

(b) Calculate:
(i) The probability of even A (1 mk)

(ii) The probability of even B (2 mks)

(iii) The probability of even A and B (2 mks)

(c) If the two dice are tossed three time

(i) Draw a tree diagram showing the event A happening for the three tosses. (1 mk)

(ii) Calculate the probability that A occurs:

(a) Exactly once (1 mk)

(b) At least once (2 mk)

(c) At most once (2 mks)

Name: ..... **Adm No**: .....

Class: ..... **Candidate's Signature**: .....

121/1
MATHEMATICS
Paper 1
2016
2½ hours

FORM 4 OPENER EXAM JAN 2017

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

121/1
MATHEMATICS
Paper 1
2½ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
*(c) This paper consists of **TWO** sections: **Section I** and **Section II**.*
*(d) Answer **ALL** the questions in **Section I** and only **Five** 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.*
*(i) **Candidates should answer the questions in English***
*(j) **This paper consists of 15 printed pages.***
*(k) **Candidates should check the question papers to ascertain that all the pages are printed as indicated and that no questions are missing.***

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

SECTION I (50 MARKS)

Answer ALL the questions in this section

1. Without using a calculator (3 marks)

   Evaluate $\frac{42 \div -6+14\ x\ 5-7\ x\ 3}{23+\ -4+(-3-\ -5)}$

2. Five people can build 3 huts in 21 days. Find the number of people, working at the same rate that will build 6 similar huts in 15 days (3 marks)

3. Evaluate without using a calculator. (3 marks)

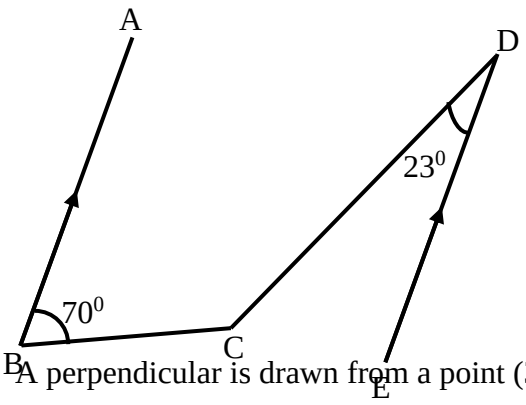
   $$\frac{\frac{2}{7}+3\frac{1}{5}\ of\frac{7}{8}\div\frac{6}{11}-\left(5\frac{1}{3}+\frac{9}{10}\right)}{\frac{3}{4}+\ 1\frac{5}{7}\div\frac{4}{7}\ of\ 2\frac{1}{3}}$$

4. A commercial bank buys and sells Japanese Yen in Kenya shillings at the rate shown below.

Buying	Selling
KSh. 0.5024	KSh. 0.5440

A Japanese tourist at the end of his tour in Kenya was left with Sh. 40,000 which he converted to JapaneseYen through the commercial bank. How many Japanese Yen did he get? (2 marks)

5. In the figure below AB//DE, ∠ABC = 70^0 and ∠CDE = 23^0. Find ∠BCD. (3 marks)



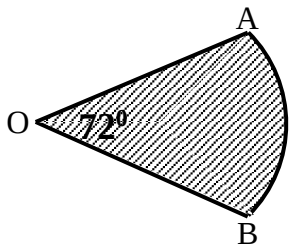
6. A perpendicular is drawn from a point (3,5) to the line 2y + x = 3. Find the equation of the perpendicular. (3 marks)

7. Find the value of x if (3 marks)

$$\left(\frac{1}{8}\right)^{2x-9} = 4^{-\frac{3}{2}x}$$

8. Onyango bought 4 TV sets and 2 tablets for KSh. 108000. Mueni bought 3 TV sets and 5 tablets from the same shop for KSh. 193,000. How much will Janet pay for one tablet and 2 TV sets. (4 marks)

9. The figure below shows a sector of a circle. If the area of the sector is 30.8cm2, calculate the length of the arc. (Take $\pi\ to\ \frac{22}{7}$)



10. Simplify the expression (3 marks)

$$\frac{b^4 - c^4}{b^3 - bc^2}$$

11. Given that $\overrightarrow{OP}$ = 2i + 3j and $\overrightarrow{OQ}$ = 3i – 2j. Find the magnitude of PQ correct to three decimal spaces. (3 marks)

12. Solve the inequality (3 marks)

$$\frac{x-2}{4} + \frac{x+5}{2} \geq \frac{4x-6}{8} - 1$$

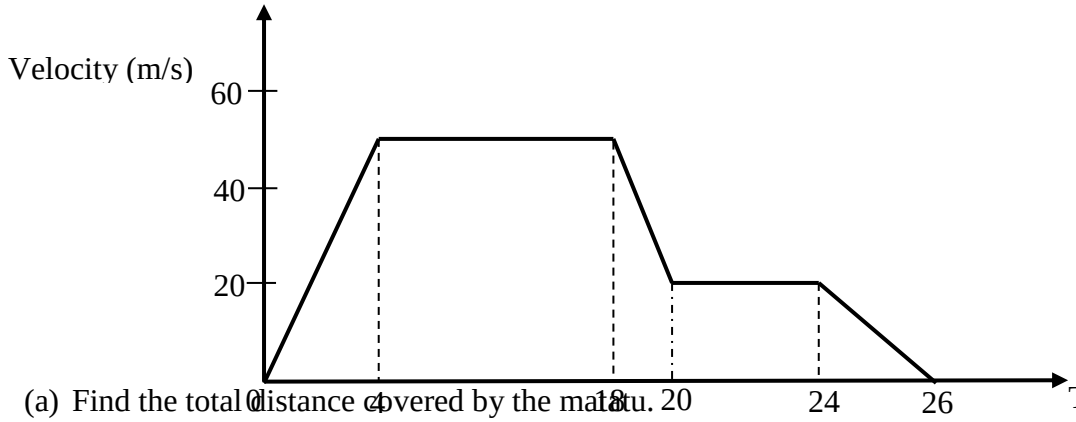
13. A and B are two matrices. If A = $\begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$, find B given that $A^2 = A + B$. (3 marks)

14. A number is formed by finding the sum of the product of prime numbers between 1 and 15 and that of prime numbers between 50 and 60.

(a) Find the number. (2 marks)

(b) What is the total value of the second digit in the number formed. (1 mark)

15. The figure below shows a velocity – time graph of a matatu.



(a) Find the total distance covered by the matatu. (2 marks)

(b) Calculate the acceleration of the matatu (2 marks)

16. A cylindrical piece of wood of radius 9.8cm and length 2m is cut length wise into two equal pieces. Calculate the total surface area of one piece. (Take $\pi = \frac{22}{7}$)

SECTION II (50 MARKS)

Answer any five questions in this section in the spaces provided.

17. (a) Three towns X, Y and Z are such that Y is 5km on a bearing of 030^0 from X, Z is 6km on a bearing of 120^0 from Y.

(i) Using a scale of 1cm to represent 0.5km draw a diagram to show the relative positions of the towns X, Y and Z. (4 marks)

(ii) Find the distance and bearing of town X from Z. (3 marks)

(iii) A straight main road runs from town X to Z. Find the length of the shortest path from town Y to the main road (3 marks)

18. The table below shows heights of 50 students.

Height (cm)	Frequency
140 – 144	3

145-149	15
150-154	19
155-159	11
160-164	2

(a) State the modal class. (1 mark)

(b) Calculate the mean height. (4 marks)

(c) Calculate the difference between the median height and the mean height. (5 marks)

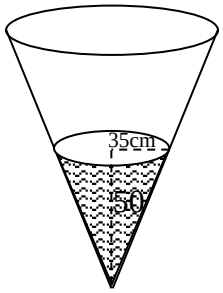
19. A bus left Nakuru for Mombasa at an average speed of 80km/h. After 1 ½ hours a car left Nakuru and travelled along the same route at an average speed of 120km/h. If the distance between Nakuru and Mombasa is 750km, determine

(a) (i) the distance of the bus from Mombasa when the car took off (2 marks)

(ii) the distance the car travelled to catch up with the bus. (4 marks)

(b) Immediately the car caught up with the bus, the car stopped for 30 minutes. Find the new average speed at which the car travelled in order to reach Mombasa at the same time as the bus (4 marks)

20. The figure shows a water vessel.



(a) Calculate the volume of the water in the vessel (2 marks)

(b) When a solid sphere is completely submerged into the water, the level of the water rose by 5cm. Calculate

(i) the radius of the new water surface (2 marks)

(ii) the volume of the sphere (to 4 sf) (2 marks)

(iii) the number of spheres that can be submerged into the water before it ever flows from the vessel if its length is 75cm (4 marks)

21. The vertices of a triangle are A (1, 2), B (7, 2) and C (5, 4).

(a) Draw on the same grid

(i) triangle ABC and its image $A^{I}B^{I}C^{I}$ under a rotation of -90^{0} about the origin (4 marks)

(ii) triangle $A^{II}B^{II}C^{II}$ the image of ABC under a reflection in the line x = 0. State the co-ordinates of $A^{II}B^{II}C^{II}D^{II}$. (2 marks)

(b) $A^{III}B^{III}C^{III}$ is the image of $A^{II}B^{II}C^{II}$ under a reflection in the line y = 0. Draw the image $A^{III}B^{III}C^{III}$ and state its co-ordinates. (2 marks)

(c) Describe a single transformation which maps $A^{III}B^{III}C^{III}$ onto ABC (2 marks)

FOR MARKING SCHEMES CALL 0705525657/0770195807

22. In triangle OAB, $\overrightarrow{OA}$ = $\underset{\sim}{a}$, $\overrightarrow{OB}$ = $\underset{\sim}{b}$ and p lies on $\overrightarrow{AB}$ such that AP:PB = 3:5

(a) Find in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ the vectors

(i) $\overrightarrow{AB}$

(ii) $\overrightarrow{AP}$

(iii) $\overrightarrow{BP}$

(iv) $\overrightarrow{OP}$

(b) Point Q is on OP such that AQ = $-\frac{5}{8}\underset{\sim}{a} + \frac{9}{40}\underset{\sim}{b}$. Find the ratio OQ: QP.

23. (a) Given that $y = -2x^2 + 3x + 7$

Complete the table below.

x	-3	-2	-1	0	1	2	3	4	5
$-2x^2$	-18	-8	-2	0			-18	-32	-50
3x + 7	-2	1	4		10	13		19	22
y	-20			7					-28

(b) On the grid provided and using a suitable scale.
draw the graph of $y = -2x^2 + 3x + 7$

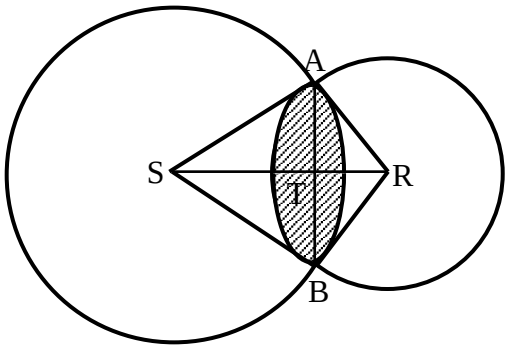
(c) On the same grid draw the straight line y = 4 – x (2 marks)

(d) Use the graph to solve the equation.

(i) $2x^2 – 4x – 3 = 0$ (2 marks)

(ii) $-2x^2 + 3x + 7 = 0$ (1mark)

24.



Two intersecting circles centres R and S have radii 7.2cm and 10cm respectively. The centres R and S are 12cm apart and ST:TR = 2:1.

(a) (i) Calculate (i) ∠ASB (2 marks)

(ii) ∠ARB (2 marks)

(b) Calculate the area of the shaded region (6 marks)

Name: ..... **Adm No**: .....

Class: ..... **Candidate's Signature**: .....

121/1
MATHEMATICS
Paper 2
2016
2½ hours

FORM 4 OPENER EXAM JAN 2017

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

121/2
MATHEMATICS
Paper 2
2½ hours

Instructions to candidates

(l) Write your name and index number in the spaces provided above.
(m) Sign and write the date of the examination in the spaces provided above.
*(n) This paper consists of **TWO** sections: **Section I** and **Section II**.*
*(o) Answer **ALL** the questions in **Section I** and only **Five** from **Section II**.*
(p) All answers and working must be written on the question paper in the spaces provided below each question.
*(q) **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
(r) Marks may be given for correct working even if the answer is wrong.
*(s) **Non – programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.*

(t) ***Candidates should answer the questions in English***

(u) ***This paper consists of 15 printed pages.***

(v) ***Candidates should check the question papers to ascertain that all the pages are printed as indicated and that no questions are missing.***

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

SECTION 1 (50 MARKS)

Answer all the questions to evaluate

1. Use logarithms to evaluate (4 Marks)

$$\left(\frac{6.79\ x\ 0.3911}{Log\ 5}\right)^{\frac{3}{4}}$$

2. Solve the equation cos y = Sin $(\frac{1}{2}y - 30^0)$ for $0 \leq y \leq 90^0$ (2 marks)

3. Given the matrices A = $\begin{pmatrix} 2 & -1 \\ -3 & 1 \end{pmatrix}$ and B $\begin{pmatrix} -3 & 4 \\ -2 & -1 \end{pmatrix}$ and that C = A^2 – B, write down the inverse of C (4 marks)

4. Make y the subject of the formula (3 marks)
   y + $\sqrt{km + y^2}$ = $2x$

5. Expand $(3 - t)^7$ upto the term containing t^4. Hence find the approximate value of $(2.8)^7$ (3 marks)

6. Without using a calculator or mathematical tables, express
   $\frac{\sqrt{3}}{1-Cos\ 30^0}$ in surd form and simplify. (3 marks)

7. A sum of Sh. 6000 is invested at 8% p.a compound interest. After how long will this sum amount to Sh. 9250? (Give your to the nearest month) (3 marks)

8. Evaluate $log_2^x + log_x^2 = 3$ (4 marks)

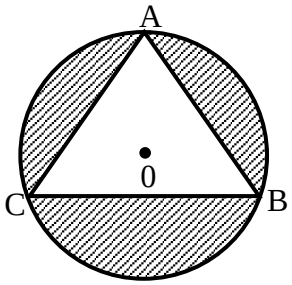
9. The parallel sides of a trapezium are given as 6.0cm and 4.5cm while the shortest distance between them is given as 3.2cm. Calculate the percentage error in the area of the trapezium. (4 marks)

10. The prefects body of a certain school consists of 7 boys and 5 girls. Three prefects are to be chosen at random to represent the school at a certain function at Nairobi. Find the probability that the chosen prefects are boys (2 marks)

11. Determine the radius and the co-ordinate of the centre of a circle whose equation is $y^2 + x^2 + 6y - 16 = 0$ (3 marks)

12. Six interior angles of a hexagon form an arithmetic progression. If the largest angle is 150^0, find the size of the smallest angle. (3 marks)

13. In the figure below O is the centre of the circle and ABC is a triangle with AB = 5cm, AC = 7cm, BC = 6cm and $\angle ACB = 30^0$. Find the area of the shaded region. (3 marks)



14. Vector OP = 6i + j and OQ = 2i + 5j. A point N divides PQ internally in the ratio 3:1. Find PN in terms of i and j (3 marks)

15. Use matrix method to determine the co-ordinates of the point of intersection of the two lines below.

$3x - 2y = 13$ and $2y + x + 1 = 0$ (3 marks)

16. A group of 10 soldiers set off with enough food to last 7 days. After 4 days, 4 soldiers were killed. How many days will the food last the remaining soldiers (3 marks)

SECTION II (50 Marks)

Attempt any five questions in this section

17. Three business ladies Mwende, Njeri and Adhiambo contributed a capital of KSh. 90,000, KSh 120,000 and KSh 80,000 respectively to start a business. The agreed to share their profits as follows: 15% equally, 60% in the ratio of their contributions and the rest was saved for the running of the business. During a certain year, they made a profit of Sh. 87,000.

Determine

(a) the amount shared equally (2 marks)

(b) the amount shared according to the ratio of their contribution (2 marks)

(c) the amount they saved (2 marks)

(d) the share Mwende and Adhiambo got (4 marks)

18. The table below gives the income tax rates in a certain year.

Taxable income in K£ p.a	Rate (%)
1 – 4500	10
4501-7,500	15

7501 – 10,500	20
10501 – 13,500	25
13,501 – 16,500	30
Over 16,500	35

Mr. Mwamba is a manager in a certain bank. He is entitled to a monthly personal relief of Sh. 3,000 and his tax (PAYE) is Sh. 9000 per month and cooperative shares of Sh.1200 per month is contributed. Calculate

(a) Mr. Mwamba total deductions per month from his earnings. (2 manks)

(b) total tax per month without relief. (1 mark)

(c) Mr. Mwamba's monthly basic salary if his monthly allowances amounted to Sh. 12,000 (7 marks)

19. A bag contains 10 similar pens of which 6 are red and the rest blue in colour. Three pens are picked at random, one at a time from bag without replacement.

(a) Draw a tree diagram to show the various outcomes. (2 marks)

(b) Find the probability that

(i) none of the pens picked is red (2 marks)

(ii) at least one of the pens picked is red (2 marks)

(iii) only one blue pen is picked (2 marks)

(iv) the first two pens picked are of the same colour (2 marks)

20. Three consecutive terms of a geometric progression are 3^{2t+1}, 9^t and 81 respectively.

(a) Calculate the value of t (3 marks)

(b) Find the common ratio of the series (1 mark)

(c) Calculate the sum of the first 10 terms of this series to 2 d.p (3 marks)

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

21. (a) Three quantities f, g and h are such that the square root of g varies directly as f and inversely as h. Find the percentage change in h if f decreases in the ratio 4:5 and g increases by 44%. (5 marks)

(b) If g varies as the square root of f and the sum of the value of g when f = 4 and g = 100 is 2:
(i) Find g in terms of f (3 marks)

(ii) Find f correct to one decimal place when g = 14 (2 marks)

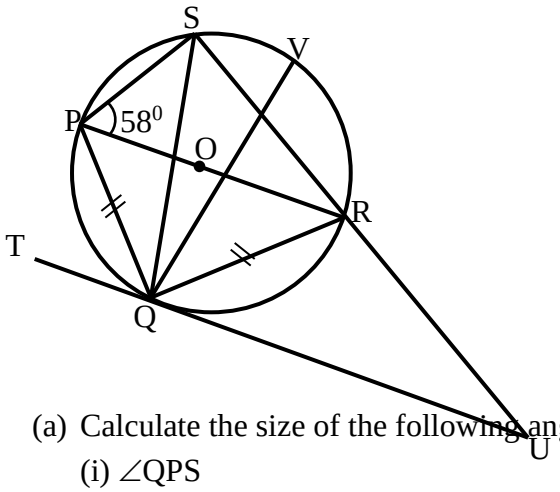
22. The table below shows values of x and some values of y for the function.
$y = -x^3 - 3x^2 + 4x + 12$ in the range $-4 \leq x \leq 2$.
(a) Complete the table by filling in the missing values of y correct 1 d.p (2 marks)

x	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0	0.5	1.0	1.5	2.0
y	12		0	-1.1	0		6		12	13.1			0

(b) On the grid provided draw the graph of $y = -x^3 - 3x^2 + 4x + 12$ for $-4 \leq x \leq 2$
Scale: Horizontal axis : 2cm for 1 unit
Vertical axis : 2cm for 4 units
(c) Use the graph to solve the equations (1 mark)
(i) $x^3 + 3x^2 - 4x - 12 = 0$
(ii) $x^3 + 3x^2 - 5x - 6 = 0$ (4 marks)

FOR MARKING SCHEMES CALL 0705525657/0770195807

23. In the figure below POR is the diameter of the circle O, PQ = QR and angle SPR = 58^0. TQU is a tangent to the circle at Q. V is a point on the minor arc SR.



(a) Calculate the size of the following angles giving reasons for your answer.

(i) ∠QPS (2 marks)

(ii) Reflex $Q\hat{O}S$ (2 marks)

(iii) ∠QVS (2 marks)

(iv) ∠QVR (2 marks)

(b) Given that SR = 5cm and RU = 4cm, find UQ (2 marks)

24. Two tanks of equal volume are connected in such a way than one tank can be filled by pipe X in 1 hour 20 minutes. Pipe Y can drain one tank in 3 hours 36 minutes but pipe T alone can drain both tanks in 9 hours.
Calculate
(a) The fraction of one tank that can be filled by pipe X in one hour (2 marks)

(b) The fraction of one tank than can be drained by both pipes Y and T in one hour. (4 marks)

(c) Pipe X closes automatically one both tanks are filled. If initially both tanks are empty and all pipes are opened at once, calculate how long it takes before X closes. (4 marks)

Name…… Index Number……../……..

Candidate's Signature……..

Date……

121/1
Mathematics
Paper 1
2 ½ hours

FORM FOUR KCSE YEAR 2018
KCSE 2018 TRIAL 3
MATHEMATICS

Instructions to Candidates

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consists of **TWO** sections: **Section I** and **Section II.***
4. *Answer **ALL** the questions in **Section I** and **only five** questions from **Section II**.*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
7. *Marks may be given for correct working even if the answer is wrong.*
8. ***Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.*
9. ***This paper consists of 12 printed pages.***
10. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

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

SECTION A (50MARKS)

1. Evaluate Leaving your answer in fraction form(3 mks)

$$\frac{\frac{3}{5}of\,30+5\frac{5}{6}\div\frac{7}{12}-2\frac{2}{3}\times1\frac{1}{2}}{5\frac{5}{8}\times1\frac{7}{9}-\frac{5}{9}of\,4\frac{4}{5}+\frac{14}{5}\div\frac{7}{10}}$$

.

2. Mr. Omondi left shs. 116,580 in his bank account to be shared between his wife, daughter and son in the ratio 1:2:3. His wife decided to divide her share equally between her daughter and son. Determine how much the son finally got. (3 mks)

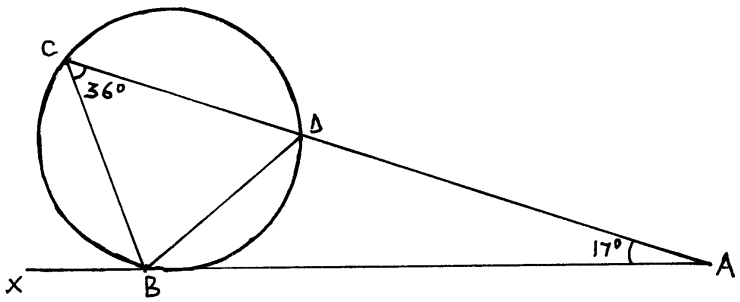
3. Use logarithms in all your steps to work out. (4mks)

$$\sqrt[3]{\frac{4968}{87.56\div6.258}}$$

4. Sankale walks for 2 ½ hours in the morning at xkm/hr and for ½ x hours in the afternoon at 6km/hr. This makes 38 ½ km altogether. How far did she walk in the morning. (3mks)

5. Given that Cos θ = $^{15}/_{17}$ and $270^0 \leq \theta \leq 360^0$. Find without using tables the values of sine θ and tangent θ. (3mks)

6. On the figure below ABX is a tangent, Angle CAB=17^0 and Angle ACB = 36^0. Calculate angle CBX and angle DBC. (3mks)



7. What is the sum of the roots of the equation. (3mks)

$$\frac{x^2 + 3}{x} = 4$$

8. Sonko is a real estate agent who is entitled to a commission on all properties bought through him. During a certain month he sold 2 mansions at sh. 2.54 million each, 4 flats at sh. 582,000 each and 5 bungalows at sh. 354,000 each. If he was paid a total commission of sh. 458,900. Calculate the percentage rate of commission he was paid.
(4mks)

9. It takes 20 men 10 days to lay 300 metres of pipes. Find how many days it would take 15 men to lay 270 metres of pipes working at the same rate. (3mks)

10. A cylindrical tank of diameter 1.4m and height 1.2m is one-quarter full of water. This water is transferred to an empty rectangular container measuring 1.2m long and 70cm wide. Calculate the height of the water in the container in centimeters. (3mks)

11. Give the integral values of x which satisfies the following inequalities.
$4 < 3x - 2$; $15 - 2x > 4$. (4mks)

12. The average mark scored by the first 27 students in a mathematics test is 52. The average mark scored by the remaining 37 is 58. Calculate the mean mark for the whole class.

(4mks)

13. Nyambura bought 3 skirts and 2 sweaters at a total cost sh. 1575. If he had bought 2 shirts and 3 sweaters he would have spent sh. 225 more. Find the cost of 5 skirts and 2 sweaters.

(4mks)

14. The straight line whose equation is $2y = 3x + 6$ meets the x-axis and the y-axis at P and Q respectively. Write down the coordinates of P and Q. (3mks)

15. Nairobi and Eldoret are 351 km apart. A bus leaves Nairobi towards Eldoret at an average speed of 66km/h. At the same time a car leaves Eldoret traveling at an average speed of 104km/hr towards Nairobi. Along the way the car stopped for 10 minutes to repair a puncture, then resumed the journey traveling at the same average speed. How far from Nairobi did they meet.

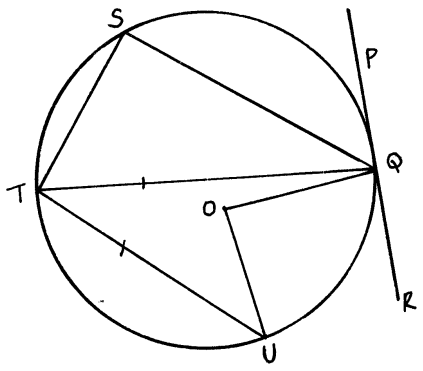
(4mks)

16. A number P is divided by 12,15 and 18. In each case the remainder is 5. Find the smallest value of P. (3mks)

Section II (50 Marks)

Answer ANY FIVE questions

17. In the figure below, O is the centre of the circle. PQR is a tangent to the circle at Q, Angle PQS = 28^0, angle UTQ = 54^0 and UT = TQ. Giving reasons, determine the size of



a) Angle STQ (2 mks)

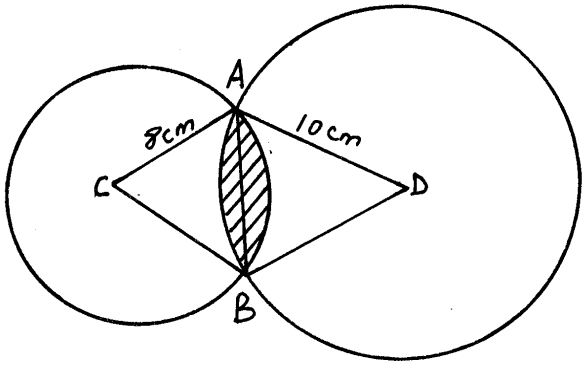
b) Angle TQU (2 mks)

c) Angle TQS (2 mks)

d) Reflex angle UOQ (2 mks)

e) Angle TQR (2 mks)

18. The figure below shows two circles, centres 'C' and 'D' of radii 8cm and 10cm respectively. The two circles subtend by angles of θ and β respectively at their centres and intersect at A and B as shown.



a) Given that the area of triangle ACB = 30.07cm^2 and that of triangle ADB = 43.30cm^3. Calculate the size of the

(i) angle marked θ (2 mks)

(ii) angle marked β (2 mks)

b) Calculate to two decimal places the area of

(i) Sectors ACB (2 mks)

(ii) Sector ADB (2 mks)

(iii) The shaded region (2 mks)

19. a) Two ships Q and R are sailing towards port P. At 1144 hours ship Q is exactly 120km on a bearing of 030^0 from P and ship R is 50km on a bearing of 300^0 from P. At this instant, ship R develops engine trouble and cannot continue with the journey. Ship Q receives the distress signal from ship R and has to change course and steam straight towards ship R at 50km/h. Without using a scale drawing, calculate the time of day ship Q reaches ship R. (5 mks)

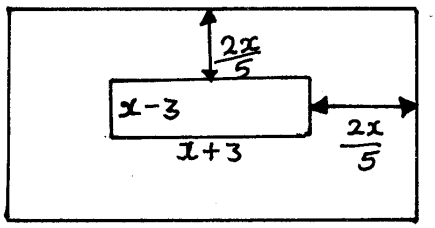
b) A particle moves along a straight line OA such that t seconds after it is at 'O'; its velocity is vm/s where $v=qt - 2t^2$ and q is a constant. At the point P, t = 4 and the particle is momentarily at rest. Calculate;

(i) The value of q (1 mk)

(ii) The distance OP (2 mks)

(iii) The acceleration when t = 1 ½ seconds. (2 mks)

20. The figure below represents the floor of a dancing hall with a carpeted margin all around of $\frac{2x}{5}$ m wide leaving a dancing space of (x-3)m by (x+3)m



a) If the total area of the entire room is 315m^2, calculate the value of x (4 mks)

b) Hence calculate the area of the carpeted margin. (2 mks)

c) If the carpet cost shs. 750 per m^2. Calculate the total cost of the sealed margin.

(2 mks)

21. a) The points $A^I B^I C^I$ are the images of A(4,1) B(0,2) and c(-2,4) respectively under a transformation represented by matrix M = $\begin{pmatrix} 1 & 1 \\ 2 & 3 \end{pmatrix}$. Write down the co-ordinates of $A^I B^I C^I$

(3 mks)

b) $A^{II} B^{II} C^{II}$ are the images of $A^I B^I C^I$ under another transformation whose matrix is N = $\begin{pmatrix} 2 & -1 \\ 1 & 2 \end{pmatrix}$. Write down the co-ordinates of $A^{II} B^{II} C^{II}$. (3 mks)

c) Transformation M followed by N can be replaced by a single transformation P. Determine the matrix for P. (2 mks)

d) Hence determine the inverse of matrix P. (2 mks)

22. Draw triangle PQR with vertices P(2,3) Q(1,2) and R(4,1) and triangle P^{II} Q^{II} R^{II} with vertices P^{II} (-2,3) Q^{II} (-1,2) R^{II} (-4,1) on the same axes. (2 mks)

(i) Describe fully a single transformation which maps triangle PPQR onto triangle P^{II} Q^{II} R^{II}. (2 mks)

(ii) On the same plane, draw triangle P^{I} Q^{I} R^{I} the image of triangle PQR, under reflection in line $y = -x$ (2 mks)

(iii) Describe fully a single transformation which maps triangle P^{I} Q^{I} R^{I} onto P^{II} Q^{II} R^{II} (2 mks)

(iv) Draw triangle P^{III} Q^{III} R^{III} such that it can be mapped onto triangle PQR by a positive quarter turn about the origin (0,0) (2 mks)

23. a) Draw a graph of $y = 8 - 10x - 3x^2$ for $-5 \leq x \leq 3$ (5 mks)

b) On the same axes, draw the line $y = 2x + 1$ and hence find;

(i) The roots of $8 - 10x - 3x^2 = 2x + 1$ (2 mks)

(ii) A quadratic equation with roots in b(i) above. (1 mk)

c) By including a suitable straight line, use your graph to solve $3x^2 + 12x - 11 = 0$ (2 mks)

24. Using a ruler and a pair of compasses only. Construct a parallelogram ABCD such that AB = 8cm diagonal AC = 12cm and angle BAC = 22.5^0 (4 mks)

a) Measure (i) The diagonal BD (1 mk)

(ii) The angle ABC (1 mk)

b) Draw the circumcircle of triangle ABC (2 mks)

c) Calculate the area of the circle drawn. (2 mks)

Name:..... Index no:...../.....……

Candidates

signature:.....

Date:.....

121/2
Mathematics

Paper 2
Time: 2 ½ hours

Form Four Evaluation Examination 2018
K.C.S.E 2018 TRIAL 3

121/2
Mathematics
Paper 2
July/August-2017.
Time: 2 ½ hours

INSTRUCTIONS TO CANDIDATES:

(a) Write your name and index number in the spaces provided above
(b) Sign and write the date of examination in the spaces provided above.
(c) This paper consists of ***TWO*** sections: ***Section I*** and ***Section II.***
(d) Answer ***ALL*** the questions in ***section I*** and only five 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

This paper consists of 16 printed pages.
Candidates must check to ascertain that all pages are printed as indicated and that no question(s) is/are missing.

1. Evaluate without using Mathematical tables or a calculator. (3mks)

$$2\log 5 - \frac{1}{2}\log 6 + 2\log 40$$

2. Solve for x given that the following is a singular matrix (2mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$

3. Make d the subject of the formula. (3mks)

$$a^2 = \sqrt{\frac{1+d^2}{b^2} - \frac{b}{3}}$$

4. Simplify $\frac{3}{\sqrt{7-2}} + \frac{1}{\sqrt{7}}$ leaving your answer in the form $a + b\sqrt{c}$, where a, b and c are rational numbers. (3mks)

5. Calculate the percentage error in the volume of a cone whose radius is 9.0cm and slant length 15.0cm.

(3mks)

6. A quantity A is partly constant and partly varies inversely as a quantity B. Given that A = -10 when B= 2.5 and A = 10 when B = 1.25, find the value of A when B = 1.5.

(4mks)

7. The table below shows corresponding values of x and y for a certain curve.

y	1.0	1.2	1.4	1.6	1.8	2.0	2.2
x	6.5	6.2	5.2	4.3	4.0	2.6	2.4

Using 3 strips and mid-ordinate rule, estimate the area between the curve x axis, the line x = 1 and x = 2.2.

(2mks)

8. 14 people can build 10 huts in 30 days. Find the number of people working at the same rate that will build 18 similar huts in 27 days. (3mks)

9. The coordinates of two airports M and N are (60^0N, 35^0W) and (60^0N, 15^0E) respectively. Calculate;

   (i) The longitude difference. (1mk)

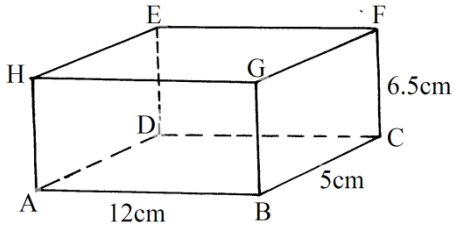
   (ii) the shortest time an aeroplane whose speed is 250 knots will take to fly from M to N along a circle of latitude.
   (2mks)

10. (a) Expand $(x-0.2)^5$ in ascending powers of x.
    (2mks)

(b) Use your expansion up to the fourth term to evaluate 9.8^5.

(2mks)

11. The figure below is a cuboid ABCDEFGH. AB = 12cm, BC = 5cm and CF = 6.5cm.



(a) State the projection of AF on the plane ABCD. (1mk)

(b) Calculate the angle between AF and the plane ABCD correct to 2 decimal planes. (3mks)

12. Show that $\frac{\sin x(\cos x+1)}{Cosx} = \sin x + \tan x.$ (3mks)

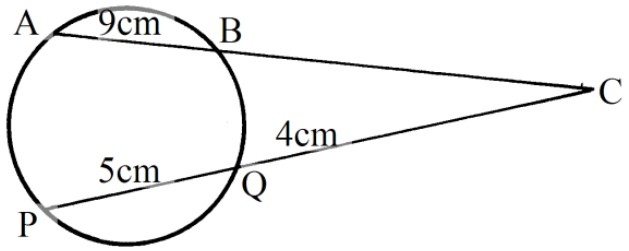
13. The mid-point of AB is (1,-1.5, 2) and the position vector of a point A is $-\underset{\sim}{1}+\underset{\sim}{j}$. Find the magnitude of $\vec{AB}$ where O is the origin. (3mks)

14. Draw a line of best fit for the graph of y against x using the values in the table below. Hence determine the equation connecting y and x.

x	**0.4**	**1.0**	**1.4**	**2.0**	**2.5**
y	**0.5**	**1.0**	**1.2**	**1.5**	**2.0**

15. A coffee dealer mixes two brands of coffee, x and y to obtain 40kg of the mixture worth Ksh. 2,600. If brand x is valued at Ksh. 70 per kg and brand y is valued at Ksh. 55 per kg. Calculate the ratio in its simplest form in which brands x and y are mixed. (4mks)

16. The figure below shows a circle centre O. AB and PQ are chords intersecting externally at a point C. AB = 9cm, PQ= 5cm and QC = 4cm. Find the length of BC.
(3mks)



SECTION II (50 MARKS)

Answer only five questions in this section

17. An examination involves a written and a practical test. The probability that a candidate passes the written test is $\frac{6}{11}$. If a candidate passes a written test then the probability of passing the practical test is $\frac{3}{5}$ otherwise it would be $\frac{2}{7}$.

(a) Illustrate this information on a tree diagram (2mks)

(b) Determine the probability that a candidate is awarded

(c) (i) credit for passing both tests (2msk)

(ii) pass for passing the written test (2mks)

(iii) retake for passing the test (2mks)

(iv)Fail for not passing the test (2mks)

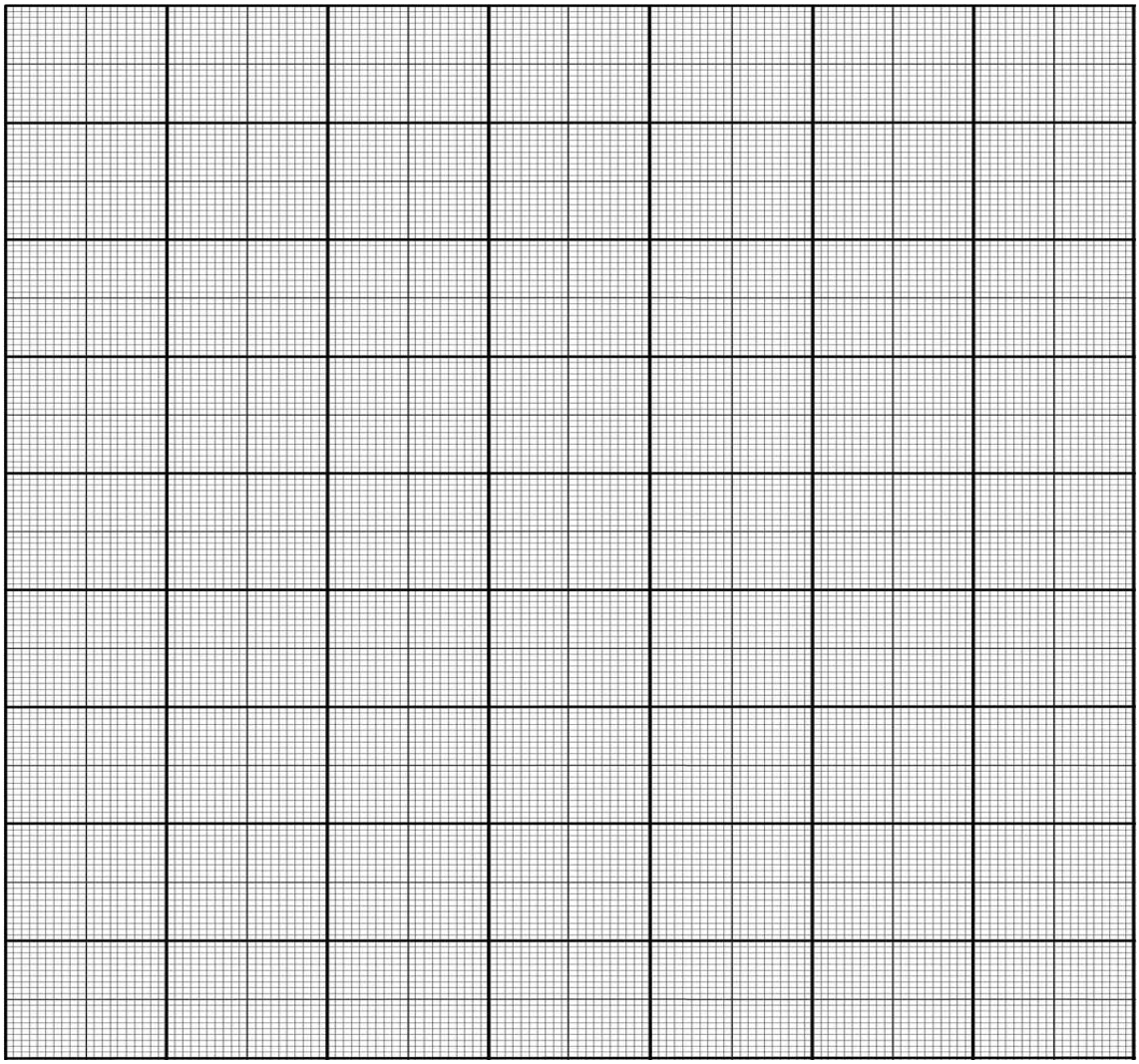
18. . The relationship between the variables a and y is believed to be y = a/x + bx. Where a and b are constants. The table below shows corresponding values of x and y

x	**1**	**2**	**3**	**4**	**5**
y	**5.00**	**7.00**	**9.67**	**12.50**	**15.40**

(a) Write the relationship in the form of y = mx + c

(1mk)

(b) By drawing a suitable straight line graph estimate the values of a and b
(7mks)



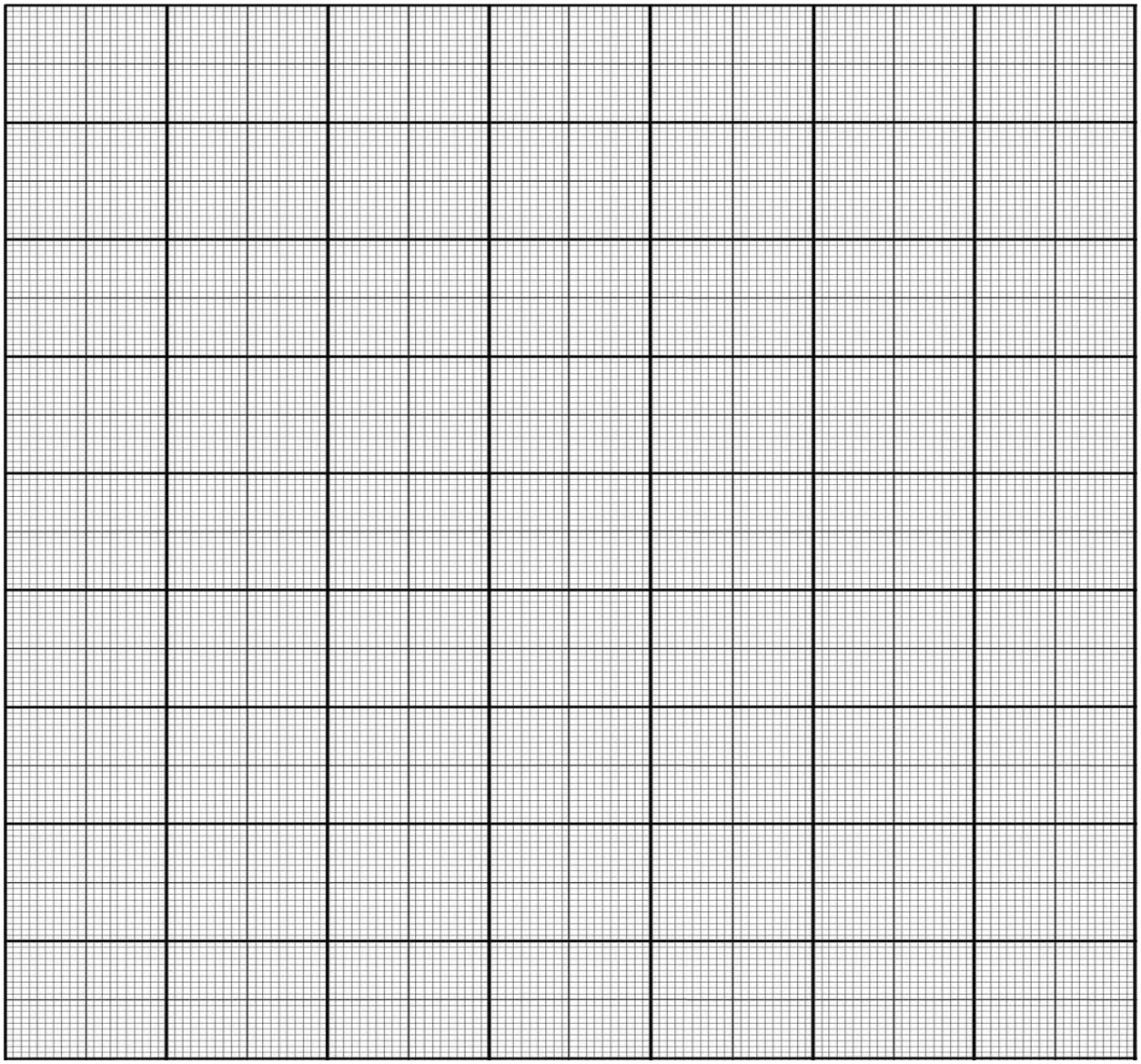
(c) Find the value of y when x = 1000 (2mks)

19. The vertices of triangle ABC are a(3,1) B (0,2) and c (2,-1)

(a) A'B'C' is the image of ABC under reflection on the line y x = 0. Draw A'B'C' on the grid provided hence state the co-ordinates of its vertices
(3mks)

(b) A"B"C" is the image of A'B'C' under positive quarter turn about the origin. Draw triangle A"B"C" and state the co-ordinates of its vertices.
(3mks)

(c) A'"B'"C'" is the image of triangle ABC under shear matrix, y axis invariant and linear scale factor 3. Write down the shear matrix hence find the co-ordiantes of the vertices of triangle A'"B'"C'" (1mk)



20. Two points P and Q are found on the earth's surface the position of P is (52°S,66°W) and Q (52°S,144°E). Taking earth's radius as 6370km,

(a) Find the difference in longitude between the two points P and Q (1mk)

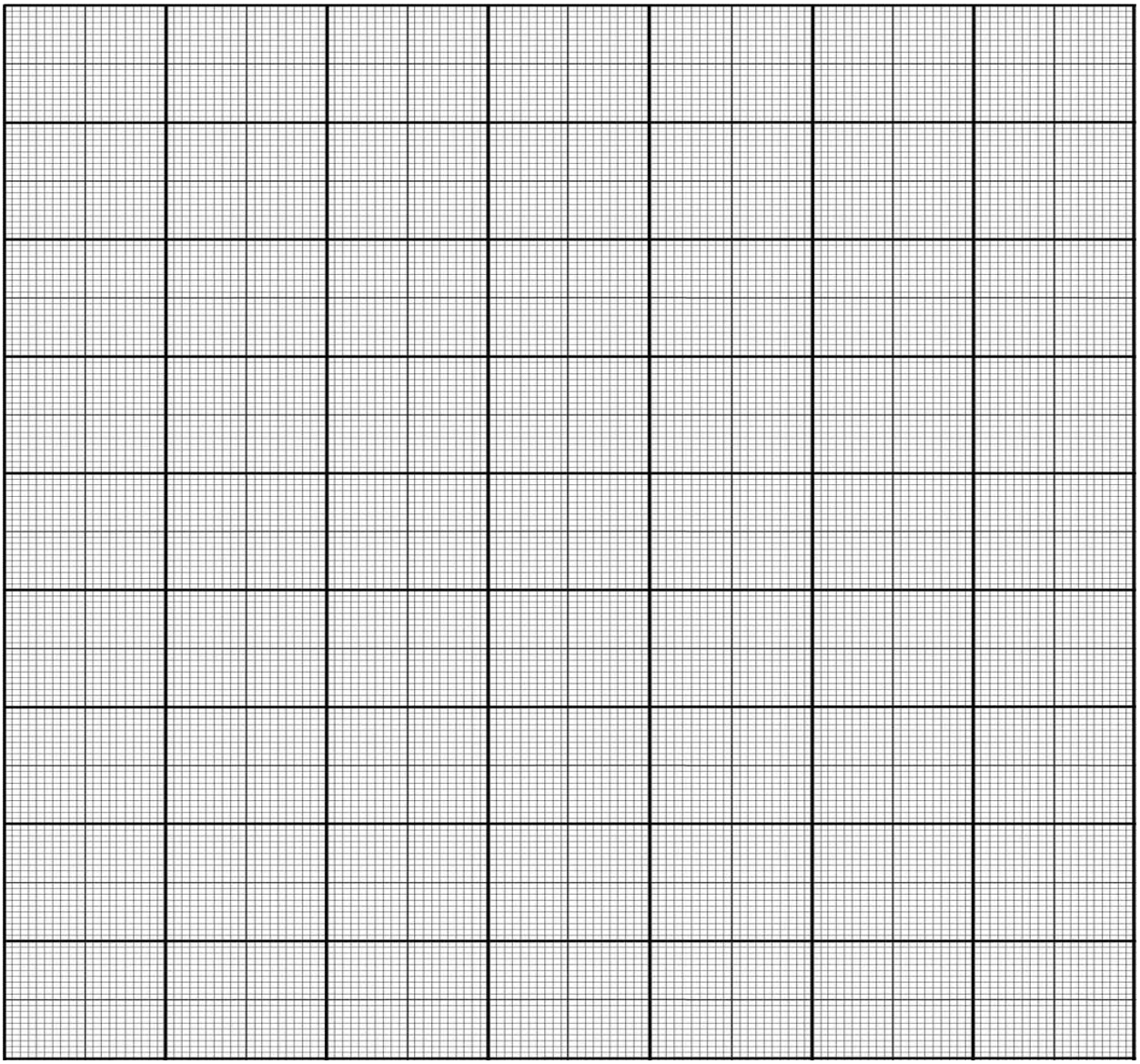
(b) (i) calculate the shortest distance between points P and q along (i) the latitutde in km (1mk)

(ii) The longitude in Km (4mks)

(d) A plane travelling at 800km/hr leaves point P At 10.00am and sais through south pole to point q. Find the local time the plane arrives at point Q to the nearest minute.
(4mks)

21. A company has two types of machines A and B for juice production. Type A machine can produce 800 litres per day while type A machine can produce 1600 litres per day. Type A machine needs four operators and type B needs seven operators. At least 800 litres must be produces daily and the total number of operators should not exceed 41. There should be two or more machine of each type. Leting x be the number of machines of type A and y for type B.
(a) Form all inequalities in x and y to represent the above information
(4mks)

(b) On the grid provided below,draw the in equalities and shade the unwanted region
(4mks)



(c) Use the graph I (b) above to determine the least number of operators required for the maximum possible production.

(2mk)

22. Using a ruler and a compass only,construct a triangle ABC such that AB = 6.8 cm, BC = 5.6 cm and angle ABC = 37 ½ ^{o}

(3mks)

(b) Locate the :
(i) Locus P such that angle APB = angle ACB
(3mks)

(ii) Locus Q such that Q is equidistant to points A and B (2mks)

(iii) Locus R such that R is equidistant to lines AB and AC (2mks)

23. The distance S meters from a fixed point O, covered by a particle after t seconds B given by the equation $S = t^3 - 6t^2 + 9t + s$
(a) calculate the gradient of the curve at t = 0.5 seconds
(3mks)

(b) Determine the values of S at the turning points of the curve (
3mks)

(c) Sketch the curve in the space provided. (4mks)

24. The table below shows the distribution of marks obtained by 50 students

Marks	**45-49**	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**	**75-79**
No of students	**3**	**9**	**13**	**15**	**5**	**4**	**1**

(a) Calculate the mean using asuitable assumed mean (3mks)

(b) calculate the variance (3mks)

(c) calculate standard deviation (1mk)

(d) If 30 students were to pass ,calculator the pass mark (give your answer to nearest whole mark) (3mks)

NAME: ……. INDEX NO: …….

SCHOOL: …… DATE : …….

CANDIDATE'S SIGNATURE:……

121/1
MATHEMATICS
PAPER 1
MARCH / APRIL 2018
TIME: 2½ HOURS

TOP GRADE PREDICTOR PRE MOCK 2018

Kenya Certificate of Secondary Education (KCSE)
MATHEMATICS
PAPER 1
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 provided 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

SECTION 1: (50 MARKS)

Answer ALL Questions in this section

2. The marked price of a car in a dealer's shop was Ksh. 450,000/=. Nasieku bought the car at 7% discount. The dealer still made a profit of 13%. Calculate the amount of money the dealer had paid for the car.

(3marks)

3. Evaluate:
(3mks)

$$\frac{\frac{1}{2} + 2\frac{4}{5} \text{ of } 8 \div 6(2 \times 4\frac{2}{5})}{\frac{2}{4} \text{ of } 6(8 \div 3\frac{1}{3})}$$

4. A man was born in 1956. His father was born in 1928 and the mother three years later. If the man's daughter was born in 1992 and the son 5 years earlier, find the difference between the age of the man's mother and that of his son.
(3mks)

5. Solve for x in the equation:

   $\text{Log}_8(x + 6) - \text{Log}_8 (x - 3) = {}^1/_3$

   (3mks)

6. Solve the simultaneous equations:

   $\frac{x}{2} + \frac{y}{3} = \frac{-13}{6}$, $\frac{2y}{3} - x = 11$

   (4mks)

7. Simplify: $\frac{12x^2 - 27}{4 - (2x + 1)}$

   (3mks)

8. Find the angle the line $3y = 2x + 6$ makes with the x-axis.
(3mks)

9. The curved surface area of a cylindrical container is $880cm^2$. Calculate to one decimal place the capacity of the container in litres given that the height is 17.5cm. (Take $\pi = {}^{22}/_{7}$).

10. State all the integral values of a which satisfy the inequality $\underline{3a + 2} \leq \underline{2a + 3} \leq \underline{4a + 15}$
(4mks)

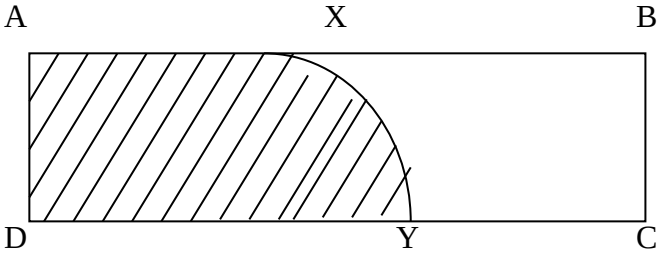
4 5 6

11. Line L_1 passes through the points A (1, -2) and B(3, -4). Find the equation of the line L_2 passing through the mid-point of AB and perpendicular to L_1, leaving your answer in the form ax + by + c = 0.
(4mks)

12. 1.5 litres of water (density 1g/cm^3) is added to 5 litres of alcohol (density 0.8g/cm^3). Calculate the density of the mixture.
(3mks)

13. A map of a certain town is drawn to a scale of 1:50,000 on the map, the railway quarters cover an area of 10cm^2. Find the area of the railway quarters in hectares.
(2mks)

14. ABCD is a rectangle. AB = 10cm, AD = AX = 6cm and XY is an arc of a circle centre D.



Calculate the area of the shaded region. (Take $\pi = 3.142$)
(3mks)

15. If $\cos \propto = \frac{15}{17}$, find without using tables or calculators $\sin \propto$ and $\tan \propto$.
(3mks)

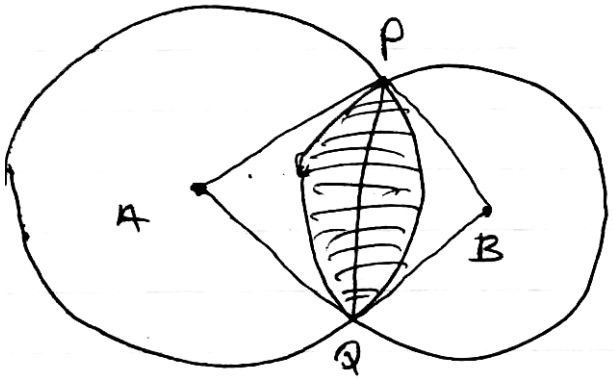
16. Express 1.441441 ..... in the form p/q where p and q are integers. (q # o)
(3mks)

17. Leonorah Jerop was on top of a cliff 30m high sees two boats P and Q out at sea. Both boats were in the same line and the angle of depression from Leonorah to P was 42^0 and the angle of depression from Leonorah to Q was 27^0. Calculate the distance then between the two boats.
(3mks)

SECTION II (50 MARKS)

Answer any five questions in this section

18. The figure below shows two circles of radii 10.5cm and 8.4cm and with centres A and B respectively. The common chord PQ is 9cm.



(a) Calculate angle PAQ.
(2mks)

(b) Calculate angle PBQ.
(2mks)

(c) Calculate the area of the shaded part.
(6mks)

19. Every Sunday Barmao drives a distance of 80km on a bearing of 074^0 to pick up her sister Afandi to go to church. The church is 75km from Afandi's home on bearing of $S50^0E$. After church they drive a distance of 100km on a bearing of 260^0 to check on their friend Akoth before Barmao drives to Afandi's home to drop her off then proceed to her house.

(a) Using a scale of 1cm to represent 10km, show the relative positions of these places.
(4mks)

(b) Use your diagram to determine:

(i) The true bearing of Barmao's home from Akoth's house.
(1mk)

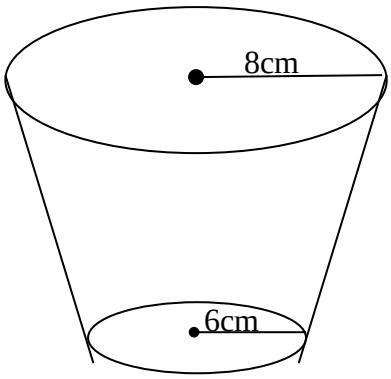
(ii) The compass bearing of the Akoth's home from Afandi's home.
(1mk)

(c) (i) The distance between Afandi's home and Akoth's home.
(2mks)

(ii) The total distance Barmao travel every Sunday.
(2mks)

20. The vertices of triangle PQR are P(O,O), Q(6,0) and R(2,4).
    (a) Draw triangle PQR on the grid provided.
    (1mk)
    (b) Triangle P'Q'R' is the image of a triangle PQR under an enlargement scale factor, ½ and centre (2,2). Write down the co-ordinates of triangle P'Q'R' and plot on the same grid.
    (2mks)
    (c) Draw triangle P"Q"R" the image of triangle P'Q'R' under a positive quarter turn, about points (1,1)
    (3mks)
    (d) Draw triangle P"'Q"'R"' the image of triangle P"Q"R" under reflection in the line y = 1.
    (2mks)
    (e) Describe fully a single transformation that maps triangle P"'Q"'R"' onto P'Q'R'.
    (2mks)

21. A pail is in the shape of a container frustrum with base radius 6cm and top radius 8cm. The slant height of the pail is 30cm as shown below. The pail is full of water.



(a) Calculate the volume of water.
(6mks)

(b) All the water is poured into a cylindrical container of circular radius 7cm, if the cylinder has the height of 35cm, calculate the surface area of the cylinder which is not in contact with water.
(4mks)

22. (a) A bus travelling at 99km/hr passes a check-point at 10.00a.m. and a matatu travelling at 132km/h in the same direction passes through the check point at 10.15a.m. If the bus and the matatu continue at their uniform speeds, find the time the matatu will overtake the bus.
(6mks)

(b) Two passenger trains A and B which are 240m apart and travelling in opposite directions at 164km/h and 88km/h respectively approach one another on a straight railway line. Train A is 150 metres long and train B is 100 metres long. Determine time in seconds that elapses before the two trains completely pass each other.
(4mks)

23. (a) Solve the equation: $\frac{x + 3}{24} = \frac{1}{x - 2}$
(4mks)

(b) A rectangular room is 4m longer than its width. If its area is $12m^2$, find its dimensions and hence the perimeter of the room.
(6mks)

24. Using a ruler and a pair of compasses only, construct triangle ABC, such that AB = 5cm, BC = 6cm and AC = 6.4cm. Locate the locus of P such that it is equidistant from the sides AB, BC and AC. Measure the shortest distance, r between side AB and the centre P using length r and centre P. Draw a circle. Measure CP.
(10mks)

25. QRST is a rhombus. The equations of QR, RS and TS are $2x + y = 7$, $x = 1$ and $2x + y = -1$ respectively. Determine:-

(a) The co-ordinates of Q and S.
(4mks)

(b) The co-ordinates of m, the point of intersection of the diagonals.
(2mks)

(c) The co-ordinates of R and T.
(4mks)

walimuepublishers@gmail.com

NAME: ……. INDEX NO: …….

SCHOOL: …….. DATE : …….

CANDIDATE'S SIGNATURE: ……

121/2
MATHEMATICS
PAPER 2
MARCH / APRIL 2018
TIME: 2½ HOURS

TOP GRADE PREDICTOR PRE MOCK 2018

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

INSTRUCTIONS TO CANDIDATES

i) Write your **Name, Index Number** and **School** in the spaces provided at the top of this page.
j) **Sign** and write the **date** of examination in the spaces provided above.
k) This paper contains **TWO** sections: section I and section II
l) Answer **all** the questions in I and any FIVE questions from section II.
m) **All** answers and working must be written on the question paper in the spaces provided below each question.
n) Show **all** the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
o) Marks may be given for **correct** working even if the answer is wrong.
p) 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

SECTION 1: (50 MARKS)

Answer ALL Questions in this section

26. Using logarithms, evaluate
(4mks)

$$\sqrt[3]{\frac{4.684 \log 314.2}{}}$$

$\tan 87^0$

27. Make x the subject of the formula:
(3mks)

$$A = \sqrt{\frac{1 - x}{1 + x}}$$

28. A surveyor gave the length and width of a rectangular plot as 80m and 55m respectively. Find his percentage error in the area of the rectangular plot.
(3mks)

29. Find the radius and centre of the circle whose equations is $2x^2 + 2y^2 - 6x + 10y + 9 = 0$.
(4mks)

30. Simplify: $\frac{2}{2\sqrt{3}+\sqrt{2}} - \frac{2}{2\sqrt{3}-\sqrt{2}}$

Giving your answer in surd form with a rational denominator.

(3mks)

31. Expand $\left(x + \frac{a}{x^2}\right)^6$ in descending powers of x up to the term independent of x. If this independent term is 1215, find the value of a.

(4mks)

32. The sum of Shs. 50,000 is invested in a financial institution that gives 12%p.a. The interest is compounded quarterly. Find the total investment after 3 years.

(3mks)

33. If $\frac{p + 3q}{2p - q} = \frac{3}{4}$ find the ratio p : q.
(3mks)

34. The angles of a triangle are in the ratio 8 : 7 : 3. If the longest side of the triangle is 5.4cm. Calculate the length of the shortest side.
(3mks)

35. Solve for k in the following equation:
$125^{k+1} + 5^{3k} = 630$
(3mks)

36. Six men take 28 days working for 10 hours a day to pack 4480 parcels. How many more men working 8 hours a day will be required to pack 2500 parcels in 4 days?
(3mks)

37. A bird flies from its nest to some food in three stages. The routes are described by the following vectors.

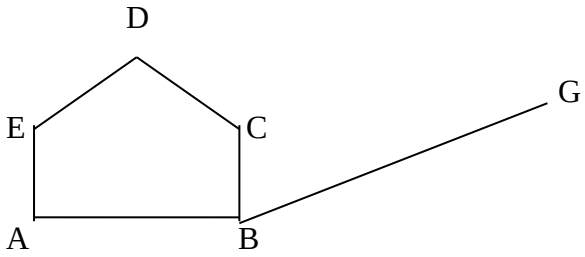
$$\begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix}, \quad \begin{pmatrix} 7 \\ 10 \\ 5 \end{pmatrix} \text{ and } \begin{pmatrix} 4 \\ -2 \\ -7 \end{pmatrix}$$

Find the distance between the bird's nest and where the food is. (3mks)

38. The size of an interior angle of a regular polygon is $3x^0$ while exterior is $(x - 20)^0$. Find the number of sides of the polygon.
(3mks)

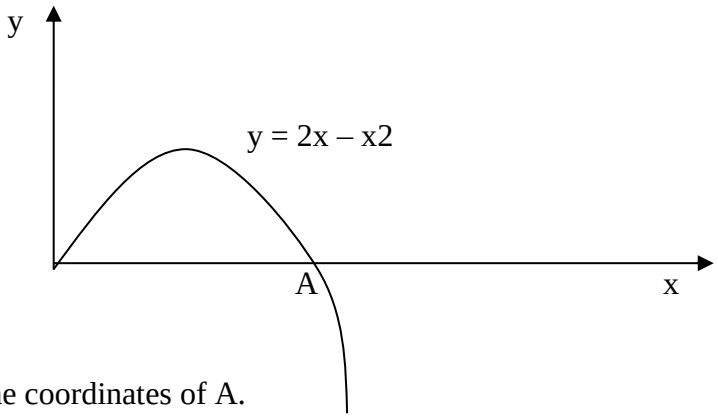
39. In what ratio must "Murang'a" coffee costing sh. 25g per 100g be mixed with "Kisii" coffee costing sh. 17.50 per 100g, so that by selling the mixture at sh. 25 per 100g, a profit of 25% is made?
(3mks)

40. In the figure below, ABCDE is a cross-section of a solid. The solid has a uniform cross-section. Given that BG is a base edge of the solid, complete the sketch, showing the hidden edges with broken lines.



(2mks)

41.



Find the coordinates of A.
(3mks)

SECTION II (50 MARKS)
Answer any five questions in this section

42. Mr. Chesingei earned an annual basic salary of Kenya pounds 12360 when the rates of taxation were as in the table below.

Monthly income (pounds) Rates (%)

1 – 484	10
485 – 940	15
941 – 1396	20
1397 – 1852	25
1853 and above	30

Apart from the basic salary, he is entitled to a house allowance of Kshs. 12,000 and medical allowance of Kshs. 6,000 per month.

(a) Calculate Chesingei's monthly taxable income in Kenya pounds.
(3mks)

(b) Calculate Chesinge's monthly net income if he is given a tax relief of Ksh. 980 per month. Give your answer in Kenyan shillings.
(5mks)

(c) How much more tax should he have paid per month in Kenya pounds if his monthly salary is increased by Ksh. 2500.
(2mks)

43. The table below shows the distribution of marks scored by 100 candidates of Cheptiret Boys High school in an examination.

Marks	1– 10	11 – 20	21 – 30	31 – 40	41–50	51–60	61–70	71–80	81–90	91–100
No. of candidates	2	5	8	19	24	18	10	6	5	3

(a) Draw a cumulative frequency curve to illustrate the information above.
(4mks)

(b) From your graph, find:

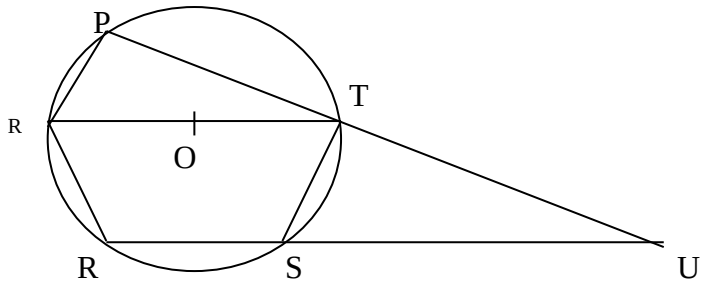
(i) Median

(2mks)

(ii) Inter-quartile range
(2mks)

(iii) Pass mark if 70% of the students passed.
(2mks)

44. The figure below shows a circle centre O in which QOT is a diameter. <QTP = 46^0, TQR = 75^0 and SRT = 38^0, PTU and RSU are straight lines.



Calculate the following angles giving a reason in each case.

(a) <RST
(2mks)

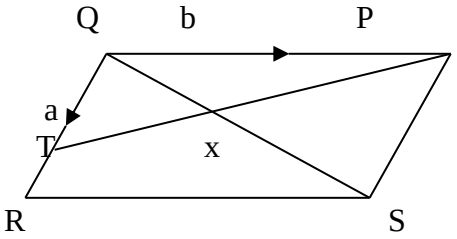
(b) <SUT
(2mks)

(c) <PST
(2mks)

(d) Obtuse <ROT
(2mks)

(e) <SQT
(2mks)

45. In the figure below, QT = a and QP = b.



(f) Express the vector PT in terms of a and b.
(1mk)

(g) If PX = kPT, express QX in terms of a, b and k, where k is a scalar. (3mks)

(h) If QR = 3a and RS = 2b, write down an expression for QS in terms of a and b.
(1mk)

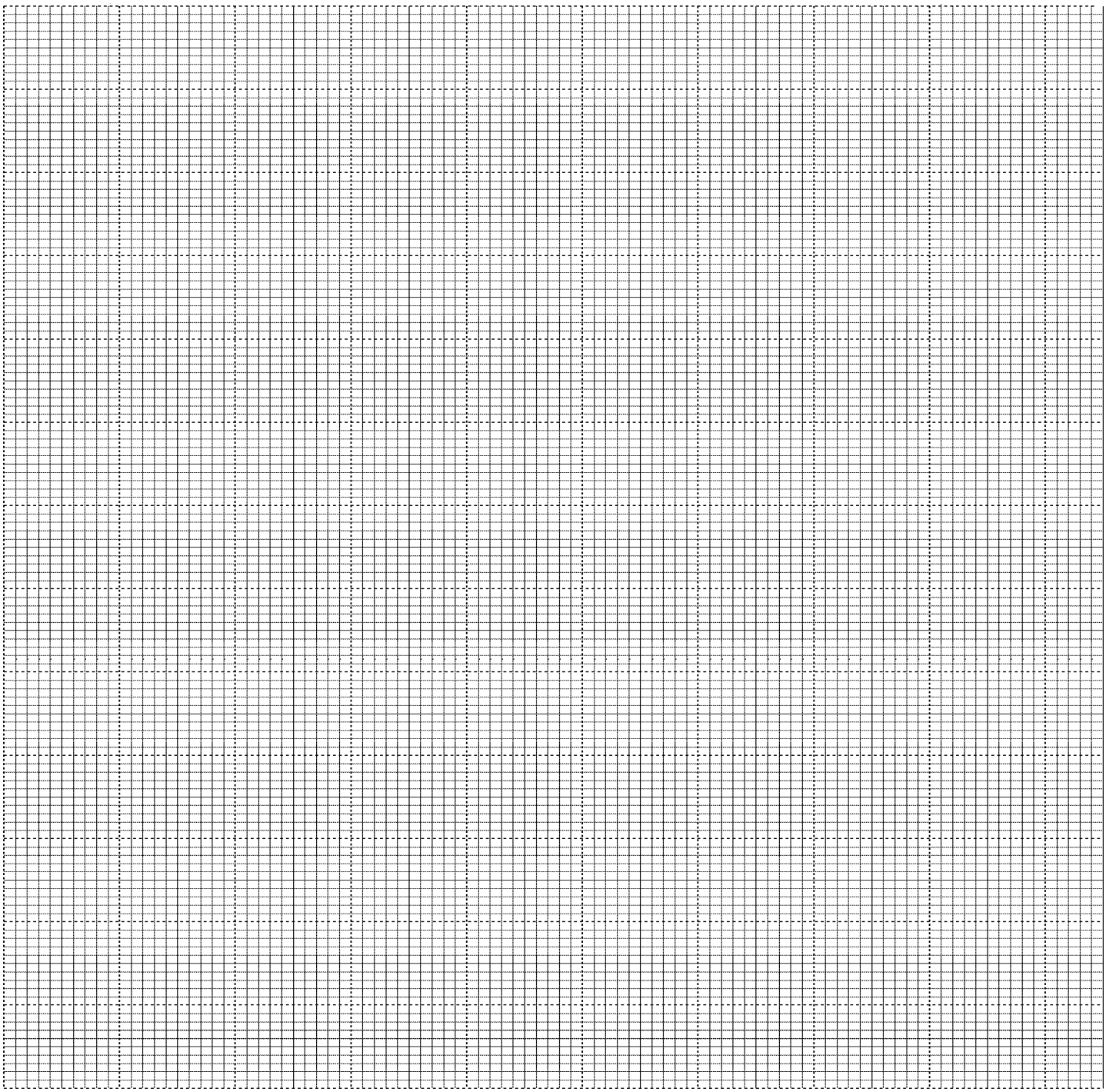
(i) If QX = tQS, use your result in (b) and (c) to find the value of k and t.
(4mks)

(j) Find the ratio PX : XT.
(1mk)

46. The law $E = KX^n$ gives an expression for the energy E joules stored in a spring for the extension xcm. The table below shows the value of E and the corresponding value of X.

xcm	2	2.5	3	3.5	4	5
E (joules)	108	169	243	330	432	675

Determine graphically the values of k and n. Write the equation connecting E and X.
(10mks)



47. The first term of an Arithmetic Progression (AP) is 200. The sum of the first 10 terms of AP is 24500.

(a) (i) Find the common difference.
(2mks)

(ii) Given that the sum of the first n terms of the AP is 80100, find n.
(2mks)

(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 AP is 5, find:-

(i) The first term of the GP.
(4mks)

(ii) The sum of the first 12 terms of the GP, to four significant figures.
(2mks)

48. (a) Fill the table below, giving the values correct to 2 decimal places.
(3mks)

x^0	0	30	60	90	120	150	180	210	240	270	300	330	360
Sin2x													
3cosx-2													

(b) On the grid provided, draw the graphs of $y = \sin 2x$ and $y = 3\cos x - 2$ of $0^0 \leq x \leq 360^0$; on the same axes. Use the scale of 1cm to represent 30^0 on the x-axis and 2cm to represent 1 unit on the y-axis. (5marks)

(c) Use the graph in (b) above to solve the equation:
$3\cos x - \sin 2x = 2$

49. The probabilities of Makori, Newton and Patrick going to school on Monday are $^{6}/_{7}$, $^{7}/_{8}$ and $^{8}/_{9}$ respectively. Find the probability that:-

(a) They will all go to school on Monday.
(2mks)

(b) None of them will go to school on Monday.
(2mks)

(c) At least one of them will go to school on Monday.
(3mks)

(d) At most one of them will go to school on Monday.
(3mks)