KCSE MOCKS

MATHEMATICS PAPER 2

Consists 3 KCSE Mock set Exams.

(Class of KCSE March 2021)

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PRE-MOCK 1

NAME…… Admission Number…...……

CLASS…… Date……

121/2 MATHEMATICS Paper 2

Time: $2\frac{1}{2}$ hours

Kenya Certificate of Secondary Education

KCSE PRE-MOCK 1

Instructions to candidates

Write your name, stream and index number in the spaces provided at the top of this page

This paper contains two sections: ***Section I and Section II***

Answer all questions in section I and any five in section II

Show all the steps in your calculations giving your answer at each stage in the spaces provided below each question.

Marks may be given for correct working even if the answer is wrong.

Non programmable *silent electronic calculators and KNEC mathematical table may be used except where stated otherwise*

For examiner's use only

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

This paper consists of 15 printed pages.

Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing

SECTION I (50 MARKS). **Attempt all the questions in this section.**

1. Find the selling price of 6 kg of a mixture of maize flour and millet flour if 4 kg of maize flour costing sh. 60 per kg is mixed with 6 kg of millet flour costing sh. 45 per kg and a profit of 20% is realized. (3 marks)

2. If x = 9.6, y= 3.60 and z = 5, Find the percentage error in the calculation of $\frac{x+y}{z}$, giving your answer to three significant figures. (3 marks)

3. Solve the equation $\log_2(x^2-4) - \log_2(x+2) = -4$ (3 marks)

4. Form a quadratic equation whose roots are $2.5 + \sqrt{3}$ and $2.5 - \sqrt{3}$ giving your answer in the form $ax^2 + bx + c = 0$ where a, b and c are integers (3 marks)

5. Make b the subject of the formula. (3 marks

$$x = \frac{a}{\sqrt{(a-b)(a+b)}}$$

6. Express in surd form and simplify by rationalizing the denominator. (3 marks)

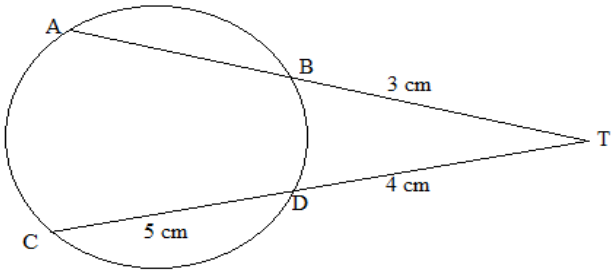
$$\frac{3\sin 45° - 2\cos 30°}{\tan 30°}$$

7. Triangle ABC is such that AB = 8 cm, BC = 11 cm and AC = 15 cm. calculate correct to 2 decimal places the;
   a) Angle ABC

(2 marks)

   b) Radius of the circum circle (2 marks)

8. In the figure below, the chords CD and AB intersect externally at T. DT = 4 cm, BT = 3 cm and CD = 5 cm. calculate the length AB. (3 marks)



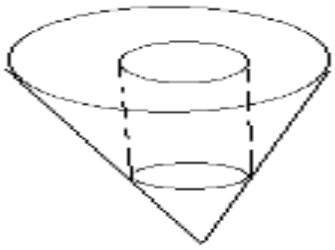
9. Solve the following equation for $0^0 \leq x \leq 360^0$ $2\cos x = sin^2 x + 2$ (4 marks)

10. Given that A (4, -2, 6) and B (-3, 1, -2) and that a point N divides AB in the ratio -2:7. Find the vector **ON** in terms of **i**, **j** and **k**. (3 marks)

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

12. Expand $\left(1 + \frac{2x}{3}\right)^8$ in ascending powers of x up to the fourth term. Hence use your expansion to evaluate $(0.98)^8$ to three significant figures. (3 marks)

13. Find the base radius of a cylindrical hole with maximum volume which can be drilled into a cone of height 16 cm and radius 12 cm as shown below. (3 marks)



14. ABCD is a regular tetrahedron. AB=BC=CA=AD=BD=CD= 8cm.

a) Calculate the angle between line AD and plane ABC. (2 marks)

b) Calculate the angle between planes ABD and ABC (2 marks)

15. A contractor intends to transport 1000 bags of cement using a lorry and a pick up. The lorry can carry a maximum of 80 bags while a pick up can carry a maximum of 20 bags. The pickup has to make more than twice the number of trips the lorry makes and the total number of trips has to be less than 30. The cost per trip is sh 2000 for the lorry and sh 900 for the pickup and the contractor wishes to minimize cost. Let x and y be the trips for the lorry and pickup respectively.

a) State the objective function. (1 mark)

b) Write down all the inequalities which govern the condition above. (2 marks)

16. The first, second and fifth terms of an arithmetic sequence are the first three consecutive terms of a geometric sequence. Find the common ratio (3 marks)

SECTION II (50 marks)

17. Using a ruler and a pair of compasses only for all constructions in this question.

a) Construct triangle ABC in which AB = 6 cm, BC = 7 cm and angle ABC = 75^o (3 marks)

b) Find locus X such that AX = 3 cm (1 mark)

c) On the same side of BC as A, construct the locus of P such that angle BPC = 120^o (3marks)

d) Show by shading the locus of Q inside triangle ABC such that angle $BPC \geq angle\ BQC$. (1 mark)

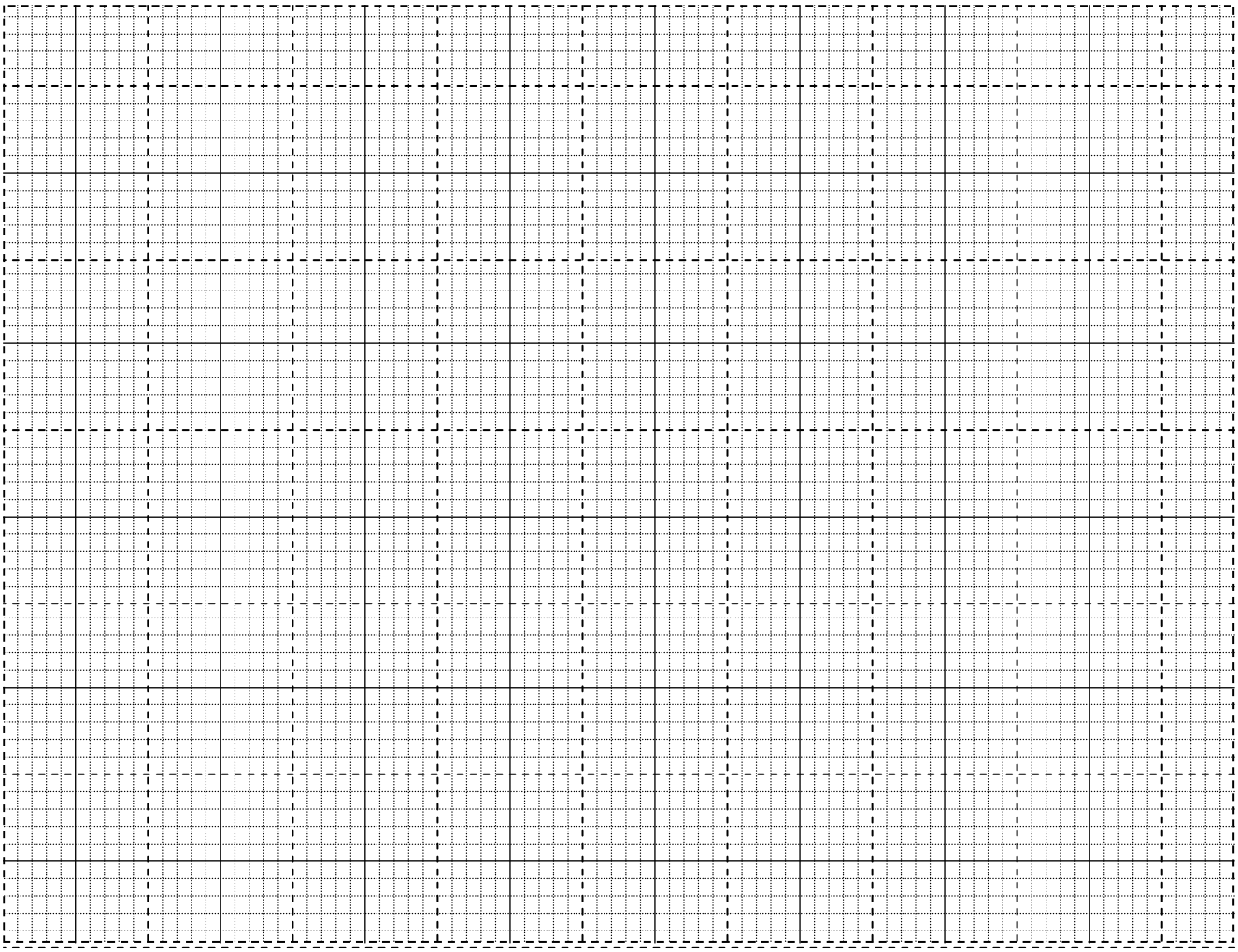
e) On the side of AB opposite C, construct the locus of T such that the area of triangle ATB = 6 cm^2 (2 marks)

18. The data below shows the heights of students in a class.

Height	130 -139	140 -149	150-159	160-169	170-179	180-189	190-199
Frequency	8	10	11	18	14	12	7

a) Using assumed mean of 164.5, calculate the mean and the standard deviation (5 marks)

b) Draw a cumulative frequency curve on the grid provided and use it to estimate the median (5 marks)



19. P varies directly as the cube of Q and inversely as the square root of R

a) Given that P = 35 when Q = 8 and R = 144, find P when Q = 20 and R = 22

(5 marks)

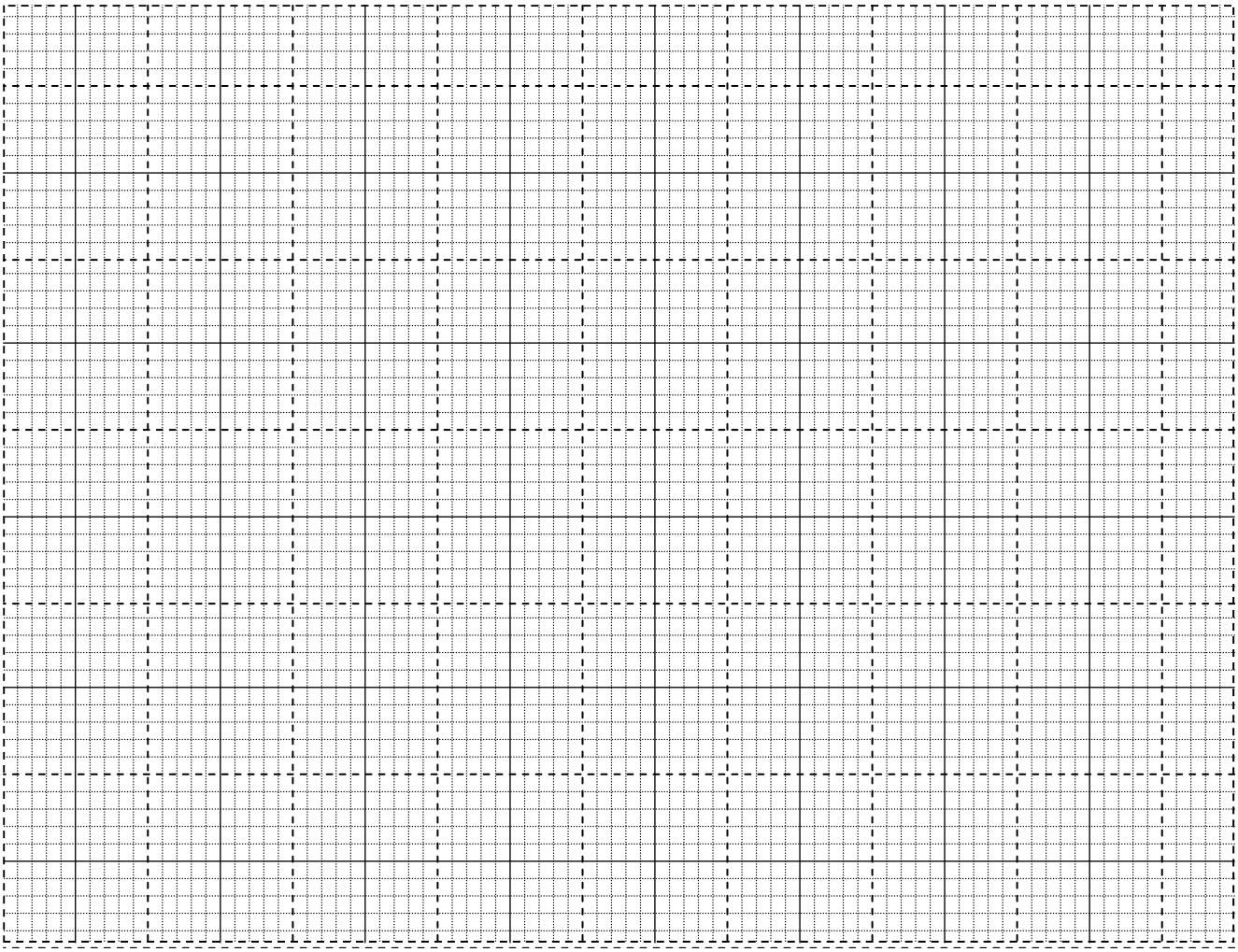
b) If Q decreases by 24% and R increases by 40% find the percentage change in P.

(5 marks)

20. The triangle ABC has vertices A (1, 2), B (2, 1) and C (2, 3). A^1 B^1 C^1 is the image of ABC under transformation given by the matrix $\begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$

a) What are the coordinates of A^1 B^1 C^1? Plot ABC and A^1 B^1 C^1 on the same axis #

(3 marks)



b) State the ratio of the areas of the two triangles and use the area of ABC to calculate the area of $A^1 B^1 C^1$ (3 marks)

c) If $A^{11} B^{11} C^{11}$ is the image of ABC under transformation given by the matrix $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$. Find the coordinates of $A^{11} B^{11} C^{11}$. Plot $A^{11} B^{11} C^{11}$ and describe the transformation fully (4 marks)

21. a) An industrialist has 460 litres of a chemical which is 75% pure. She mixes it with a chemical of the same type but 90% pure so as to obtain a mixture which is 78% pure. Find the amount of the 90% pure chemical used. (3 marks)

b) Three machines A, B and C are set to work together. A working alone takes 6 hours to complete the work; B takes 8 hours while C takes 12 hours. All the three machines started working at the same time. 40 minutes later machine A broke down. B and C continued for another 1 hour before B ran out of fuel and therefore stopped working for 20 minutes while C continued. If B resumed working after 20 minutes, calculate the:

(i) Fraction of the work left after machine A broke down. (2 marks)

(ii) Fraction of the work done by C working alone for 20 minutes (2 marks)

(iii) Total time taken for the work to be completed. (3 marks)

22. The table below shows taxation rates in Kenya

Monthly taxable income (kshs p.m)	Tax rate %
1-9680	10
9681-18800	15
18801-27920	20
27921-37040	25
37041 and above	30

A civil servant is provided with a house and pays a nominal rent of sh 6260 per month. In addition the government gives him taxable allowances amounting to sh 16000 per month. He is entitled to a personal relief of sh 1520 per month. He has a life insurance policy for which he pays sh 1200 per month and claims insurance relief at the rate of sh 3 per k£. The civil servant's PAYE is sh 6900.Apart from PAYE and insurance his other monthly deductions are WCPS 2% of basic salary, HELB loan sh 4000 and cooperative shares sh 600. Calculate his:

a) Taxable income per month. (6 marks)

b) Basic salary per month (2 marks)

c) Net monthly pay. (2 marks)

23. The probability of James, Tyson and David passing an examination are $\frac{4}{5}, \frac{3}{4}$ and $\frac{2}{3}$ respectively. Find the probability that in one attempt:
(a) only one passes the examination. (2 marks)

(b) All the three passes the examination. (2 marks)

(c) Two pass the examination. (2 marks)

(d) None passes the examination. (2 marks)

(e) At least one passes the examination. (2 marks)

W3An aero plane left town P $(65^{O}N, 15^{0}E)$ to another town Q $(65^{0}N, 165^{0}W)$ at a speed of 200 knots using the shortest route. Take $\pi = \frac{22}{7}$ and radius of the earth R= 6370 km.

a) (i) Calculate the distance travelled in nautical miles. (2 marks)

(ii) Calculate the time taken to travel from P to Q in hours. (2 marks)

b) Another plane left P at 1.30 pm local time and travelled to T $(65^0N, 60^0E)$ along a parallel of latitude. Calculate the:

(i) Distance between P and T to the nearest km (3 marks)

(ii) Local time of arrival at town T if the plane flew at the speed of 470 km/h

(3 marks)

MOCK 1

NAME: ……..…….. INDEX NO: ……..…..

CLASS: ……

DATE:……..

121/2
MATHEMATICS
TIME: 2 ½ HOURS

KCSE MOCK 1

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

SECTION 1:(50 MARKS.)

ANSWER ALL THE QUESTIONS

1. Use logarithms to evaluate. **(4mks)**

$$\frac{4.497 \times \sqrt{0.3673}}{1-cos 81.53^\circ}$$

2. Calculate the percentage error in the volume of a cone whose radius is 9.0cm and slant length 15.0cm. **(3mks)**

3. Make **y** the subject of the formula. **(3mks)**

$$v = \left(\frac{ax^2y}{w-y}\right)^{\frac{1}{2}}$$

4. Solve for **x**: **$\tan^2 x - 2\tan x = 3$** for the interval **$0 \leq x \leq 180^o$** **(3 mks)**

5. Solve the equations **(4mks)**

$$x + 3y = 13$$
$$x^2 + 3y^2 = 43$$

6. Simplify $\dfrac{3+\sqrt{5}}{\sqrt{5}-2}$ give the answer in the form $a + b\sqrt{c}$ where a, b and c are integers. **(3mks)**

7. 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)**

8. Find the value of x given that. **(3mks)**

$$\log_2(x^2 - 2) - \log_2\left(\frac{1}{2}x + 5\right) - 1 = 0$$

9. The tangent to the curve $y = ax^2 + bx + c$ is parallel to the line $y - 4x = 0$ at the point where $x = 2$. If the curve has a minimum value of -3 where $x = 1$, find the values of a, b and c. **(3 mks)**

10. The points **A, B and C** lie on a straight line. The position vectors of **A** and **C** are $2\mathbf{i} + 3\mathbf{j} + 9\mathbf{k}$ and $5\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$ respectively; B divides AC internally in the ratio 2:1. Find the

(a) Position vector of **B**. **(2 mks)**

(b) Distance of B from the origin. **(1 mk)**

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

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

4x +3y = 6

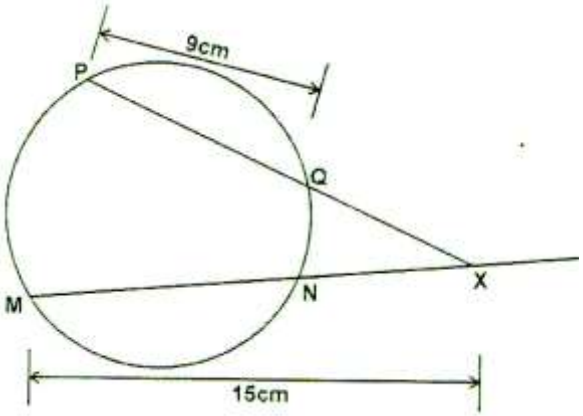
3x + 5y = 5

12. Find the radius and the centre of a circle whose equation is. **(3mks)**

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

13. A model of the globe representing the earth has a radius of 0.2m. Point A and B are located at (60˚ N,140˚ E) and (60˚ N,120˚ W),respectively. If O is the centre of the latitude 60 N, find the area of the minor sector OBA, in square metres. **(3 mks).**

14.Find the length NX in the figure below that PQ = 9cm, PX = 12cm and MX = 15cm. **(2 mks)**

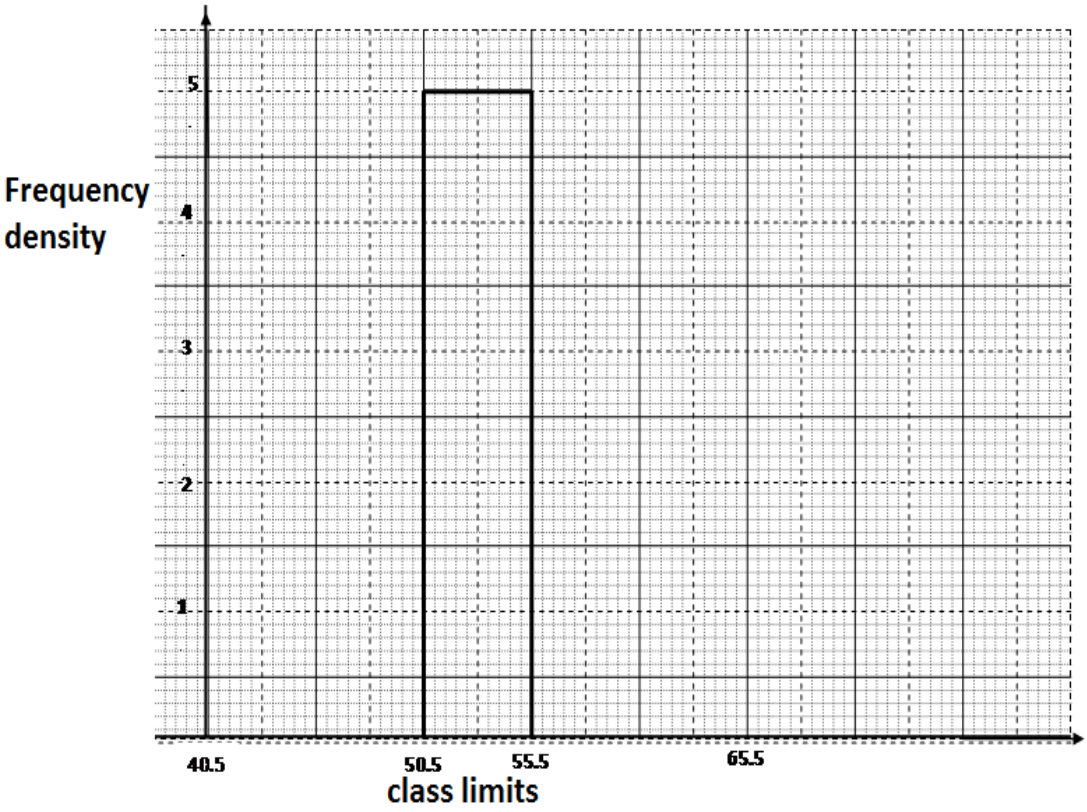


15. A colony of insects was found to have 250 insects at the beginning. Thereafter, the number of insects doubled every two days. Find the number of insects after 16 days. **(3 mks)**

16. The following data was obtained from the mass of a certain animal. Complete the table and the histogram below.

(3 mks)

Mass(kg)	frequency
41-50	20
51-55	
56-65	40



SECTION II (50 MARKS)

Answer ONLY FIVE questions in this section

17.The table below shows the rate at which income tax is charged for all income earned in a month in 2015.

Taxable Income p.m (Kenya pound)	Rate in % per Kenya pound
1 -236	10%
237 -472	15%
473 -708	20%
709 – 944	25%
945 and over	30%

Mrs.mumanyi earns a basic salary of 18000.She is entitled to a house allowance of Ksh. 6,000 a person relief of Ksh. 1064 month

. Every month she pays the following.

(i) Electricity bill shs.580
(ii) Water bill shs. 360
(iii) Co-operative shares shs. 800
(iv) Loan repayment Ksh. 3000

(a) Calculate her taxable income in k£ p.m. **(2 mks)**

(b)Calculate her P.A.Y.E **(6 mks)**

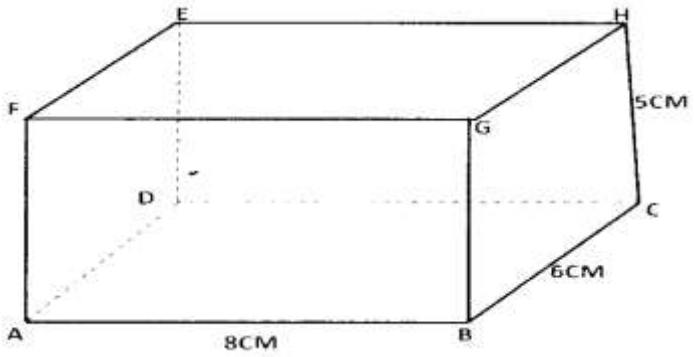
(c) Calculate her net salary. **(2 mks)**

18 (.a) Use the trapezium rule with six trapezia to calculate the areas bounded by the curve $Y=2x^2+ 3x +1$, the axis and the ordinate x=0 and x=3**. (5mks)**

b) Calculate the exact axed in **(a) above by integration. (3mks)**

c) Assuming they are calculated in (a) above is an estimate, calculate the percentage error made when the trapezium rule is used leaving your answer to 2 decimal places. **(2mks)**

19. The figure below shows a cuboid.



Calculate

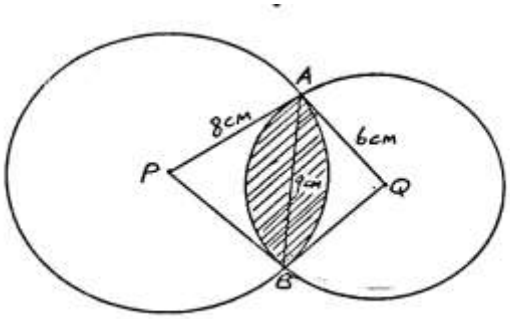
(a) The length **BE.** (2 mks)

b) The angle between BE and plane ABCD. **(3 mks)**

c) The angle between FH and BC. **(2mks)**

d) The angle between place AGHD and plane ABCD. **(3 mks)**

20. The figure below shows two intersecting circles radii 8cm and 6cm respectively. The common chord AB = 9cm and P and Q are the centres as shown.



a. Calculate the size of angle

i. APB **(1mk)**

ii. AQB **(1mk)**

b. Calculate the area of

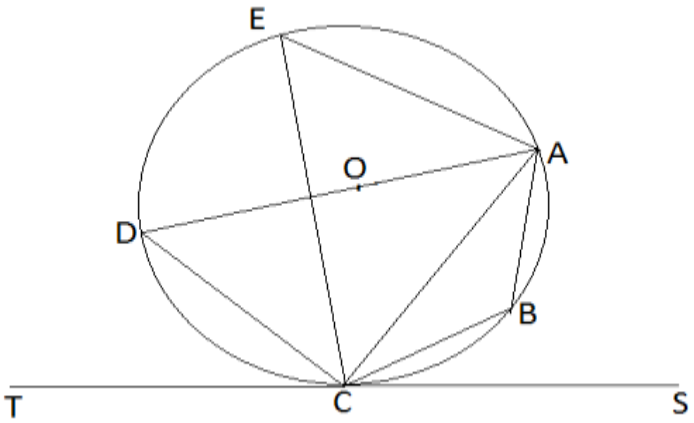
i. Minor segment of the circle centre P. **(2mks)**

ii. Minor segment of the circle centre Q **(2mks)**

iii. The quadrilateral APBQ **(2mks)**

iv. The shaded region **(2mks)**

21. In the figure below DA is a diameter of the circle ABCDE centre O. TCS is a tangent to the circle at C, AB = BC and angle DAC = 38^0



Giving reasons, determine the following angles:

(a) $\angle DCT$ **(2 mks)**

(b) $\angle DEA$ **(2 mks)**

(c) $\angle ACB$ **(2 mks)**

(d) $\angle BDC$ **(2 mks)**

(e) $\angle BOA$ **(2 mks)**

22. A flower garden is in the shape of a triangle ABC such that AB = 9M, AC=7.5M and angle ACB=75˚. Using a rule and a pair of compass only.

a) Construct $\triangle$ABC **(3mks)**

b) Construct a locus of P such that AP = PC. **(2mks)**

c) Construct locus of Q such that it is equal distance from AB and BC and locus of R which is 2m from AC. **(2mks)**

d) Flowers are to be planted such that they are nearer AC than AB and less than 5m from a shade the portion with flowers. **(3mks)**

23. 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, q = 12** and **r = 2** find **p** when **q = 15** and **r = 5** **(4mks)**

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

c. If p is increased by 20% and r is reduced by 10% find,

i. A simplified expression for the change in q in terms of **q** and **r.** **(3mks)**

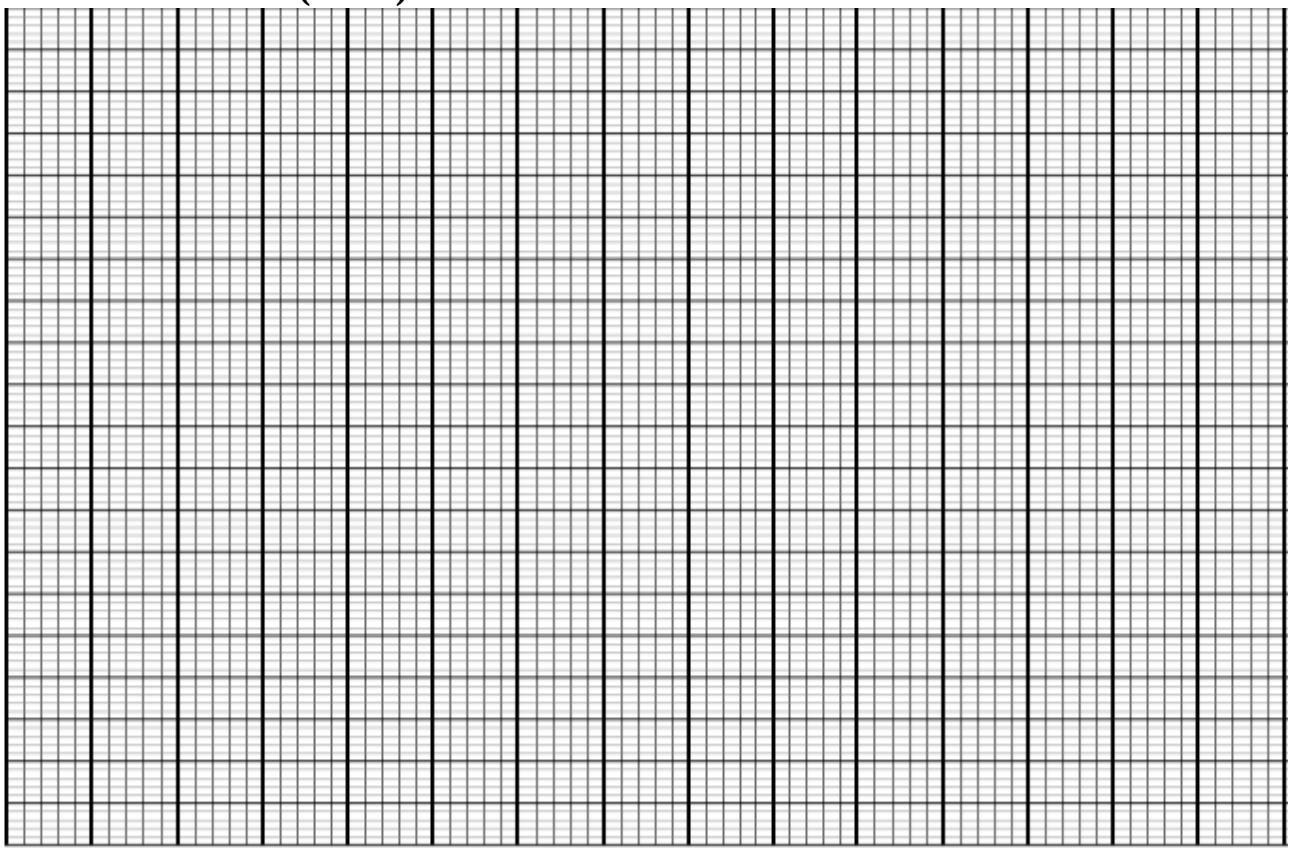
ii. The percentage change in **q.** **(2mks)**

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

a. 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=3sin x	0	1.5		3	2.6				-2.6			-1.5	0

On the grid provided draw the graphs of **y=2cos 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)**

POST MOCK 1

Name…….Adm No……..Class……
Index No……. Signature……Date……

121/2
Mathematics Paper 2
Form 4
TIME: 2 ½ Hours

KCSE POST MOCK 1

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

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ***ALL*** questions from section I and ***ANY FIVE*** from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

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

GRAND TOTAL

SECTION I: ***Answer all questions from this section***

1. Use logarithm tables to evaluate (4 Marks)

$$\sqrt[3]{\frac{45.3 \times 0.00697}{0.534}}$$

2. Solve for x in the equation $2\text{Sin}^2x - 1 = \text{Cos}^2x + \text{Sin}x$ for $0^0 \leq x \leq 360^0$ (3 Marks)

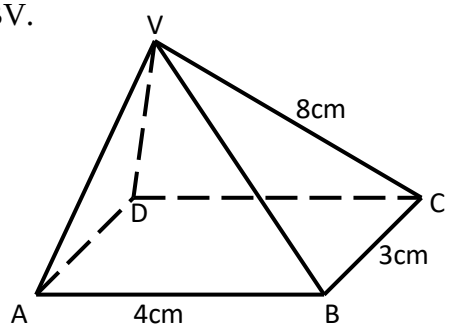
3. (a) Expand $\left(1 + \frac{3}{x}\right)^5$ upto the fifth term (2 Marks)

(b)Hence use your expansion to evaluate the value of $(2.5)^5$ to 3 d.p. (2 Marks)

4. Make p the subject of the formula (3 Marks)

$$E = \sqrt{\frac{p-3u}{y-3xp}}$$

5. The figure below shows a rectangular based right pyramid. Find the angle between the planes ABCD and ABV. (2marks)



6. A object A of area $10cm^2$ is mapped onto its image B of area $60cm^2$ by a transformation whose matrix is given by P= $\begin{pmatrix} x & 4 \\ 3 & x+3 \end{pmatrix}$. Find the possible values of x (3 Marks)

7. The position vectors of A and B are $\underset{\sim}{a}$ = 4i + 4j – 6k and $\underset{\sim}{b}$ = 10i + 4j + 12k. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D (3 Marks)

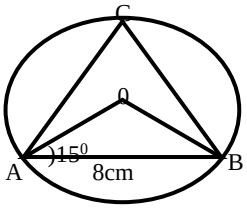
8. A dealer has two types of grades of tea, A and B. Grade A costs Sh. 140 per kg. Grade B costs Sh. 160 per kg. If the dealer mixes A and B in the ratio 3:5 to make a brand of tea which he sells at Sh. 180 per kg, calculate the percentage profit that he makes (3 marks)

9. A variable Z varies directly as the square of X and inversely as the square root of Y. Find the percentage change in Z if X increased by 20% and Y decreased by 19% (3 Marks)

10. By rounding each number to the nearest tens, approximate the value of $\frac{2454\ x\ 396}{66}$ Hence calculate the percentage error arising from this approximation to 4 significant figures (3 Marks)

11. Find the centre and radius of the circle whose equation is $2x^2 + 2y^2 - 8x + 12y - 2 = 0$ (3 Marks)

12. In the figure below AB = 8cm and O is the centre of the circle. Determine the area of the circle if angle OAB= 15^0 (3 Marks)



13. Pipe A can fill a tank in 2 hours; pipes B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take:

(a) To fill the tank if A and B are left open and C closed (2 Marks)

(b) To fill the tank with all the pipes open (2 Marks)

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

(b)Hence solve the simultaneous equation below using matrix method (3 Marks)

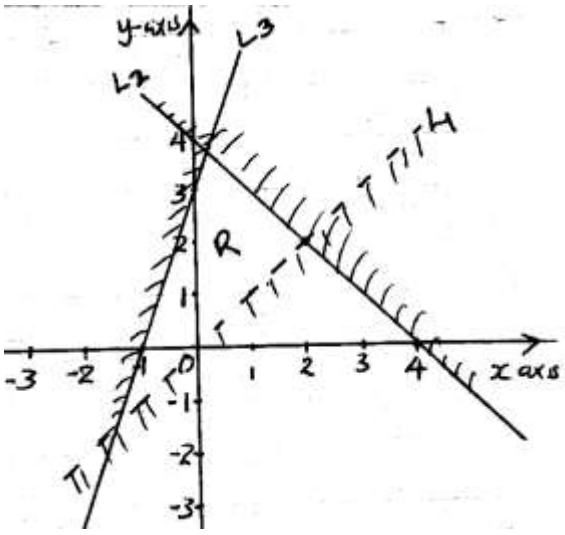
$4x + 3y = 6$

$5y + 3x - 5 = 0$

15. Evaluate by rationalizing the denominator and leaving your answer in surd form.(2 Marks)

$$\frac{\sqrt{8}}{1+Cos\ 45^0}$$

16. Form the three inequalities that satisfy the given region R (3 Marks)



SECTION II – 50 MARKS

Answer any FIVE questions from this section

17. (a)P, Q and R are three quantities such that P varies directly as the square of Q and inversely as the square root of R.

i) Given that P = 12 when Q = 24 and R = 36, find P when Q =27 and R = 121. (3 Marks)

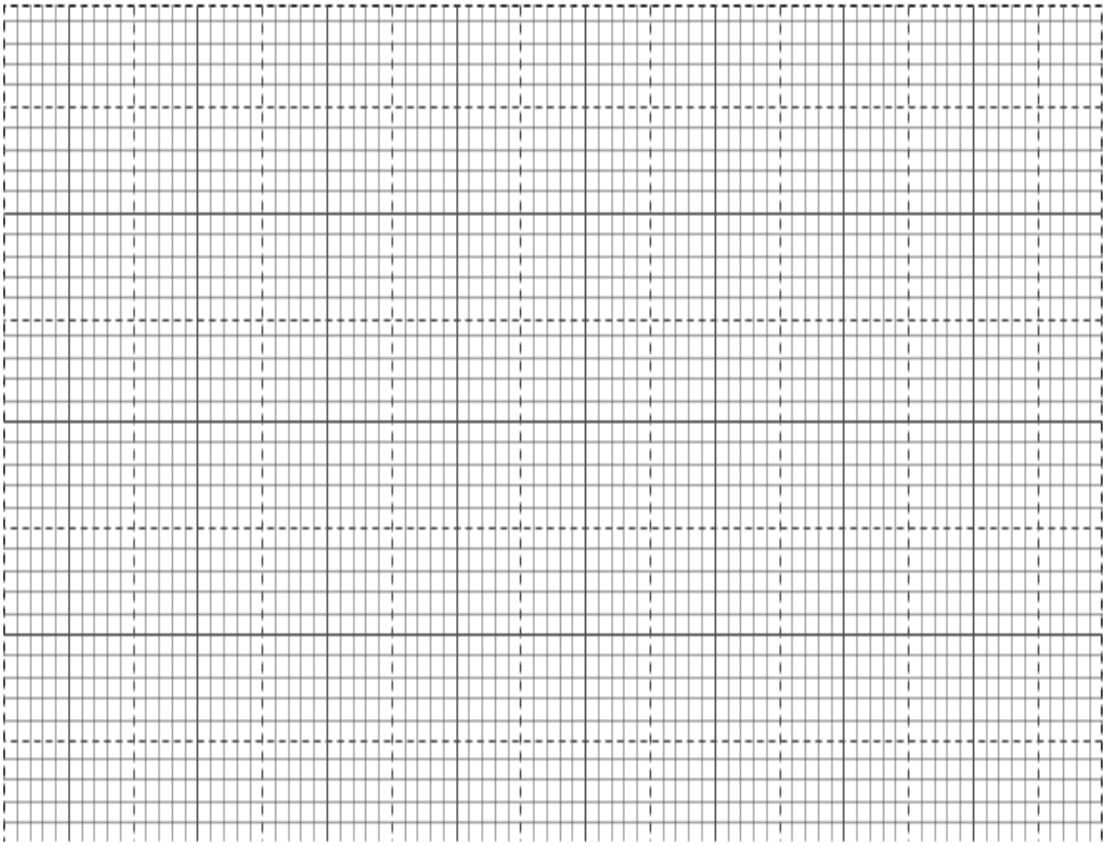
ii) If Q increases by 10% and R decreases by 25%, find the percentage increase in P. (4 marks)

b) If Q is inversely proportional to the square root of P and P = 4 when Q = 3. Calculate the value of P when Q = 8. (3 marks)

18. (a) complete the table for the curves $y = 3\sin(2x + 30^0)$ and $y = \text{Cos}2x$,use the range $0 \leq x \leq 180^0$

x	0	15	30	45	60	75	90	105	120	135	150	165	180
y=3sin (2x+30)	1.5		3		1.5		-1.5			-2.60	-1.00		1.5
y=Cos 2x	1			0		-0.866		-0.866	-0.5			0.866	1

(b) Using the scale Horizontal axis 1cm represent 30^0, vertical axis 1cm represent 1 unit, draw the graphs of $y = 3 \text{ Sin } (2x + 30)$ and $y = \text{Cos } 2x$ (4 Marks)



(c)Use your graph to solve the equation $3\text{Sin } (2x + 30) = \text{Cos } 2x$ (1 Mark)

(d)Determine the following from your graph

(i) Amplitude of $y = 3\text{Sin } (2x + 30)$ (1 Mark)

(ii) Period of $y = 3 \text{ Sin } (2x + 30)$ (1 Mark)

(iii) Period of $y = \text{Cos } 2x$ (1 Mark)

19. The 2^{nd} and 5^{th} terms of an arithmetic progression are 8 and 17 respectively. The 2^{nd}, 10^{th} and 42^{nd} terms of the A.P. form the first three terms of a geometric progression. Find:
(a) The 1^{st} term and the common difference. (3 Marks)

b) The first three terms of the G.P and the 10^{th} term of the G.P. (4 Marks)

(c)The sum of the first 10 terms of the G.P. (3Marks)

20. The probability of passing KCSE depends on the performance in the KCPE. If the candidate passes the KCPE, the probability of passing KCSE is $\frac{4}{5}$. If the candidate fails in the KCPE, the probability of passing KCSE is $\frac{3}{5}$. If a candidate passes KCSE the probability that he/she will get employed is $\frac{5}{8}$. If he/she fails KCSE the probability of getting employed is $\frac{1}{3}$. The probability of passing KCPE is $\frac{2}{3}$.

(a) Draw a well labelled tree diagram to represent the above information. (2 Marks)

(b) Using the tree diagram, find the probability that a candidate:-

(i) Passes the KCSE (2 Marks)

(ii) Gets employed (2 Marks)

(iii) Passes KCSE and get employed (2 Marks)

(iv) Passes KCPE and does not get employed (2 Marks)

21. The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the table shown below.

Height x (cm)	Frequency	d	d^2	fd	fd^2	cf
25 – 29	5			-15		5
30 – 34	12			-24		17
35 – 39	18	-1	1	-18		35
40 – 44	30	0	0	0		65
45 – 49	17	1	1			
50 – 54	11	2				
55 – 59	7	3				

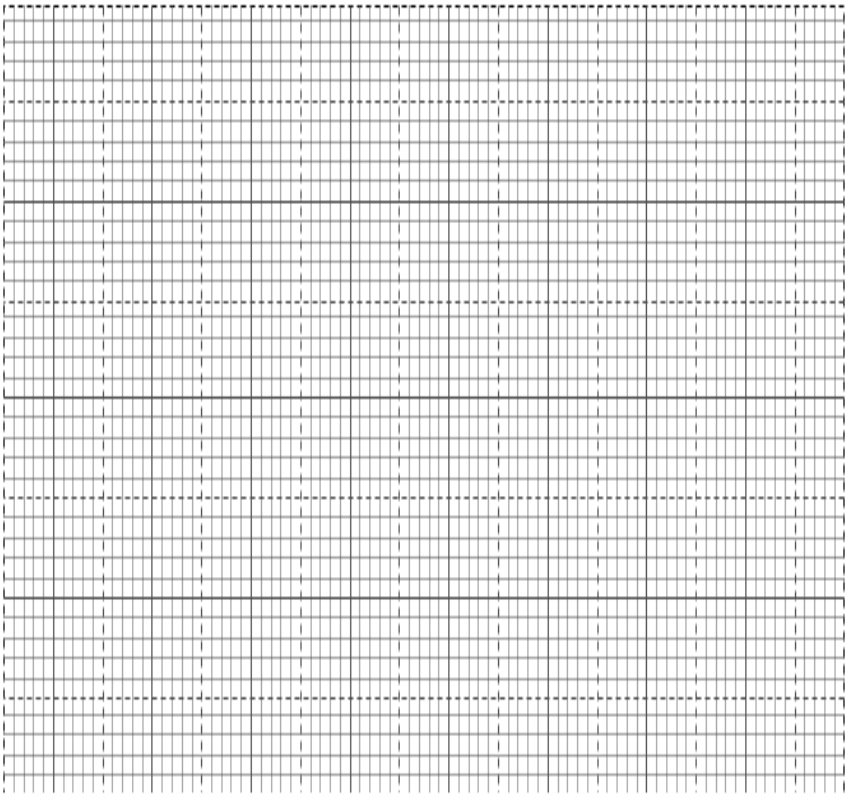
(a) Complete the table (2 Marks)

(b) Calculate to 2 d.p.

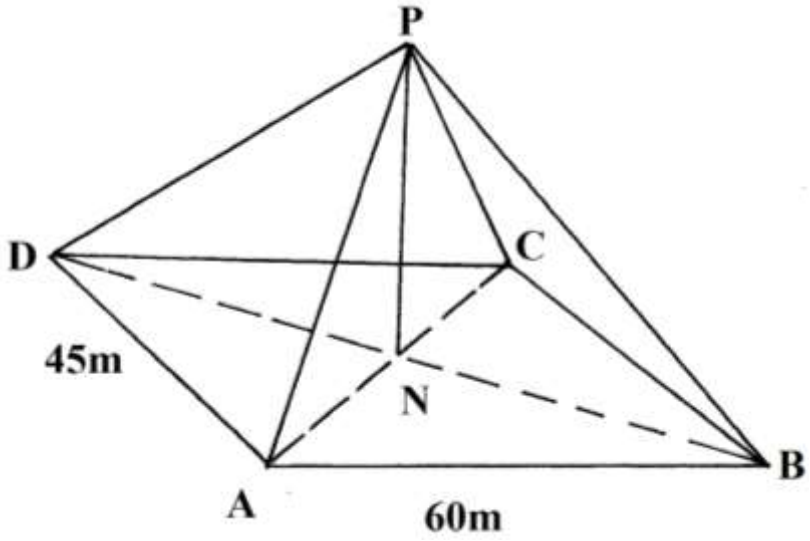
(i) The mean (2 Marks)

(ii) The standard deviation (2 Marks)

(c)Using the data above plot an ogive and use it to find the quartile deviation (4 Marks)



22. The figure below shows rectangular plot ABCD with AB =60m and BC=45m. PN is a vertical pole of length 30m to which four taut wire PB_1, PC1,PD and PA are attached



Calculate

a) length of the projection of PCon the plane ABCD (2mrks)

b) the angle PC made with the base ABCD (3mks)

c) The angle between the planes PBC and ABCD (3Mrks)

d) If point A is to be the North of point C. calculate the bearing of B from A (2mks)

23. (a) Construct a parallelogram ABCD in which AB = 9cm, AD = 5cm and angle BAD = 60^0. Measure the length AC (3 Marks)

(a) Show the locus of point P which moves so that it is equidistant from A and C.(1 Mark)

(b) Show the locus of point Q which moves such that angle BQD = 90^0.(2 Marks)

(d) The position of point X such that AX ≥ XC and angle BXD = 90^0(2 Marks)

(c) Shade the region inside the parallelogram such that AX≥XC and angle BXD ≥90^0 (2 Marks)

24. a) Draw ΔPQR whose vertices are P(1,1), Q(-3,2) and R(0,3) on the grid provided (1 Mark)
b) Find and draw the image P'Q'R', image of ΔPQR under the transformation whose matrix is $\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$ (3 Marks)

c) P'Q'R' is then transformed into P"Q" R" by the transformation of $\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$ matrix
Find the co-ordinates of P"Q" R" and draw the image (3 Marks)

d) Describe fully the single transformation which maps PQR onto P"Q" R". Find the matrix of this transformation (3 Marks)