

NAME.....INDEX NUMBER.....

121/1

MATHEMATICS PAPER 1.

PRE-MOCK 2022.

2 ½ Hours

SUKELLEMO

Instructions to Candidates

- (a) Write your name and index number in the spaces provided below
- (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** 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**
- (f) Marks may be given for correct working even if the answer is wrong.
- (g) **Non – programmable** silent calculators and KNEC Mathematical tables may be used except where stated otherwise.
- (g) **The paper consists 14 printed pages.**

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

GRANT

TOTAL

17	18	19	20	21	22	23	24	Total

SECTION 1 (50 MARKS)

Answer all the questions in the space provided below each question

1. Find the equation of a straight line passing through the points A (1,-3) and B (-2, 5). Express your answer in the form $ax + by = c$ where a, b and c are integers. (3marks)

2. Evaluate without using mathematical tables or calculator $\frac{-10 \div 2 + 6 \times 4 - 8 \times 5}{-5 + (-12) \div 3 \times 2}$ (3marks)

3. Solve for x in the equation $\frac{\cos(2x-30)^\circ}{\sin(3x+10)^\circ} = \tan 45^\circ$ (3marks)

4. Two taps P and Q together can fill a water tank in 6 minutes. Tap P alone takes 5 minutes longer than tap Q. How many minutes does it take tap P alone to fill the tank? (3marks)

5. Given that, $27^{5x-2y} = 243$ and $81^{2x-y} = 3$, Calculate the values of x and y. (3marks)

6. A point P is mapped onto P' by a negative quarter turn about the origin. P' is mapped onto P'' by a translation represented by the vector $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$. If P'' has coordinates (11,-5) determine the coordinates of p. (3marks)

7. A metallic pipe which is 21 meters long has an internal radius of 13 cm and an external radius of 15 cm. if the density of the metal is 8620 kg/m^3 , find its mass. (3marks)

8. Using logarithms evaluate $\sqrt[3]{\frac{82.73 \times 0.2943^2}{613.5}}$ (3marks)

9. A proper fraction is such that the denominator exceeds the numerator by 3. If 2 is subtracted from both the numerator and denominator, the fraction formed is $\frac{1}{8}$ less. Determine the original fraction. (3 marks)

10. Given that $OM = 2i + 3j - 6k$ and $ON = -3i + 5j + k$. Find the magnitude of MN to 2 decimal places. (3marks)

11. Find the range of the integral values of x in the inequality $10 < 3(x + 2) < 35$, giving your answer in the form $a \leq x \leq b$ (3marks)

12. Simplify completely $\frac{2-2x}{6x^2-x-12} \div \frac{x-1}{2x-3}$ (3marks)

13. The marked price of a recliner sofa set in a furniture store was ksh 400,000. A customer bought the recliner at 10% discount. The dealer still made a profit of 20%, Calculate the amount of money the dealer paid for the recliner. (3marks)

14. Draw a line AB of length 9 cm. On one side of line AB construct the locus of a point P such that the area of triangle ABC is 13.5 cm^2 . On this locus locate two positions of a point P1 and P2 such that $\angle AP_1B = \angle AP_2B = 90^\circ$

15. Given that the area of an image is four times the area of the object under a transformation whose matrix is $\begin{pmatrix} x & x-4 \\ x+8 & x \end{pmatrix}$, find the possible value of x . (3 marks)

16. Construct a triangle ABC in which AB = 5cm and AC = 8cm and $\angle ABC = 105^\circ$. Using line AC, locate point x on AB produced such that AX:XB = 3: -2. (4marks)

SECTION II (50 MARKS)

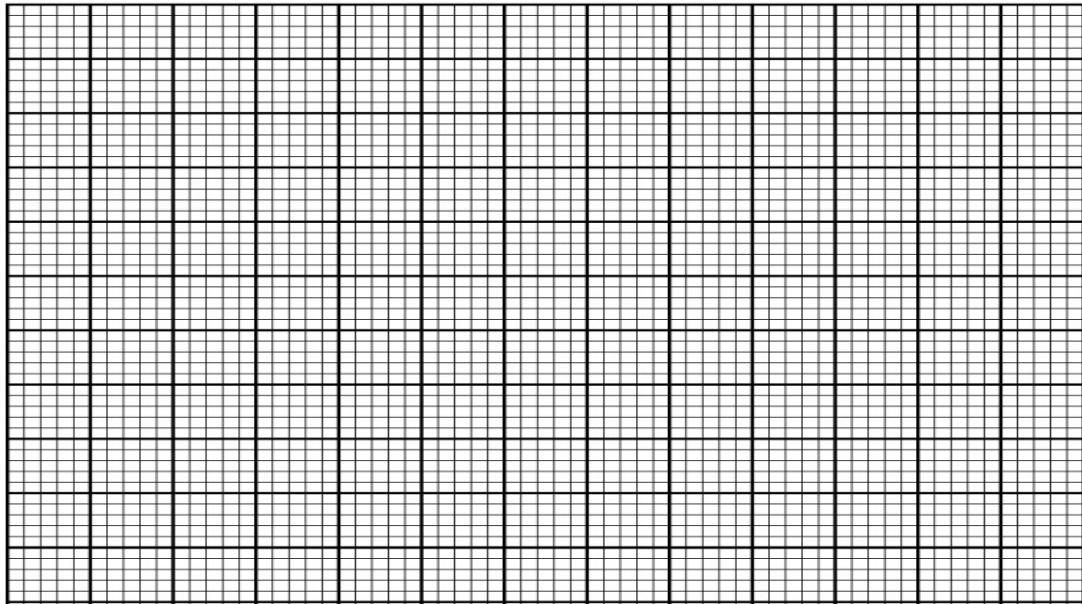
Answer only five questions in this section

17. The table below shows the weekly salary (k£) paid to workers in a school.

Salary (k£)	$50 \leq x \leq 100$	$100 \leq x \leq 150$	$150 \leq x \leq 250$	$250 \leq x \leq 350$	$350 \leq x \leq 500$
No. of Workers	25	27	30	26	24

a) Calculate the differences between the mean and the median. (6 marks)

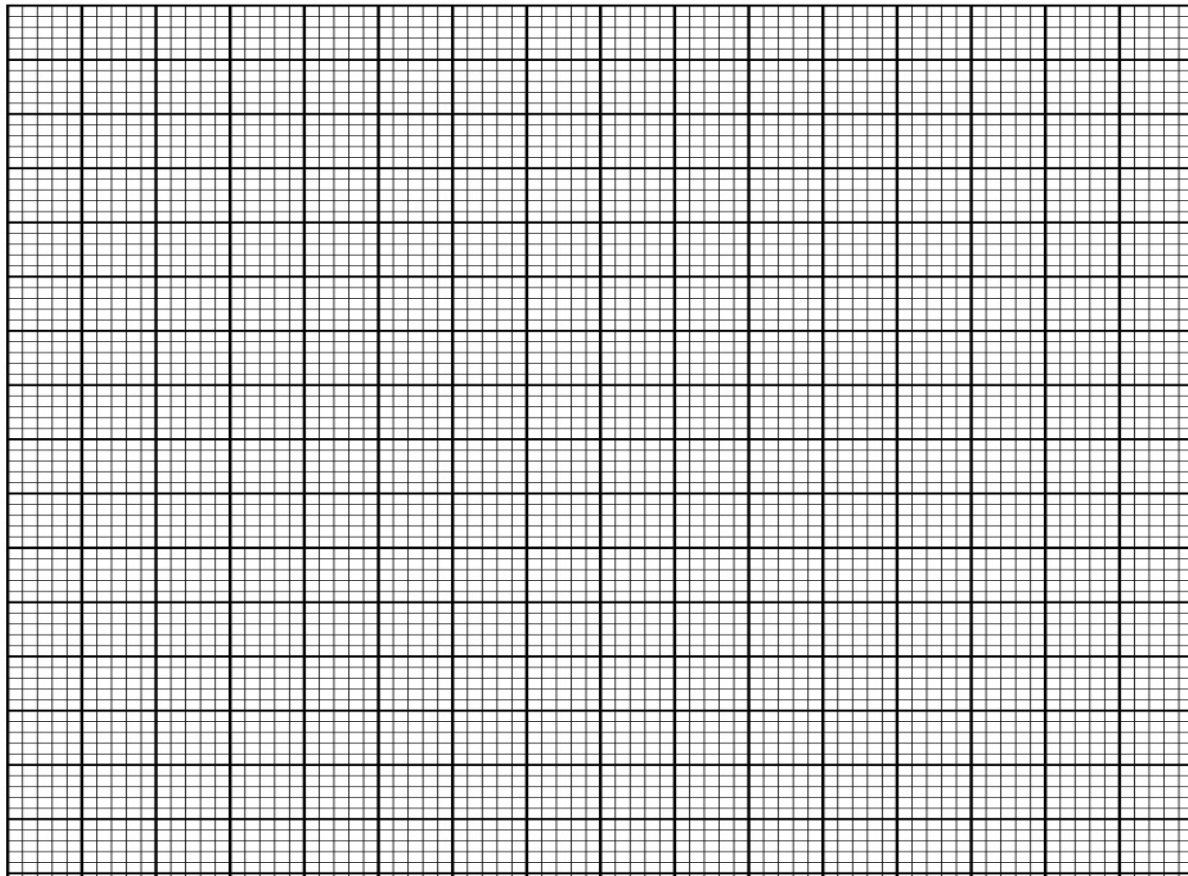
b) Draw a frequency polygon to illustrate the above information. (4marks)



18. a) Complete the table of values for the equation, $y = -2x^2 + x + 8$. (2marks)

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

b) Use the values above to draw the graph of $y = -2x^2 + x + 8$. (3marks)



c) Using the graph drawn above Solve the equations:-

(i) $2x^2 = x + 8$ (2marks)

(ii) $-2x^2 + 4x + 12 = 0$ (3marks)

19. Three towns P, Q and R are such that Q is 16 km north of P and the distance of R is 12 km from P and on a bearing of 60° from Q.

a). Using a scale of 1 cm to represent 4 km, Make a scale drawing showing the relative positions of the three towns. (3marks)

b) Using the scale drawing above, find the

i) Distance of R from Q. (1mark)

ii) Bearing of P from Q. (1mark)

iii) How far town R is east of Q (1mark)

c) A Passenger in an aero plane after take-off from town R spotted town P at an angle of depression of 48° , by means of a scale drawing determine the vertical height of the plane at town R. (3marks)

20. a) The equation of a straight line L_1 is of the form $3y + 2x = 5$. L_1 is perpendicular to L_2 and meets it at the point where $X = -2$, determine the equation of L_2 in the form $y = mx + c$ where m and c are constants. (5marks)

b) L_3 is parallel to the line L_2 and passes through the point $(-3, 2)$, find the equation of L_3 , leaving your answer in its double intercept form. (3marks)

c) Determine the angle of inclination of L_2 to the Y-axis. (2marks)

21. The points **P**, **Q**, **R** and **S**, have position vectors $2\mathbf{p}$, $3\mathbf{p}$, \mathbf{r} and $3\mathbf{r}$ respectively, relative to an origin **O**. A point **T** divides **PS** internally in the ratio 1:6.

a) Find, in its simplest form **OT**, **QT** and **TR** in terms of **p** and **r**. (6 marks)

b) Show that the points **Q**, **T** and **R**, are collinear. (3marks)

c) Determine the ratio in which **T** divides **QR**. (1mark)

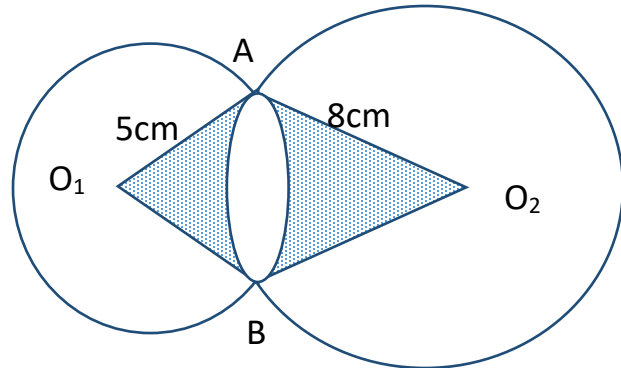
22. In the figure below, O_1 and O_2 are the centers of the circles whose radii are 5 cm and 8 cm respectively. The circles intersect at A and B and angle $AO_1O_2 = 64^\circ$.

Calculate the area of the:-

a) Sector

i) AO_1B (2marks)

ii) AO_2B (3 marks)



b) Intersecting region.

(3marks)

c) The shaded region.

(2marks)

23. a) Find the x –intercept of the curve $y = (x+2) (x-1)^2$. (1mark).

b) Find the gradient function of the curve $y = (x+2) (x-1)^2$ (2marks)

c) Find the co-ordinates of the turning point. Hence sketch the curve $y= (x+2) (x-1)^2$. (4 marks)

d) Calculate the exact area enclosed by the curve and the x - axis (3marks)

24. P and Q are two points on latitude 40°N . Their longitudes are 30°E and 150°W respectively. Find to one decimal place : (Take the radius of the earth = 6370km and $\pi = \frac{22}{7}$)

a) The distance in km between P and Q along the parallel of latitudes. (2marks)

b) The shortest distance along the earth's surface between P and Q in km. (3marks)

c) A weather forecaster reports that the center of a cyclone at $(40^\circ\text{N}, 60^\circ\text{W})$ is moving due north at 24 knots. How long will it take to reach a point $(45^\circ\text{N}, 60^\circ\text{W})$. (2marks)

d) A plane leaves P at 2.15 pm at a speed of 350 knots to town R $(40^\circ\text{N}, 65^\circ\text{E})$. Determine the time at R when the plane arrived. (3marks)

