

**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)

$$\left(\frac{\left(1\frac{3}{7} - \frac{5}{8}\right) \times \frac{2}{3}}{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7}} \text{ of } 2\frac{1}{3} \right)^{-2}$$

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 $\frac{(\sqrt[3]{0.000125})}{0.325}$, 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 m². 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/cm³. 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 $\sin(x + 4^\circ) = \cos(3x)^\circ$. Find $\tan(x + 40^\circ)$ to 4 s.f. (3 mks)

11. In a regular polygon, the exterior angle is $\frac{1}{3}$ 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 $22\frac{1}{2}^\circ$ on the circumference of a circle, radius 10cm. (3 mks)

13. An airplane leaves point A (60°S , 10°W) 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) $\frac{1}{2}$

(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° . 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 $N30^{\circ}E$ from ship P. ship R is 750 km from ship Q and on a bearing of $S60^{\circ}E$ 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 $|\overrightarrow{XY}|$ leaving your answer in index form. (3 mks)

(ii) Given that $|\overrightarrow{XZ}| = 11.3170$, 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.....

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Grand
Total

1. Without using logarithm tables or calculator, solve $3^{2x+3} - 28(3^x) + 1 = 0$. (3 mks)

2. Use a mathematical table to evaluate: (3 mks)

$$\left(\frac{4.28 \times 0.01677}{\tan 20} \right)^{\frac{1}{5}}$$

3. Simply and leave answer in surd form. (3 mks)

$$\frac{-9}{\sqrt{13} + \sqrt{3}} - \frac{5}{\sqrt{3} - \sqrt{13}}$$

4. 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)

5. Simplify: (3 mks)

$$\frac{\log 16 + \log 81}{\log 8 + \log 27}$$

6. Simplify the expression: (4 mks)

$$\frac{(-36 + 9x^2) + (-6y + 3xy)}{3x - 6}$$

7. Given that $\frac{x(x^2 - 1)}{x + 1}$, find dy/dx at the point (2,4). (3 mks)

8. (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)

9. 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)

10. A chord of AB of length 13cm subtends an angle of 67° at the circumference of a circle centre O. find the radius of the circle. (3 mks)

11. Find the coordinates of the image of a point (5, -3) when its rotated through 180° about (3,1).
(3 mks)

12. 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)

13. 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 $\frac{1}{20}$ of the meal is lost during casting. Calculate the number of complete slabs cast.
(3 mks)

14. 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)

15. Determine the inverse, T^{-1} of the matrix $T \begin{pmatrix} 4 & 6 \\ 6 & -2 \end{pmatrix}$ hence solve : (3 mks)

$$2x + 3y = 30$$

$$3x - y = 10$$

16. Use squares, square roots and tables to evaluate:

(3 mks)

$$3.045^2 + (49.24)^{-1/2}$$

SECTION B

17. 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)

18. A $3\frac{1}{2}$ Bao yearly plan is a school pocket money (SPM) saving scheme requiring 12 months payments of a fixed amount of money on the same date 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 complete 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 $\frac{1}{2}$ per cent. (3 mks)

19. 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 at 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 provided. (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)

20. 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 matrix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ Describe the transformation. (4 mks)
- (iii) Parallelogram O'''A'''B'''C''' under the enlargement, centre (0,0) and scale factor $\frac{1}{2}$
(2 mks)

21. A particle moving with acceleration $a = (10 - t) \text{ m/s}^2$. When $t = 1$ velocity $V = 2 \text{ m/s}$ and when $t = 0$ displacement $S = 0 \text{ m}$.

- (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.

22. (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 value 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)

23. Use a ruler and pair of compasses only in this question. ABC is a fixed triangle in which $AB = AC = 6$ cm and angle $BAC = 90^\circ$. 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)

24. 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)