KCSE PREDICTIONS 2020
MATHEMATICS PAPER 1

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 $\dfrac{\left(\sqrt[3]{0.000125}\right)}{0.325}$, 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 $\sin(x + 4^0) = \cos(3x)^0$. Find $\tan(x + 40^0)$ 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 $22\frac{1}{2}^0$ 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^{0}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)