

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2016

121/1

MATHEMATICS

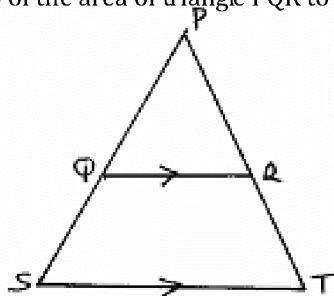
PAPER 1

JULY/AUGUST, 2016

TIME: 2½ HOURS

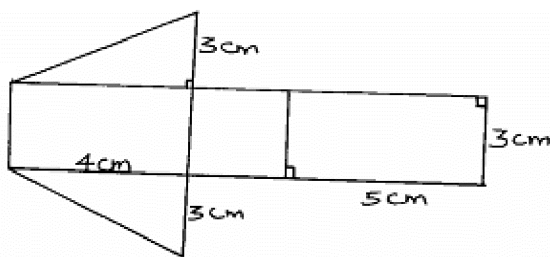
SECTION I: (50 MARKS)**Answer all the questions in this section in the spaces provided**

- If $(5x + 6y) : (2x + 10y) = 22 : 10$ find $x : y$. (3mks)
- A radio has a marked price of Sh.4000, Winnie managed to convince the shopkeeper to drop the marked price by 15% which he did. The shopkeeper still made a profit of 20%. What was the shopkeeper's cost of the radio? (3mks)
- Solve the following inequality and show your solution on a number line. (3mks)
 $4x - 3 \leq \frac{1}{2}(x + 8) < x + 5$
- Evaluate using square root, reciprocal and square tables only. (4mks)
 $\left[\frac{1}{\sqrt{0.7235}} \right]^2 - \frac{1}{10.56}$
- Find the equation of the perpendicular bisector of line AB where A is (3, 9) and B (7, 5) giving your answer in the form $ax + by + c = 0$. (3mks)
- Simplify: $\frac{x^2 + x - 4xy - 4y}{(x + 1)(4y^2 - xy)}$. (3mks)
- (a) A translation $T \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ maps point P onto $P^1(6, 5)$. Find P. (1mk)
 (b) Point X^1 is the image of X (3, 2) under the same translation. Find the length of PX^1 leave your answer in surd form. (3mks)
- Solve for θ in $\cos 3\theta = \sin 6\theta$. (2mks)
- Find the value of x in the following equation. (4mks)
 $64^{x+1} + 8^{2x} = 1040$
- A tourist exchanged X US dollars for Kenya shilling when he arrived in Kenya. He spent three days in the country and paid Ksh.45,600 for expenses. He later left the country and exchanged the remainder back to US dollars. He went back with 1200 dollars. Find the value of X.
 Buying 1 US dollar = Ksh.98.36
 Selling 1 US dollar = Ksh.98.54 (3mks)
- Solve the simultaneous equations. (4mks)
 $xy = 4$
 $x + y = 5$
- The image of P (5, 5) under an enlargement scale factor -2 is $P^1(8, 7)$. Find the coordinates of the centre of enlargement. (3mks)
- In the figure below, triangle PQR is similar to triangle PST and QS is parallel to ST. Given that the ratio PQ:PS is 3:5, find the ratio of the area of triangle PQR to that of the trapezium QRST. (3mks)



- Ruto is 12 years old. In three years time he will be $\frac{1}{3}$ of his father's present age. How old was his father 12 years ago. (3mks)
- Four interior angles of a hexagon are 100° , 140° , 125° and 105° . The fifth interior angle is four times the sixth angle. Find the fifth interior angle. (3mks)

16. The figure below shows a net of a solid.



(a) Sketch the solid of the net showing the hidden edges with dotted lines. (1mk)

(b) Find the surface area of the solid. (2mks)

SECTION II: (50 MARKS)

Answer only any FIVE questions in this section.

17. From a reservoir, water flows through a cylindrical pipe of diameter 0.2m at a rate of 0.35m/s.

(a) Determine the number of litres of water discharged from the reservoir in one hour. (4mks)

(b) The water flows from the reservoir for 18 hours per day for 25 days per month and serves a population of 2500 families. Determine the average consumption of water per family per month giving your answer to nearest 100 litres. (4mks)

(c) The water is charged at the rate of Sh.450 per 100 litres calculate the average water bill per family per month. (2mks)

18. Two airports A and B are such that B is 500km due east of A. Two planes P and Q take off from A and B respectively and at the same time. Plane P flies at 360km/hr on a bearing of 030° . Plane Q flies at 240km/hr on a bearing of 315° . The two planes land after 90 minutes. Using a scale of 1: 10,000,000.

(a) Show the positions of the planes after 90 minutes. (4mks)

(b) Find the distance between the planes after 90 minutes. (2mks)

(c) Find: (i) the bearing of plane P from plane Q. (2mks)

(ii) the bearing of plane Q from the plane P after 90 minutes. (2mks)

19. The marks scored by 50 students in a Geography examination are as follows.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 60 | 54 | 40 | 67 | 53 | 73 | 37 | 55 | 62 | 43 |
| 44 | 69 | 39 | 32 | 45 | 58 | 48 | 67 | 39 | 51 |
| 46 | 59 | 40 | 52 | 61 | 48 | 23 | 60 | 59 | 47 |
| 65 | 58 | 74 | 47 | 40 | 59 | 68 | 51 | 50 | 50 |
| 71 | 51 | 26 | 36 | 38 | 70 | 46 | 40 | 51 | 42 |

(a) Prepare a frequency distribution table using a class interval of 10. (3mks)

(b) Draw a histogram to represent the distribution. (3mks)

(c) Use your histogram to estimate the modal class. (1mk)

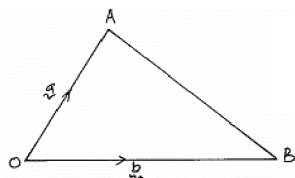
(d) Calculate the percentage of students who scored in the range $50 < x \leq 70$. (3mks)

20. A bus left Makindu at 11.45am and travelled towards Mombasa at an average speed of 80km/h. A Nissan matatu left Makindu at 1.15pm on the same day and travelled along the same road at an average speed of 120km/h. The distance between Makindu and Mombasa is 400km.

(a) Determine the time of the day the Nissan overtook the bus. (5mks)

(b) Both vehicles continue towards Mombasa at their original speeds. Find how long the matatu had to wait at Mombasa before the bus arrived. (5mks)

21. The position vectors of points A and B in triangle OAB below are a and b respectively. Points M and N are on sides OA and AB respectively such that $3OM = OA$ and $2AN = 3NB$.



(a) Express in terms of a and b.

(i) MB. (1mk)

(ii) ON. (1mk)

(b) ON and MB intersect at X. Given that $MX = hMB$ and $OX = kON$, where h and k are constants. Express OX in terms of

(i) a, b and k. (1mk)

(ii) a, b and h. (1mk)

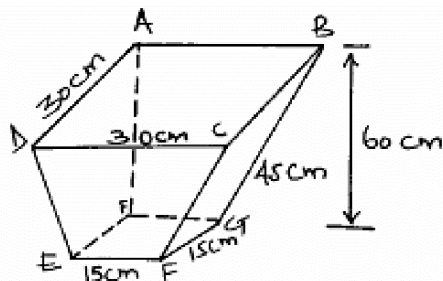
(c) Determine the values of h and k. (4mks)

(d) Determine the ratio OX: XN. (2mks)

22. A group of young men decided to raise Ksh.480,000 to start a business. Before actual payment was made four members pulled out and each of the remaining had to pay an additional Ksh.20,000. Write an expression in terms of

P for:

- (a) (i) Original contribution of each member. (1mk)
 (ii) Contribution after withdrawal of four members. (1mk)
 (b) Form an equation in P and hence determine the number of initial members. (5mks)
 (c) Three men Kamau, James and Hassan shared Shs.480,000 such that Kamau: James is 3: 2 and James: Hassan is 4: 2. Find how much each got. (3mks)
23. The figure below shows an open waste paper basket in the form of a frustrum of a right square pyramid of height 60cm. The depth of the basket is 40cm and the other measurements are as shown in the figure. (5mks)



- (b) The total surface area of the basket. (5mks)
24. The equation of a curve is $y = (x - 1)(x + 3)^2$. (5mks)
- (a) Find
- (i) the x -intercept of the curve. (2mks)
 (ii) the y -intercept of the curve. (1mk)
- (b) (i) Determine the stationary points of the curve. (2mks)
 (ii) For each of the points in (b)(i) above, determine whether it is a maximum or a minimum. (2mks)
- (c) Sketch the curve. (2mks)