
KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

MANG’U HIGH SCHOOL
MATHEMATICS
PAPER 2

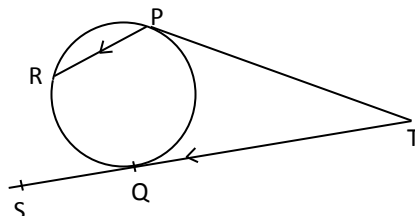
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**MANG'U HIGH SCHOOL KCSE TRIAL
AND PRACTICE EXAM 2016
Paper 2**

SECTION I: (50 MARKS)

Answer all questions in this section:

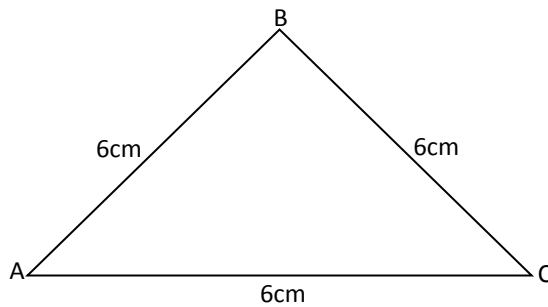
1. A pyramid block has a square base whose side is exactly 7.5cm. Its height measured to the nearest millimeter is 3.5cm. Find the percentage error in calculating its volume correct to 3 decimal places. (3 marks)
2. A blend of juice is made from pineapple and passion. The cost of two limes of pineapple is 120/= and three limes of passion is 270/=. In what ratio should the juice be mixed such that by selling the mixture at 84/= per lime a profit of 20% is realized? (3 marks)
3. Solve for χ in $(\log_2 \chi)^2 + \log_2 8 = \log_2 \chi^4$. (3 marks)
4. In the figure shown **below**, angle PTS = 54° and PT and ST are tangents to the circle and that PR is parallel to TS.



Giving reasons; find the values of angles:

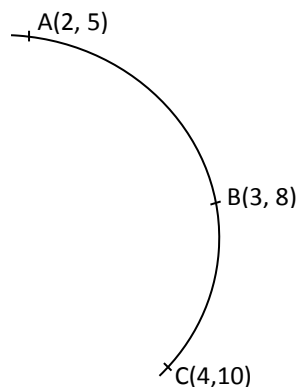
- (i) PRQ. (2 marks)
 - (ii) RQS. (2 marks)
5. Given that $\tan 15^\circ = 2 + \sqrt{3}$, find without using tables or a calculator, in the form $a + 2\sqrt{c}$, the value of $\tan 75^\circ$. (3 marks)
 6. Make P the subject of the formula:

$$\chi = \left[\frac{1}{mp^3} - A^2 \right] B$$
 (3 marks)
 7. Expand $\left(3 - \frac{1}{2}\chi \right)^5$ up to the 5th term. Hence use the expansion to evaluate $(3.25)^5$ correct to 4 decimal places. (4 marks)
 8. A commercial plot is valued at shs.500,000. The plot depreciates at a rate of 10% per six months for a period of 2 years. It then appreciates at a rate of 4% per quarter yearly for three years. Find the value of the plot after 5 years to nearest shillings. (3 marks)
 9. The equation of a curve is $y = \chi^3 - 3\chi^2 + K\chi + 2$ and a normal is $9y + \chi = 18$. If they intersect at $\chi = 0$; Find the value of K. (3 marks)
 10. The figure **below** drawn to scale represents a field in the shape of an equilateral triangle of sides 120m. (4 marks)



Mr. Mutai wants to plant some tea seedlings in the field. The seedling must be at most 90m from A and nearer to B than to C. If no seedling is to be more than 60m from BC, show by shading, the exact region where the seedling may be planted within the triangle.

11. The product of the digits in a two digit number is 24. Four times the ten digit exceeds the unit digit by 10. Calculate the number. (3 marks)
12. Solve for χ in the equation $\sin^2(3\chi + 30^\circ) = \frac{3}{4}$ for $0^\circ \leq \chi \leq 180^\circ$. (3 marks)
13. A Kenya airways plane flies from point P(40°N, 45°W) to a point Q(35°N, 45°W), then to point T(35°N, 135°E). Find the shortest distance between Q and T in nautical miles. (2 marks)
14. The position vectors of points A and B are $2\mathbf{i} - \mathbf{j} + 4\mathbf{k}$ and $4\mathbf{i} + 3\mathbf{j}$ respectively. If point R is the mid-point of \overrightarrow{AB} . Find the magnitude of \overrightarrow{AR} . (3 mark)
15. Water flows through a pipe whose cross sectional radius is 3.5cm at a rate of 3m/min. Calculate how long it will take the pipe to fill a 22000 line Ken tank. (2 marks)
16. The figure **below** shows an arc of a circle through three points A, B and C.



Calculate the co-ordinates of the centre of the circle. (4 marks)

SECTION II

Answer any five questions.

17. (a) Fill the table below using the following function $y = 3 + 4\chi - 2\chi^2$ for $-3 \leq \chi \leq 5$. (2 marks)

χ	-3	-2	-1	0	1	2	3	4	5
$-2\chi^2$	-18			0		-8			-50
4χ			-4		4		12		

3									
y									

- (b) On the grid provided, draw the graph of the function $y = 3 + 4x - 2x^2$ for $-3 \leq x \leq 5$.
(3 marks)

GRAPH

- (c) Using your graph; estimate the roots of the equations:-
- (i) $3 + 4x = 2x^2$. (2 marks)
- (ii) $2x^2 - 3x - 6 = 0$. (2 marks)
- (d) State the y – co-ordinate of the maximum turning point. (1 mark)
18. (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)
19. Every morning during class time, Brenda either reads a novel or solves Mathematics questions. The probability that she reads a novel is $\frac{4}{5}$. If she reads a novel, there is a probability of $\frac{3}{7}$ that she will fall asleep. If she solves Math's questions there is a probability of $\frac{1}{2}$ that she will fall asleep. Sometimes the teacher on duty enters Brenda's classroom.

Using a tree When Brenda is asked whether she had been a sleep, there is a probability of $\frac{1}{5}$

that she will admit that she had been asleep and a probability of $\frac{3}{5}$ that she will claim to

have been asleep. diagram;

Find the probability that

- (i) She sleeps and admits it. (2 marks)
- (ii) She sleeps and does not admit. (2 marks)
- (iii) She does not sleep but claims to have been asleep. (2 marks)
- (iv) She does not sleep and says that she has not been a slept. (2 marks)
- (v) She sleeps and admits and changes her mind. (2 marks)
20. The table **below** shows the distribution of marks scored by 50 students of Afraha high.

Marks	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100
No. of students	2	3	5	6	12	10	6	4	2

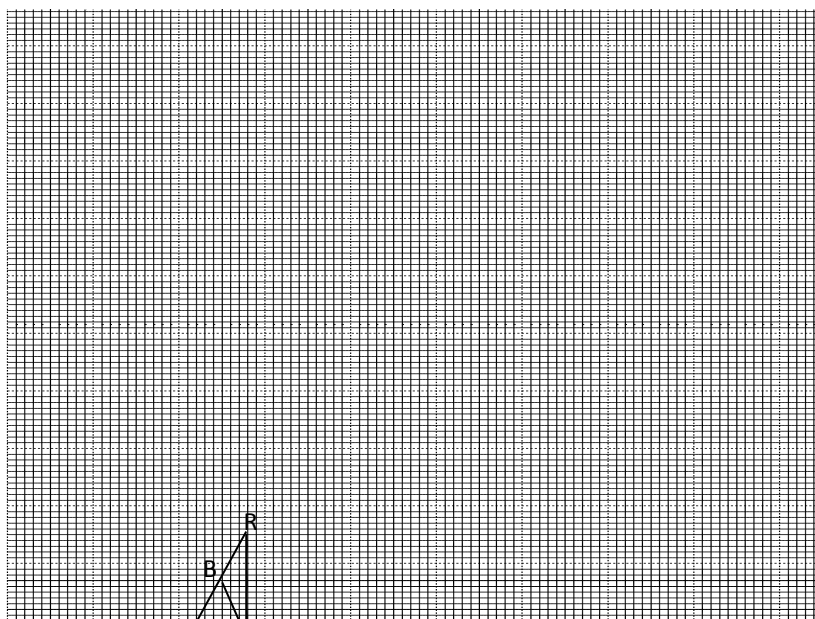
Calculate:-

- (a) interquartile range. (3 marks)
- (b) Mean mark. (3 marks)
- (c) Standard deviation (4 marks)

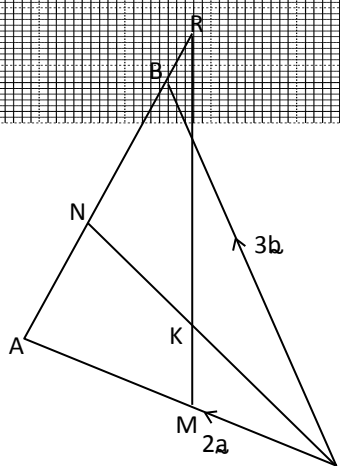
21. Two quantities P and r are connected by the equation $P = Kr^n$. Where k and n are constants. The table of values of P and r is given **below**.

P	1.2	1.5	2.0	2.5	3.5	4.5
r	1.58	2.25	3.39	4.774	7.86	11.5

- (a) State the linear equation connecting P and r . (1 mark)
- (b) (i) Using a suitable scale, draw a suitable line graph from the above data on the grid provided. (5 marks)
- (ii) Using your graph, estimate the values of K and n . (3 marks)
- (c) Find the relation connecting P and r . (1 mark)



22.



The diagram **above** shows triangle ABC , such that $\overrightarrow{CA} = 2\mathbf{a}$ and $\overrightarrow{CB} = 3\mathbf{b}$. M is the midpoint of \overrightarrow{CA} . N is a point on AB such that $2AN = NB$ and R is a point on AB produced such that

$2AR = 5RB$. If K is the point of intersection of MR and CN ,

- (a) Express in terms of \mathbf{a} and \mathbf{b} .
- (i) \overrightarrow{AB} . (1 mark)
- (ii) \overrightarrow{CN} . (2 marks)
- (iii) \overrightarrow{BR} . (1 mark)
- (iv) \overrightarrow{MR} . (2 marks)
- (v) \overrightarrow{CK} . (2 marks)
- (b) Find the ratio $CK:KN$. (2 marks)

23. The product of the first three terms of geometric progression is 729. If the first term is a and

the common ratio is r.

(a) Express r in terms of a. (2 marks)

(b) Given the sum of the three terms is 39.

(i) Find the values of a and r and hence write down two possible sequences each up to the 4th term. (6 marks)

(ii) Find the product of the 10th term of the two sequences. (2 marks)

24. The velocity of a particle, Vm/s, moving in a straight line after t seconds is given by:-

$$V = 3t^2 - 3t - 6 \quad \text{Find:-}$$

(i) the acceleration of the particle after 2 seconds. (2 marks)

(ii) the distance covered by the particle between t = 1 and t = 4 seconds. (3 marks)

(iii) the time when the particle is momentarily at rest. (2 marks)

(iv) The maximum velocity attained by the particle. (3 marks)

Construct the pillar given that the actual height of material used is 0.832g/cm³. (Give your answer in tones). (4 marks)

the whole pillar is 60m and the density of the answer in tones).

19. (a) Use the quadratic formula to solve the equation. $2x^2 - 9x + 3 = 0$ giving your answer to 4 significant figures. (3 marks)

(b) Simplify the expression completely: $\frac{-5x + 2x^2}{16x^4 - 18} + x$ (4 marks)

(c) If the expression $25y^2 - 70y + (16 + K)$ is a perfect square; where K is a constant; find the value of K. (3 marks)

20. Christians who attended a church service on a Sunday were grouped by age as shown in the table below.

Age in x years	$0 \leq x < 5$	$5 \leq x < 15$	$15 \leq x < 25$	$25 \leq x < 45$	$45 \leq x < 75$
No. of members	14	41	59	70	15

(a) Estimate the mean age (4 marks)

(b) On the grid provided, draw a histogram to represent the distribution. Use the scale: 1cm to represent 5 units on the horizontal axis. 2cm to represent 5 units on the vertical axis. (4 marks)

- determine
- (c) On the same axes in (b) above, construct a frequency polygon and use it to determine the modal class. (2 marks)