

GEM SUB-COUNTY JOINT EVALUATION EXAMS 2016

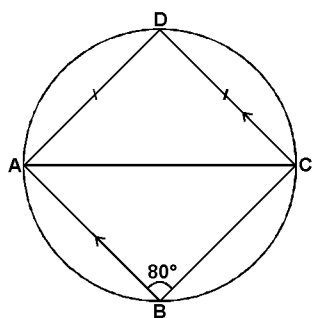
Kenya Certificate of Secondary Education

MATHEMATICS

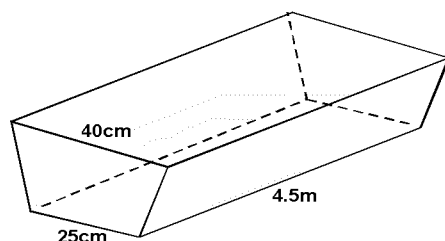
Paper - 121/1

July/August 2016**Time:** 2½ hours**SECTION 1 (50 MARKS)****Answer all the questions in this section in the spaces provided**

1. Evaluate $\frac{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3}}{(1\frac{3}{7} - \frac{5}{8}) \times \frac{2}{3}}$ (3 marks)
2. A fruit juice dealer sell the juice in packets of 300ml, 500ml and 750ml. Find the size of the smallest container that can fill each of the packets and leave a remainder of 200ml. (3 marks)
3. The length of a rectangle is $(3x + 1)$ cm. Its width is 3cm shorter than its length. Given that its area is 28cm^2 . Find its length. (3 marks)
4. In a fundraising committee of 45 people, the ratio of men to women is 7 : 2. Find the number of women required to join the existing committee so that the ratio of men to women changes to 5 : 4. (3 marks)
5. Given that $\log(a/b) = 4.5$ and $\log(a^5b^2) = 5$. Solve for a and b. (4 marks)
6. Atieno is now four times as old as her daughter and six times as old as her son. Twelve years from now the sum of the ages of her daughter and the son will be 9 years less than hers. Calculate Atieno's present age. (3 marks)
7. Using tables of Reciprocals find the value of M if. (4 marks)
- $$\frac{1}{M} = \frac{13}{0.156} - \frac{3}{0.6375}$$
8. If the expression $9x^2 - 30xy + (q + 13y^2)$ is a perfect square, find the value of q. (3 marks)
9. The angle of elevation of a top of a building from a point P is 45° . From a point Q, which is 10m from P towards the base of the building, the angle of elevation is 48° . Calculate the height of the building to one decimal place. (4 marks)
10. A perpendicular line is drawn from a point Q(4, 6) to the line $5y + 4x = 20$. Find its equation in the form $ay + bx = c$ where a, b and c are integers. (3 marks)
11. The surface area of two similar cylindrical water tanks are 50m^2 and 162m^2 . Given that the volume of the larger tank is 36450m^3 , find the volume of water in the smaller tank if it is a half full. (4 marks)
12. Without using mathematical tables or calculators, find the value of q given that. (2 marks)
- $$\sin(2\theta - 40)^\circ = \cos(3\theta + 30)^\circ$$
13. Factorise $kl - ml - kn + mn$. Hence use it to simplify the expression. (3 marks)
- $$\frac{(kl - ml - kn + mn)(l + n)}{n^2 - l^2}$$
14. ABCD is a cyclic quadrilateral in which $AD = DC$ and AB is parallel to CD.

Given that angle $ABC = 80^\circ$, find the sizes of angles DAC, BAC and BCD. (3 marks)

15. The figure below shows a trough which is 40cm wide at the top and 25cm at the bottom. The trough is 20cm deep and 4.5 m long.



Calculate the capacity of the trough in litres. (3 marks)

16. Without using mathematical tables or a calculator evaluate,

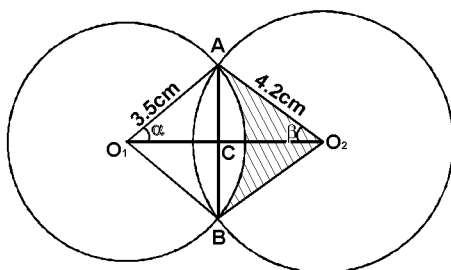
(2 marks)

$$\frac{2.7 \times 2.04}{300 \times 0.054}$$

SECTION 11 (50 MARKS)

Answer ANY FIVE the questions in this section in the spaces provided

17. Three teachers Michael, Peter and Apollo decided to buy a plot. The plot owner offered the plot at Kshs 2.8 million but agreed to be paid 65% of the value as initial deposit in the ratio 5 : 3 : 2 respectively and that the remaining amount be paid after two years including an additional 5% of the initial value for processing the plot documents. The total balance was to be paid in the same ratio as the deposit.
- a) How much of the deposit did each teacher contribute? (5 marks)
- b) What amount of money were the teachers to pay at the end of the two years? (3 marks)
- c) How much of the total value did Apollo pay? (2 marks)
18. Two circles of radii 3.5cm and 4.2cm with centres O_1 and O_2 respectively intersect at points A and B as shown in the figure below. The distance between the two centres is 6cm.



Calculate the

- a) length O_1C to three decimal places. (2 marks)
- b) sizes of $\angle AO_1B$ and $\angle AO_2B$ to the nearest degree. (4 marks)
- c) area of quadrilateral O_1AO_2B , to two decimal places. (2 marks)
- d) shaded area correct to two significant figures. (2 marks)

(Take $\pi = \frac{22}{7}$)

19. Two friends Jane and Tom live 40km apart. One day Jane left her house at 9.00am and cycled towards Tom's house at an average speed of 15km/h. Tom left at 10.30am on the same day and cycled towards Jane's house at an average speed of 25km/h.
- a) Determine :
- i) the distance from Jane's house where the two friends met. (4 marks)
- ii) the time they met. (2 marks)
- iii) how far Jane was from Tom's house when they met. (2 marks)
- b) The two friends took 10 minutes at the meeting point and then they cycled to Tom's house at an average speed of 12km/h. Find the time they arrived at Tom's house. (2 marks)
20. a) On the grid provided; plot the points A(2, 8), B(1,1), C(3, 4) and D(6, 2) and join them to form quadrilateral ABCD. (2 marks)
- b) Locate and plot on the same grid the points A^1 , B^1 , C^1 and D^1 which are images of A, B, C and D respectively under the reflection in the y-axis. Join the points to form quadrilateral $A^1B^1C^1D^1$ and state the co-ordinates of its vertices. (3 marks)
- c) Quadrilateral $A^{11}B^{11}C^{11}D^{11}$ is the image of $A^1B^1C^1D^1$ under enlargement centre origin and scale fact -1. On the same grid draw quadrilateral $A^{11}B^{11}C^{11}D^{11}$ and state the co-ordinates of its vertices. (3 marks)
- d) Quadrilateral $A^{11}B^{11}C^{11}D^{11}$ is the image of ABCD under a certain transformation T. Describe transformation T fully. (2 marks)

21. The table below is for the function $y = (3 - x)(x + 1)$

x	-3	-2	-1	0	1	2	3	4
y	-12				4			

- a) Complete the table (2 marks)
- b) Use the values from the table above to draw the graph of $y = (3 - x)(x + 1)$. Using the following scale; Horizontal axis : 2cm for 1 unit ; vertical axis : 1cm for 1 unit. (3 marks)
- c) Use your graph in part (b) above to solve the following quadratic equations:
- i) $-x^2 + 2x + 3 = 0$ (1 mark)
- ii) $-x^2 + x + 6 = 0$ (4 marks)

22. The heights (in cm) of some seedlings in a nursery are recorded in the table below.

Height (cm)	1.0 - 1.4	1.5 - 1.9	2.0 - 2.4	2.5 - 2.9
No. of seedlings	2	6	4	8

- a) Calculate the mean height of the seedlings in the nursery. (4 marks)
 b) Estimate the median height of the seedlings in the nursery. (3 marks)
 c) On the grid provided, draw a frequency polygon to represent the information. (3 marks)

23. A particle moves along a straight line such that its displacement s in metres is given by $s = t^3 - 4t^2 - 16t + 4$, where t is time in seconds. Find

- a) the displacement of the particle when $t = 4$ seconds. (2 marks)
 b) the velocity of the particle when $t = 4$ seconds. (3 marks)
 c) the value of t when the particle is momentarily at rest. (3 marks)
 d) the acceleration of the particle when $t = 2$ seconds. (2 marks)

24. A three digit number is such that the sum of its hundreds and ten digit is 10. When the number is divided by its hundreds digit, the quotient is 108. If the number is divided by the sum of all the digits, the quotient is 36. Find the number. (10 marks)