GUCHA SOUTH EVALUATION TEST (GSET)
Kenya Certificate of Secondary Education
MATHEMATICS
Paper 2
July/August 2016
Time: 2½ Hours

SECTION I : (50 MARKS)
Answer all questions from this section.

1. Use logarithm table to calculate the value of : (4 marks)

$$\sqrt[3]{\frac{0.7214 \times 20.37}{69.8}}$$

2. It is given that $\frac{8\sqrt{5}}{\sqrt{7}-\sqrt{5}} = a + b\sqrt{c}$. Find the values of a, b and c (3 marks)

3. In the figure below determine the length of the minor arc AC correct to 4 s.f where AB and BC are tangents to the circle whose centre is O at points A and C respectively. Also OB = 24cm, BC = 18cm and AC = 21cm. (4 marks)
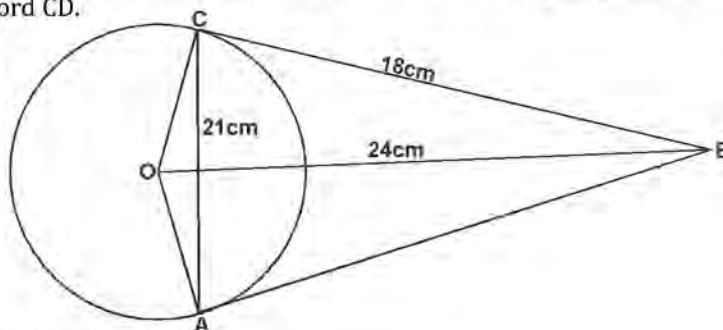
4. M = (2, 3, 4) and N = (7, 11, 14). Find vector MN in terms of i, j and k. Use this answer to find the distance from M to N correct to 2d.p. (3 marks)

5. Chords AB and CD in the figure shown below intersect externally at Q. If AB = 5cm, BQ = 6cm and DQ = 4cm. Calculate the length of chord CD. (2 marks)

6. Make b the subject of the formula (3 marks)
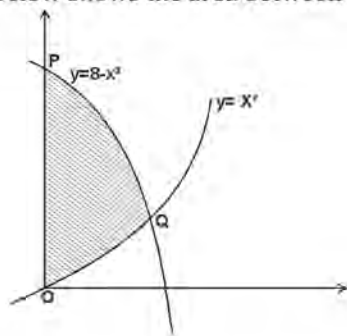
$$i = \sqrt{\frac{a-b}{1+ab}}$$

7. If x lies between 0° and 360° and sin x° = 0.2588. Find two values of x° (2 marks)

8. Calculate the percentage error involved in finding the value of 8.6 ÷ 3.4 (3 marks)

9. The diagram below shows the area between the curves y = x² and y = 8 - x² and the y-axis.

   a) Find the coordinates of points P and Q. (2 marks)
   b) Find the area of the shaded region. (5 marks)

10. Under a transformation whose matrix is $M = \begin{pmatrix} x-2 & -2 \\ x & x \end{pmatrix}$ a triangle whose area is 12.5cm² is mapped onto a triangle whose area is 50cm². Find the possible values of x. (3 marks)

11. Six men take 56 hours to pack 2240 parcels. Find the number of hours 5 men would take to pack 2500 parcels if they worked at the same rate. (2 marks)

12. Given that y partly varies as x and partly varies inversely as x². If y = 3 when x = 1 and y = 5 when x = ½, calculate the value of y when x = ³/₂ (4 marks)

13. Find the number of terms in the sequence

   3, 7, 11 ......, ..., ..., 83 (2 marks)

14. By completing the square solve $x^2 + 5x + 3 = 0$ (3 marks)

15. a) Expand and simplify $\left(1 + \dfrac{5}{x}\right)^6$ to the 4th term. (2 marks)

   b) Use your expansion in (a) above to approximate the value of $(3.5)^6$ (2 marks)

16. In form 3 a student is required to take either Geography or History but not both. In Etago division the total number of students taking Geography and history is not more than 300. Students taking History are more than the Geography ones but less than twice the ones taking Geography. Geography students are not less than 50 while History students are not more than 200. If x represents History students and y represents Geography students. Write down 5 inequalities representing the above information. (3 marks)

SECTION II : (50 MARKS)
Answer ONLY FIVE questions from this section.

17. The table below shows the rates of taxation in a certain year.

Monthly income in Kshs.	Tax rate in Ksh. each
Upto 9680	10%
from 9681 to 18800	15%
from 18801 to 27920	20%
from 27921 to 37040	25%
Over 37040	30%

In that year Opiyo was earning a basic salary of Ksh.21000 per month. In addition he was entitled to a house allowance of Ksh.12,000, commuter allowance of Ksh.3040 and a personal relief of Ksh.1056 per month.

   a) Calculate how much income tax Opiyo paid per month. (7 marks)
   b) Opiyo's other deductions per month were:
   Cooperative society contributions shs.2000
   Loan repayment shs.2500
   Calculate his net salary per month. (3 marks)

18. The position of two towns A and B are A(40°S, 28°E), B(40°S, 52°W). Find :
   a) The difference in longitude between A and B (2 marks)
   b) i) The distance from A to B along a circle of latitude in nautical miles. (2 marks)
   ii) In kilometres (2 marks)
   c) Town C is 4800km due North of town B. Find the latitude of town C. (Take radius of the earth to be 6370km) (4 marks)

19. Box M has 2 green balls and 3 yellow balls. Box N has 5 green balls and 4 yellow balls. A box is selected at random and two balls are drawn from it in succession without replacement.
   a) Draw a tree diagram to represent the information above. (2 marks)
   b) Find the probability that :
   i) they are both green (3 marks)
   ii) they are both yellow and from box N (2 marks)
   iii) the second ball is yellow (3 marks)

20. Taps X and Y can fill a tank in 3hrs and 5hrs respectively, while tap Z can empty the same tank in 4 hours.
   a) If tap Z is closed, how long will it take taps X and Y to fill the tank ? (5 marks)
   b) Calculate the time it will take to fill the tank when the three taps X, Y and X are left open and running ? (5 marks)

21. The table below shows exam marks obtained by 40 pupils.

8	33	45	45	19
11	34	43	29	28
26	16	22	38	39
37	17	25	34	41
22	26	33	27	40
41	21	32	17	22
18	25	27	35	40
23	36	30	44	42

   a) Make a frequency distribution table using a class interval of 10 with marks starting from 1 - 10. (2 marks)
   b) From the frequency distribution table in (a) above calculate :
   i) the standard deviation using assumed mean of 25.5 (4 marks)

ii) the interquartile range (4 marks)

22. In triangle OAB, M and N are points on OA and OB respectively such that OM : MA = 2 : 3 and ON : NB = 2 : 1. AN and BM intersect at X as shown in the diagram below.
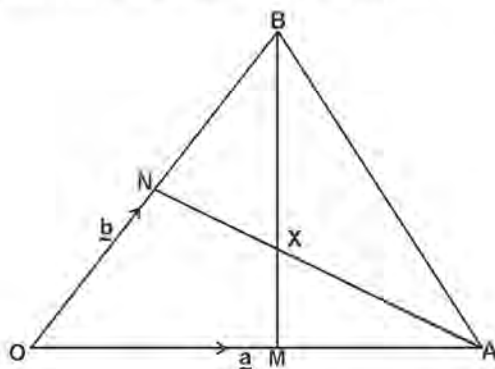
a) Given that OA = a and OB = b. Express in terms of a or b.
   i) BM (1 mark)
   ii) AN (1 mark)
b) Taking BX = tBM and AX = hAN. Where t and h are scalars, find two expressions for OX, hence find the values of h and t. (8 marks)

23. An ant moves along a straight line so that t seconds after observation is commenced, its distance in metres from a fixed point O in the line is given by $h = 12 - 6t + 2t^3$. Calculate :
a) The distance after 2 seconds (2 marks)
b) The speed of the ant when t = 3 seconds. (3 marks)
c) The acceleration of the ant when t = 2 seconds (3 marks)
d) The value of t for which the ant is momentarily at rest. (2 marks)

24. a) Copy and complete the following table for $y = 5 \sin (2x + 30)$ for $0° \leq x \leq 360°$

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
y		5.0			-5.0			5.0		-2.5			2.5

b) On the grid provided, draw the graph of $y = 5 \sin (2x + 30)$. Use a scale of 1cm to represent 30° on the x-axis and 1cm to represent 1 unit on the y-axis. (3 marks)
c) State the amplitude and work out the period of the wave. (2 marks)
d) Use your graph above to find the range of values of x for which $5 \sin(2x + 30) < 1$ (3 marks)