GUCHA SOUTH EVALUATION TEST (GSET)
Kenya Certificate of Secondary Education
MATHEMATICS
Paper 1
July/August 2016
Time: 2½ Hours

SECTION I : (50 MARKS)
Attempt all questio ns in this section.

1. Evaluate : (3 marks)

$$\frac{\sqrt{\frac{1}{4}}\text{of}\,3\frac{1}{2}+\frac{3}{2}\left(\frac{5}{2}-\frac{2}{3}\right)}{\frac{3}{4}\text{of}\,2\frac{1}{2}\div\frac{1}{4}}$$

2. Simplify the expression (3 marks)

$$\frac{4x^2 - y^2}{2x^2 - 3xy - 2y^2}$$

3. The prime numbers less than 10 are multiplied to form a number
a) Write down the number formed. (2 marks)
b) State the total value of the first digit in the number formed in 2(a) above. (1 mark)

4. Joyce exchanged Ksh.600,000 to Sterling pounds. After settling the bills worth £1200, she changed the balance to Euros. She then purchased goods worthy 200 Euros. Using the exchange rates below, calculate her balance in Kenyan shillings. (4 marks)

	Buying (Ksh)	Selling (Ksh)
1 Sterling pound	114.20	114.50
1 Euro	101.20	101.30

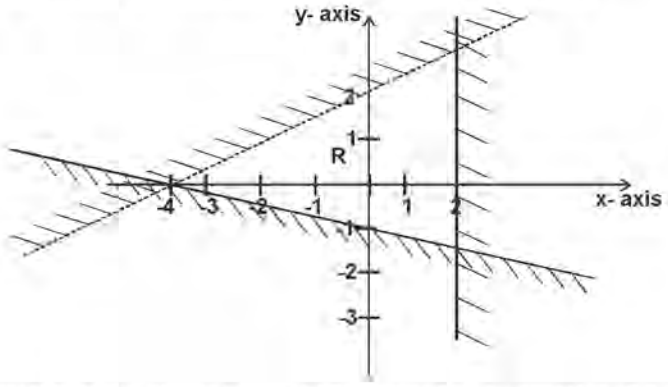
5. Solve for x in the following equation (3 marks)

$$9^x\,(27^{x-1}) = \tan 45^o$$

6. If OA = 2i - 4k and OB = -2i + j - k. Find |AB| (3 marks)

7. Under an enlargement with scale factor -3, the point P(3, 6) is mapped onto $P^1(7, 18)$. Find the centre of enlargement hence image of a point Q(1, 1) under the same enlargement. (4 marks)

8. Form the three inequalities that satisfy the given region R. (3 marks)

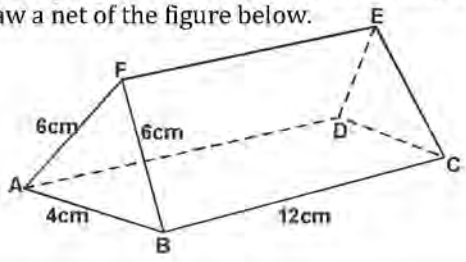


9. The interior angle of a polygon is 90° more than its exterior angle. Find the number of sides of the polygon. (3 marks)

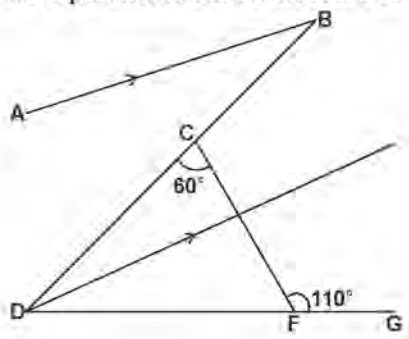
10. An 890kg culvert is made of a hollow cylindrical material with outer radius of 76cm and interval radius of64cm and length 3m. Determine the density of the material used in its construction in kg/m^3 correct to 1 decimal place. (Take p = 3.142) (3 marks)

11. A van leaves town X at 6.45a.m and travels towards town Y 400km away at an average speed of 80km/hr at 8.00a.m, a truck left Y for X at an average speed of 60km/hr. At what time will the two vehicles meet. (3 marks)

12. Using a scale of 1 : 2 draw a net of the figure below. (3 marks)



13. In the figure below AB is parallel to DE. DE bisects ĐBDG and ĐDCF = 60° and ĐCFG = 110°



Find
a) ∠CDF (2 marks)
b) ∠ABD (1 mark)

14. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number. (3 marks)

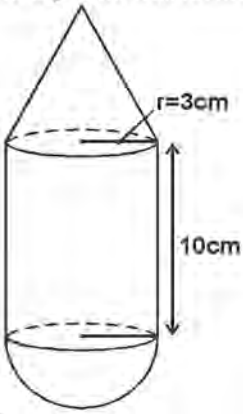
15. The line $-nx + 2y = 3$ passes through the point (-3, 1). Calculate :
i) The angle the line makes with x-axis. (2 marks)
ii) The x-intercept of the line (1 mark)

16. Determine the equation of normal to the curve $y = x^2 - 3x + 2$ at a poit (-2, 3) giving your answer in the form $ax + by = c$ (3 marks)

SECTION II : (50 MARKS)
Attempt only five questions

17. Every Saturday Alex drives a distance of 80km on a bearing of 074° to pick up his brother John to go to church. The church is 75km from John's house on a bearing of S50°E. After church they drive a distance of 100km on a bearing of 260° to check on their father before Alex drives to John's home to drop him off then proceed to his house.
a) Using a scale of 1cm to represent 10km show the relative positions of these places. (4 marks)
b) Use your diagram to determine
i) the true bearing of Alex's home from their father's house. (1 mark)
ii) the compass bearing of the father's home from John's home (1 mark)
iii) the distance between John's home and the father's home (2 marks)
iv) the total distance Alex travels every Saturday. (2 marks)

18. In the figure below the tap cone was formed from a sector of area 42pcm²



Calculate in terms of p
a) The total surface area of the shape (4 marks)
b) The volume of the shape (6 marks)

19. The British government hired two planes to airlift football fans to South Africa for the world cup tournament. Each plane took 10½ hours to reach its destination. Boeing 747 has carrying capacity of 300 people and consumes fuel at 120 litres per minutes. It makes 5 strips at full capacity. Boeing 740 has carrying capacity of 140 people and consumes fuel at 200 litres per minutes. It makes 8 strips at full capacity. If the government sponsored the fans one way at the cost of 800 dollars per fan, calculate :
a) The total number of fans airlifted to South Africa. (2 marks)
b) The total cost of fuel used if one litre cost 0.3 dollars. (4 marks)
c) The total collection in dollars made by each plane. (2 marks)
c) The net profit made by each plane (2 marks)

20. A quadrilateral ABCD has vertices A(3, 7), B(5, 5), C(3, 1) and D(1, 5).

a) On the grid provided plot the quadrilateral ABCD (2 marks)

b) $A^1B^1C^1D^1$ is the image of ABCD under a translation $T\begin{pmatrix}3\\-1\end{pmatrix}$. Plot $A^1B^1C^1D^1$ and state its coordinates. (2 marks)

c) Plot $A^{11}B^{11}C^{11}D^{11}$ the image of $A^1B^1C^1D^1$ after a rotation about the origin through a positive quarter turn. State its coordinates. (3 marks)

d) $A^{111}B^{111}C^{111}D^{111}$ is the image of $A^{11}B^{11}C^{11}D^{11}$ after a reflection on the line y = 0. Plot $A^{111}B^{111}C^{111}D^{111}$ and state its coordinates. (3 marks)

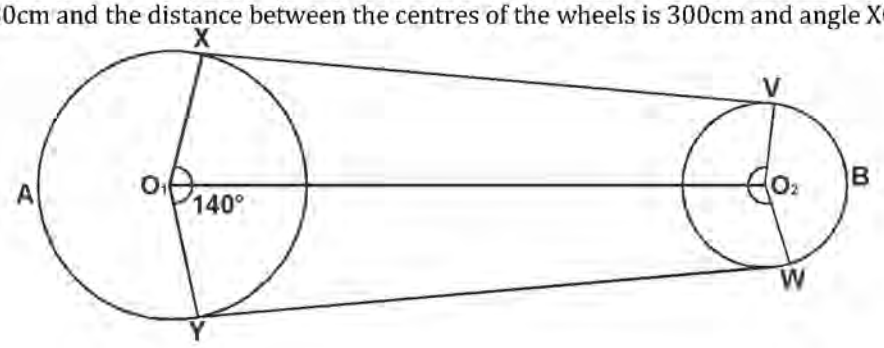
21. Using a ruler and pair of compass only construct

a) A line PQ 8cm long. On the line construct triangle PQR such that ĐQPR = 75° and line PR = 7cm. Measure line QR.(4 marks)

b) Construct a circumcircle of triangle PQR and measure its radius. (3 marks)

c) Calculate the difference in area between the circle and the triangle. (3 marks)

22. The figure below shows a pulley system where a conveyor belt is tied round two wheels. The radius of the larger wheel is 180cm and the distance between the centres of the wheels is 300cm and angle $XO_1Y = 140°$. ($p = {}^{22}/_{7}$)



Determine :

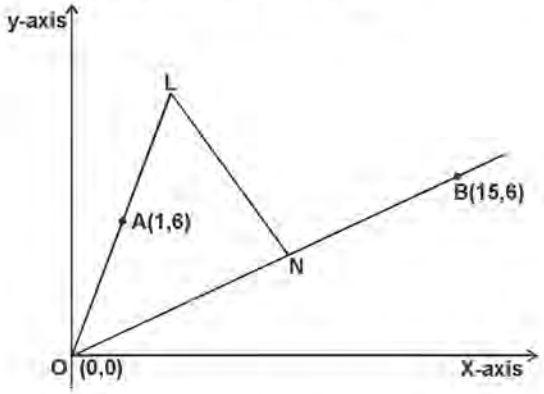
a) Length XV (2 marks)

b) VBW (4 marks)

c) XAY (2 marks)

d) Total length of conveyor belt (2 marks)

23. In the diagram below, the coordinates of points A and B are (1, 6) and (15, 6) respectively. Point N is on OB such that 3ON = 2OB. Line OA is produced to L such that OL = 3OA.



a) Find vector LN (2 marks)

b) Given that a point M is on LN such that LM : MN = 3 : 4 find the coordinates of M. (2 marks)

c) If line OM is produced to T such that OM : MT = 6 : 1.

i) Find the position vector of T (2 marks)

ii) Show that points L, T and B are collinear (4 marks)

24. a) Complete the table below for the function $y = x^2 + 3$ (2 marks)

x	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
y	4		7			15.25	19		27		39

b) Use the mid-ordinate rule with five strips to estimate the area bounded by the curve $y = x^2 + 3$, the line x = 1 and the line x = 6 (2 marks)

c) Use integration to find the exact area in (b) above. (3 marks)

d) Calculate the percentage error arising from the use of mid-ordinate rule. (3 marks)