REVISION EXERCISES

BURETI SUB-COUNTY JOINT EVALUATION 2016

Kenya Certificate of Secondary Education

121/1

MATHEMATICS

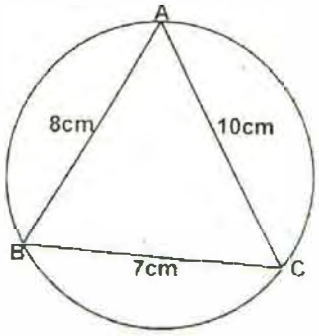
Paper 1

Time : 2 ½ Hours

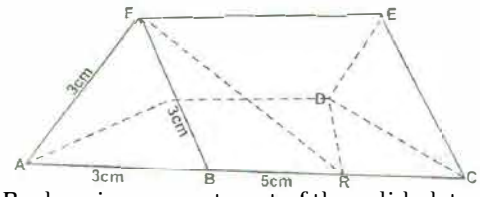
SECTION 1 (50 MARKS)

Answer all the questions in this section in the spaces provided

1. Without using a calculator or tables, find the value of y given that: (2 marks)
   $y = \frac{(a+b)(x-c)^2}{(a-x)(a-c)}$ a =5, b = 6, x = 3, c = 2
2. Three toilets are designed to flush automatically at intervals of 6, 3 and 12 minutes. They all flush at 6.30 am. What time will they next together? (2 marks)
3. Mwambala hired a lorry and a pick up to transport bags of maize. The pick-up 1 ½ times as many trips as the lorry. For one trip, its costs him Sh. 2500 to hire a pick-up and Sh. 4500 to hire a lorry. If he paid a total of Sh. 16,500 for transport. Determine the number trips each vehicle made. (3 marks)
4. The perimeter of a right-angled is 30cm and the hypotenuse is 13cm, find the length of the other two sides. Hence calculate the area of the triangle. (4 marks)
5. Use logarithm to evaluate. (4 marks)
   $\sqrt{\frac{2.53^2 \times 83.45}{484^2}}$
6. Solve $4 \leq 3x - 2 < 9 + x$ hence list the integral values that satisfies the inequality. (3 marks)
7. Simplify the expression. (3 marks)
   $\frac{2x^2 - 3xy - 2y^2}{4x^2 - y^2} \div \frac{2x+y}{2x-y}$
8. The figure below shows a triangle ABC inscribed in a circle. AC = 10cm, BC = 7cm and AB = 8cm.

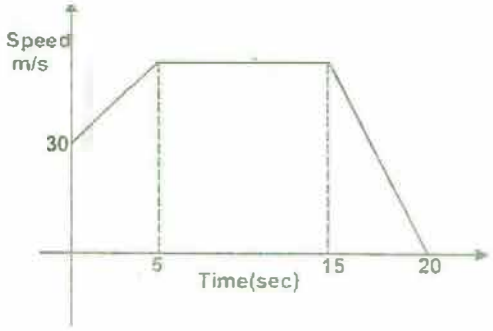


   (a) Find the size of angle BAC. (2 marks)
   (b) Calculate the radius of the circle correct to 1 decimal place. $\pi = 3.142$ (2 marks)
9. A plane leaves an airstrip L and flies on a bearing of 040^0 to airstrip M, 500km away. The bearing of N is 350^0. By scale drawing, determine the distance between airstrips M and N. (4 marks)
10. A pentagon has angles $(2x + 20^0)$, $(x + 50^0)$, $(3x - 10^0)$, $(2x + 40^0)$ and $(x - 10^0)$. Calculate the sizes of all the external of this pentagon. (3 marks)
11. Below is a triangle prism ABCDEF. A find string stretch from F to D through R or BC.



    By drawing accurate net of the solid, determine the short distance possible length of the string. (3 marks)
12. A Kenyan businessman bought goods from Japan worth Sh. 2,950, 000 Japanese Yen. On arrival in Kenya, custom duty of 20% was charged on the value of the goods. If the exchange rates were as follows; (3 marks)
    1 US dollar = 118.0 Japanese Yen
    1 US dollar = 76 Kenya shillings
    Calculate the duty paid in Kenya shillings

13. The figure below shows the motion of a particle in 20 seconds. The particle starts off at a speed of 30m/s and accelerates at 4m/s^2 for 5 seconds. Calculate the total distance covered by the particle in 20 seconds. (4 marks)



14. Estimate the area bounded by the survey $y = \frac{1}{2}x^2 + 5$, the x-axis, the line $x = 1$ and $x = 5$ using trapezium rule with 4 trapezia.
(3 marks)

15. Determine the inverse, T^{-1} of the matrix
$T = \begin{pmatrix} 1 & 2 \\ 1 & -1 \end{pmatrix}$
Hence find the co-ordinates to the point at which the two lines $x + 2y = 7$ and $x - y =$ intersect. (3 marks)

16. Find the value of m in the following equation. (3 marks)
$\left(\frac{1}{27}\right)^m \times (81)^{-1} = 243$

SECTION II (50 MARKS)

Answer ANY 5 questions in this section in the spaces provided

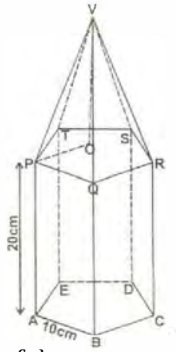
17. The co-ordinates of the points P and Q are (1,-2) and (4, 10) respectively. A point T divides the line. PQ in the ratio 2:1
    (a) Determine the co-ordinates of T. (2 marks)
    (b) (i) Find the gradient of a line perpendicular to PQ. (3 marks)
    (ii) Hence determine the equation of the line perpendicular to PQ and passing through T. In the form $ax + by + c = 0$
    (3 marks)
    (iii) If the line meets the y-axis at R, calculate the length TR, correct to 3 significant figures. (2 marks)

18. The following are masses of 25 students in form 4 class.
    49, 51, 50, 60, 55, 45, 56, 51, 58, 59, 40, 54, 44, 44, 42, 59, 62, 46, 43, 57, 56, 52, 43, 41
    (a) Prepare a frequency distribution table with a uniform class size starting with the class 40 – 43. (4 marks)
    (b) Estimate the median mass. (3 marks)
    (c) Draw a histogram for the data. (3 marks)

19. Line AB drawn below is a side of a triangle ABC.

    (a) Using a pair of compasses and ruler only construct;
    (i) triangle ABC in which BC = 10cm and $\angle CAB = 90^0$. (2 marks)
    (ii) a rhombus BCDE such that $\angle CBE = 120^0$. (2 marks)
    (iii) a perpendicular from F, the point of intersection of diagonals of the rhombus, to meet BE at G. Measure FG;
    (2 marks)
    (iv) a circle to touch all the sides of the rhombus. (1 mark)

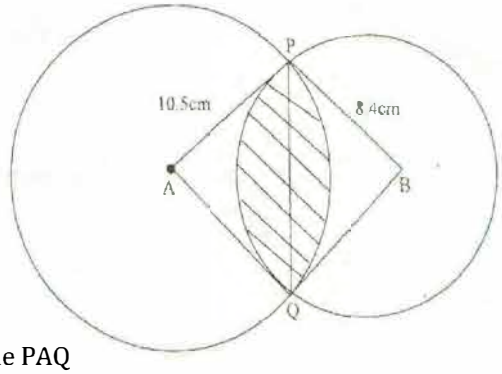
20. The figure below shows a solid consisting of a right pyramid and a pentagonal prism.



Given that the height of the pentagon prism is 20cm while the height of the right pyramid $V_0 = 36$cm. If PO = 15cm. Calculate
(a) the area the base correct to 2 decimal places. (2 marks)

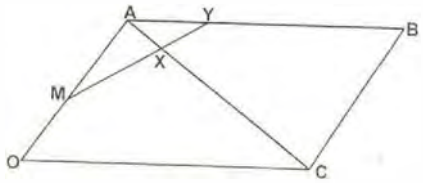
(b) the length of AV (1 mark)
(c) the surface area of the solid correct to 2 decimal places. (4 marks)
(d) the volume of the solid correct to 4 significant figures (3 marks)

21. The figure below shows two circles of radii 10.5cm and 8.4cm with centres A and B respectively. The common chord PQ = 9cm. (Take $\pi = 3.142$)



(a) Calculate angle PAQ (2 marks)
(b) Calculate angle PBQ. (2 marks)
(c) Calculate the area of the shaded part. (6 marks)

22. OABCD is a parallelogram. M is the mid-point of OA and $Ax = \frac{2}{3}AC$, OA = a and OC = c



(a) Express the following in terms of vectors a and c
(i) AC (1 mark)
(ii) AX (1 mark)
(iii) MX (2 marks)
(b) If AY = hAB and MY = kMX. Express MY into two different ways hence find the scalars h and k (4 marks)
(c) Find the ratio AY : YB (2 marks)

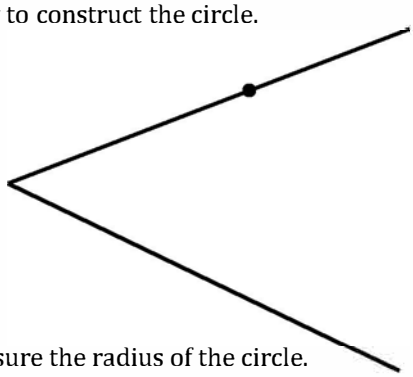
23. A group of youth planned to open a computer business. They planned to buy some computers for a total of KSh. 1,800,000. Before they could buy the computers the price per unit was reduced by Sh. 4000. This reduction in price enabled the retailer to buy five more computers using the same amount of money as originally planned. Let x represent the number of computers purchased.
(a) Write down an expression in terms of x for the price of each computer.
(i) before the price was reduced. (1 mark)
(ii) after the price was reduced. (1 mark)
(b) Use the expressions in (a) above to determine the number of computers that youth group purchased. (4 marks)
(c) Two computers purchased got damaged while in store, the rest were sold and the youth group made 20% profit. Calculate the profit made by the youth group on each computer sold. (4 marks)

24. The equation of a curve is given by $y = x^3 + 4x^2 - 3x$
(a) Find the value of y when x = 1. (1 mark)
(b) Determine the stationary points of the curve. (5 marks)
(c) Find the equation of the normal to the curve at x = 1. (4 marks)

BURETI SUB-COUNTY JOINT EVALUATION 2016
Kenya Certificate of Secondary Education
121/2
MATHEMATICS
Paper 2
Time : 2 ½ Hours

SECTION 1 (50 MARKS)
Answer all the questions in this section in the spaces provided

1. Five people can build 3 huts in 21 days. Find the number of people, working at the same rate that will build 6 similar huts in 15 days. (2 marks)
2. In a Geometric Progression (G.P) the 4^{th} term is 24 and 6^{th} term is 96.
   Determine
   (a) the common ratio of the G.P (2 marks)
   (b) the first term of the G.P (2 marks)
3. Solve for x in the equation. (3 marks)
   $9^{(22x+2)} - 41(2^x) + 8 = 0$
4. (a) In the figure below, lines AB and AC represent tangents to a circle at B and C. Use a pair of compasses and a ruler only to construct the circle. (2 marks)



   (b) Measure the radius of the circle. (1 mark)
5. Three types of flour costing Sh. 203, Sh. 197 per kg are mixed in the ratio 2:5:k respectively. Find the value of k, if the mixture was sold at KSh 221 per kg giving of 30% profit. (3 marks)
6. Make b the subject of the formula in; (3 marks)
   $t = \sqrt{\frac{a-b}{a+ab}}$
7. (i) Expand and simplify $(2 - x)^5$ (2 marks)
   (ii) Use the first three terms to approximate the value of $(1.6)^5$ as a mixed fraction. (2 marks)
8. Solve the equation $2\cos 2x - \sin x - 1 = 0$, for $-180^0 \leq x \leq 180^0$. (3 marks)
9. Evaluate $\frac{\sqrt{2}+1}{\sqrt{3}+\sqrt{5}}$ leaving your answer in its simplest form. (3 marks)
10. A bus left Kisumu for Nairobi and travelled at a speed of 80km/h. After 30 minutes, a car travelling a speed of 100km/h left Kisumu for Nairobi and followed the same route of the bus. Determine the distance from Kisumu covered by the car time it caught up with the bus. (3 marks)
11. The probability that a certain student passes her examination is $\frac{4}{5}$. If she passes the probability that she does not get a job is $\frac{3}{5}$. If she does not pass the probability that she gets a job is $\frac{1}{4}$. Find the probability that she does not get a job. (3 marks)
12. Use the mid-ordinate rule, with strips of 1 unit width to estimate the area bonded by the curve $y = \frac{1}{x+1}$, the lines $x = 0$ and $x = 5$. (3 marks)
13. The value of a machine depreciates every year by 10% of its value at the beginning of the year. Its value when new is Sh. 65,000. Find its value to the nearest shillings after 8 years. (3 marks)
14. Given that $x = 2i + j - k$, $y = 3i + 4j - k$ and $z = -5i + 5j + 2k$ that $p = 3x - y + z$. Find the magnitude of vector p to 3 significant figures. (3 marks)
15. Find the value of y given that the matrix $\begin{pmatrix} y+7 & 4 \\ -3 & x \end{pmatrix}$ is singular. (3 marks)
16. Find the equation of the normal to the curve $y = 2x3 + 5x2 - x - 6$ at the point where $x = 1$. (4 marks)

SECTION II (50 MARKS)

Answer ANY 5 questions in this section in the spaces provided.

17. Mr. Mitei, a civil servant earns a basic salary of KSh. 40,300, house allowance of KSh. 12,000 and medical allowance of KSh 3,800 every month. He claims a personal relief of Sh. 1056 per month and life insurance relief of 5% of the premium paid per month.

Monthly taxable income	Rate in KSh/pound
1 – 8800	2
8801 – 16800	3
16801 – 24800	5
24801 – 36800	7
36801 – 48800	9
Over 48800	10

(a) Calculate Mr. Mitei's annual income in K£ per annum. (2 marks)
(b) The tax paid by Mr. Mitei every month. (4 marks)
(c) If further deductions are made every month from his salary.
WCPS of 2% of basic salary
Life insurance premium of Sh. 4600
Sacco loan repayment of Sh. 14200
Calculate
(i) Total deductions (2 marks)
(ii) His net pay for every month. (2 marks)

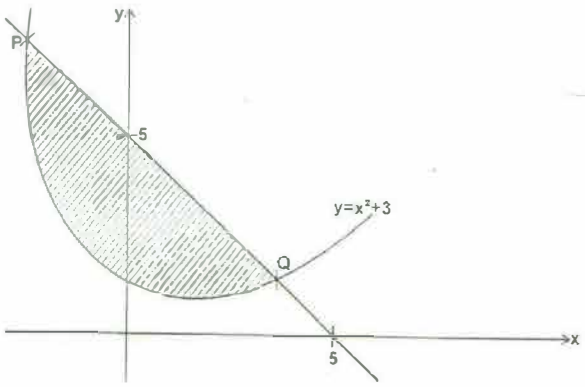
18. Two variables A and B are related by the equations $A = KB^n$. The table below shows the corresponding values of A and B from the relation.

A	1.2	1.5	2.0	2.5	3.5	4.5
B	1.57	2.26	3.39			

(a) Determine a linear equation connecting A and B. (1 mark)
(b) Draw a suitable straight line graph to represent the relationship above. (5 marks)
(c) Determine the values of k and n. (3 marks)
(d) The value of B when A = 4.32 (1 mark)

19. A trader makes two types of chairs, ordinary and special chairs. The cost of each ordinary chair is Sh. 300, while each special chair is Sh 700. He is prepared to spend not more than Sh. 21,000. It is not viable for him to make less than 20 chairs. Ordinary chairs must be less than twice the special chairs but more than 15. By taking the number of ordinary chairs as x and special chairs as y.
(a) Write down all inequalities in x and y. (4 marks)
(b) Represent the inequalities on the grid provided. (4 marks)
(c) He sells a special chair at a profit of Sh. 140 and ordinary chair at a profit of Sh. 120; Determine the maximum possible profit. (2 marks)

20. The sketch below represents the curve $y = x^2 + 3$ and a straight line PQ which cuts the x-axis and the y – axis at (5 ,0) and (5,0) respectively. The line intersects the curve at point P and Q as shown.



(a) Find the equation of the line in the form $y = mx + c$ (2 marks)
(b) Determine the co-ordinates of P and Q. (3 marks)
(c) Calculate the area of the shaded region. (5 marks)

21. (a) Complete the table given below by filling the blank spaces.

x^0	0^0	15^0	30^0	45^0	60^0	75^0	90^0	105^0	120^0	135^0	150^0	165^0	180^0
4 Cos 2x	4.00		2.00	0	-2.00	-3.46	-4.00	-3.46	-2.00	0	2.00		4.00
2 Sin (2 x + 30^0)	1.00	1.73	2.00	1.73		0	-1.00	-1.73	-2.00			0	1.00

(b) On the grid provided below draw on the same axes, the graph of $y = 4 \text{ Cos } 2x$ and $y = 2 \text{ Sin } (2x + 30^0)$ for $0^0 \leq x$ 180^0.

Take the scale, 1cm for 15^0 on x-axis and 2cm for 1 unit on the y – axis. (5 marks)

(c)From your graph;

(i) state the amplitude of $y = 4 \text{ Cos } 2x$. (1 mark)

(ii) find the period of $y = 2 \text{ Sin } (2x + 30^0)$

(iii) Use your graph to solve, $4 \text{ Cos } 2x - 2\text{Sin } (2x + 30^0) = 0$

22. Given that $y = (1 + x)(5 - 2x)$

(a) Copy and complete the table below.

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5
y	-9	-4		3					3			-9

(b) Draw the graph of $y = (1 + x)(5 - 2x)$ on the grid provided. (3 marks)

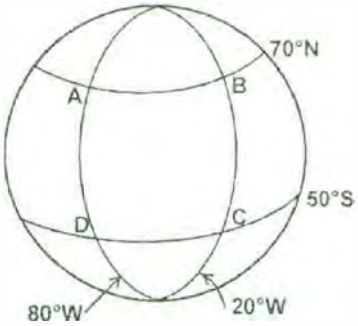
(c) Find the line of symmetry of the curve $y = (1 + x)(5 - 2x)$ (1 mark)

(d) By drawing suitable straight lines use your graph to solve

(i) $y = (1 + x)(5 - 2x) = -2$

(ii) $(1 + x)(5 - 2x) = (1 - 2x)$

23. The diagram below shows the positions of A, B, C and D on the earth's surface.



(a) State the position of A. (1 mark)

(b) Calculate in kilometres 9 the distance between A and C via B to 2dp. (Take $\pi = \frac{22}{7}$ and radius of earth to be 6370km)

(c) A plane travels due North from A for a distance of 4200nm. Give the coordinates of its new position after covering this distance. (3 marks)

(d) State the local time at D if the time at C is 8.00 am on Monday. (2 marks)

24. (a) PQRS is a quadrilateral with vertices P (1,4), Q(2,1), R(2,3) and S(6,4). On the grid provided, plot the quadrilateral. (1mark)

(b) Draw $P^IQ^IR^IS^I$ the image of PQRS under a positive quarter turn about the origin and write down the co-ordinates. (3 marks)

(c) Draw $P^{II}Q^{II}R^{II}S^{II}$ the image of $P^IQ^IR^IS^I$ under transformation whose matrix is $\begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ and write down its co-ordinator. (1marks)

(d) Determine the single matrix of transformation that maps PQRS onto $P^{II}Q^{II}R^{II}S^{II}$. (3 marks)