NAME:…… **INDEX**……...……

SCHOOL:……...

121 / 2
MATHEMATICS
PAPER 2
JULY / AUGUST 2007
2 ½ HOURS

BOMET DISTRICT MOCK EXAMINATION
Kenya Certificate Of Secondary Education 2007

121 / 2
MATHEMATICS
PAPER 2
JULY / AUGUST 2007

INSTRUCTIONS TO CANDIDATES

1. *Write your name and index number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* ***Section I and Section II.***
3. *Answer* ***all*** *questions in* ***section I*** *and* ***any five questions*** *from* ***Section II.***
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. *Non- programmable silent electronic calculators* ***and KNEC*** *Mathematical tables may be used, except where stated otherwise.*

For Examiner's Use Only

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

SECTION II

17	18	19	20	21	22	23	24	Total

Grand Total

This paper consists of 16 pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

SECTION I (50 Marks)

Answer all the questions in this section.

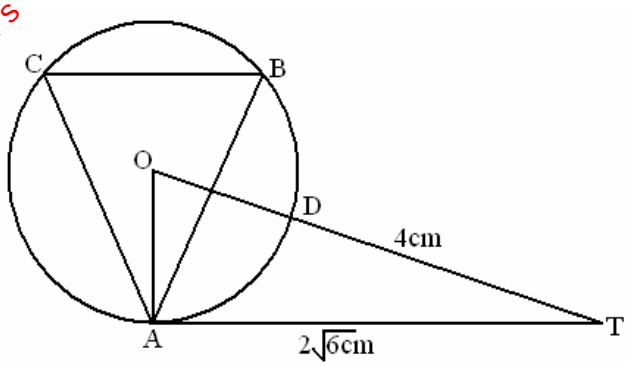
1. The expression $px^2 + 12x + 4p + px$, where p is a constant, is a perfect square. **Find** the value of p. (3mks)

2. If X = 33.5 and y = 33.1 both being correct to one decimal place, **calculate** the maximum possible percentage error in X-y. (3mks)

3. Given that $Sin^2 x + Cos^2 x = 1$, **solve** for x in the equation

   $Cos\, x + Sin\, x = 1 \;\; for \;\; -180^0 \leq x \leq 180^0$ (3mks)

4.



In the figure above, O is the centre of the circle and AT is a tangent to the circle at A. AT = $2\sqrt{6}$ cm and DT = 4cm. **Determine** the value of angle BAT. (3mks)

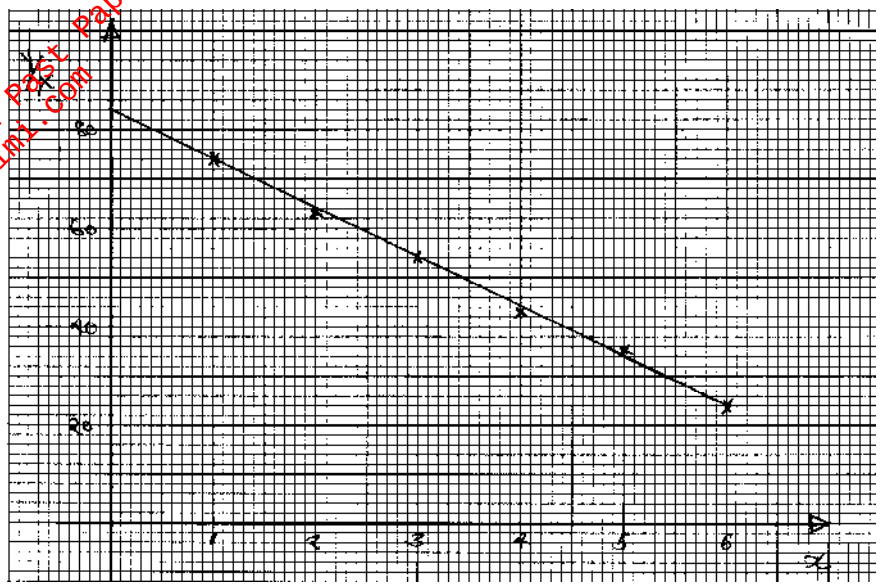
5. The cost per head for catering for a party is partly constant and partly varies inversely as the number of people expected. The cost per head for a party of 100 people is Sh.1,860 and that for 180 people is sh. 1,060. **Find** the cost per head for 200 people. (3mks)

6. The figure below shows a triangular garden in which $\angle ABC = \angle ANB = 90^0$, AN = x m, NC = 4m, $\angle BAN = 30^0$ and $\angle BCN = 60^0$. Without using mathematical tables or a calculator, **find** the value of length x leaving your answer in a simplified form. (3mks)

7. (a) **Expand** and **simplify** the expression $\left(4x - \frac{y}{2}\right)^5$ up to the third term. (2mks)

(b) Hence use the expansion in (a) above to **approximate** the value of $(39.6)^5$ correct to 3 significant figures. (2mks)

8. The graph below shows the linear relation between two variables X and Y connected by the expression $Y = pX^2 + qX$.



Using the graph, **estimate**, to the nearest whole number, the value of

(i) P (2mks)

(ii) q (1mk)

9. Use logarithms tables to **evaluate**. $\left(\frac{130.9}{27.68 \times 100.9}\right)^{2/3}$ (4mks)

10. A car valued at Ksh. 600,000 depreciates by 20% in the first year and 10% in the second year. A uniform rate would have depreciated the car in the two years. **Calculate** this uniform rate to 2dp. (3mks)

11. The difference between the second and fourth terms of an arithmetic sequence is 3. If the product of the first and the fourth term is 34, **calculate** the value of the first term. (3mks)

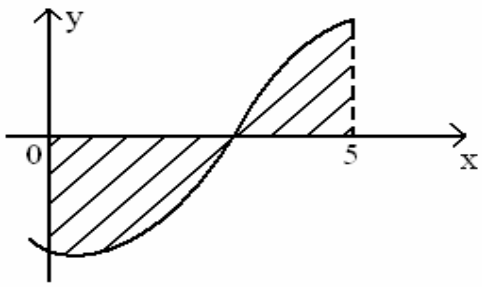
12. **Make** x the subject of the formular: $\sqrt{x} = \frac{S - 5a}{6x}$ (3mks)

13. Five men working six hours a day take eight days to fill a trench. **How** long does it take three men working eight hours a day to complete the same trench? (3mks)

14. **Draw** using a protractor and ruler only a rectangle ABCD of side 8cm by 3cm. On CD mark two points, P_1 and P_2, such that angle AP_1B = angle $AP_2B = 90^0$. Measure P_1P_2. (3mks)

15. Differentiate $y = 5x - 8x^2 + x^3$. Hence, or otherwise, **determine** the turning points for the curve $y = 5x - 8x^2 + x^3$. (3mks)

16. The sketch below represents the graph for $y= x^2 - x - 6$. Use the curve and five trapezia to estimate the area bounded by the x – axis, y – axis, x = 0 and x = 5. (3mks)



SECTION II (50 Marks)

Answer any five questions from this section.

17. Two tanks of equal volume are connected in such a way that one tank can be filled by pipe A in 1hour 20minutes. Pipe B can drain one tank in 3hours 36minutes but pipe C alone can drain both tanks in 9 hours. **Calculate**:

(a) The fraction of one tank that can be filled by pipe A in one hour. (2mks)

(b) The fraction of one tank that can be drained by both pipes B and C in one hour. (4mks)

(c) Pipe A closes automatically once both tanks are filled. Assuming that initially both tanks are empty and all pipes opened at once, calculate how long it takes before pipe A closes. (4mks)

18. An examination involves a written test and a practical test. The probability that a candidate passes the written test is $\frac{6}{11}$. If the candidate passes the written test, then the probability of passing the practical test is $\frac{3}{5}$, otherwise it would be $\frac{2}{7}$

(a) **Illustrate** this information on a tree diagram. (2mks)

(b) **Determine** the probability that a candidate is awarded

(i) Credit for passing both tests. (2mks)

(ii) Pass for passing the written test. (2mks)

(iii) Retake for passing one test. (2mks)

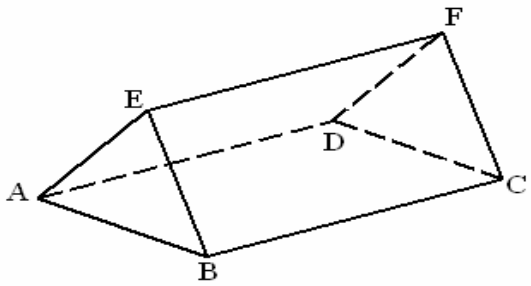
(iv) Fail for not passing the written test. (2mks)

19. (a) Conctruct triangle PQR with PQ = 7.2cm, QR = 6.5cm and angle PQR = 48^0 (3mks)

(b) The locus L_1, of points equidistant from P and Q, and locus , L_2 of points equidistant from P and R, meet at M. Locate M and measure QM (4mks)

(c) A point, x, moves within triangle PQR such that QX ≥ QM. Shade and label the locus of X.(3mks)

20. The figure below represents a prism with a cross section of an equilateral triangle of side 8cm and length 12cm, as shown below.



(a) Draw the net of the prism ABCDEF (2mks)

(b) **Calculate** the angle between the plane ABCD and the line BF. (2mks)

(c) M is the midpoint of EF. **Calculate**

(i) The length BM (2mks)

(ii) The perimeter of triangle BMD. (2mks)

(d) **Calculate** the angle between the plane ABM and the base plane ABCD. (2mks)

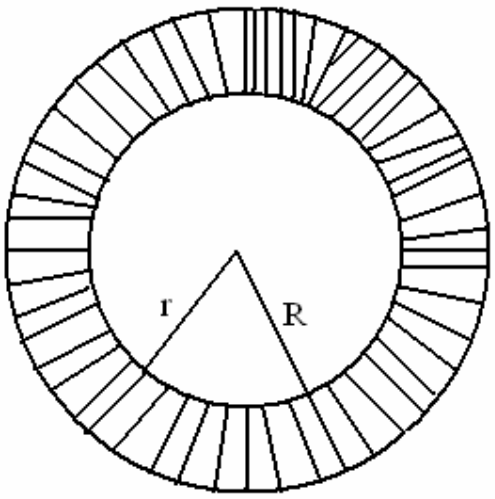
21. Give the matrix $A = \begin{pmatrix} -1 & -4 \\ 1 & 3 \end{pmatrix}$

(a) (i) **Calculate** A^2 and A^3 (2mks)

(ii) **Find** the values of the constants p and q for which $A^2 = pA + qI$ where I is the identity matrix. (3mks)

(iii) The triangle ABC maps onto $A^1B^1C^1$ under the transformation represented by matrix A. **Find** the area of triangle ABC if the area of triangle $A^1B^1C^1$ is $21cm^2$ (3mks)

(b) The figure shows two concentric circles such that the ratio of their radii is 1: 3. If the area of the shaded region is 78.4 square units, **calculate** the area of the larger circle. (2mks)



22. A certain uniform supplier is required to supply two types of shirts: one for girls labelled G and the other for boys labelled B. The total number of shirts must not be more than 400. He has to supply more of type G than of type B. However the number of type G shirts must not be more than 300 and the number of type B shirts must not be less than 80. by taking x to be the number of type G shirts and y the number of type B shirts,

(a) **Write down** in terms of x and y all the inequalities representing the information above. (3mks)

(b) On the grid provided in the next page **draw** the inequalities and shade the unwanted regions. (4mks)

(c) Given that type G costs Shs. 500 per shirt and type B costs Shs. 300 per shirt.

(i) Use the graph in (b) above to **determine** the number of shirts of each type that should be made to maximize profit. (1mk)

(ii) **Calculate** the maximum possible profit. (2mks)

graph

23. (a) The equation of a curve is given by $y = x^3 + x^2 - 6x$. **Show** that the value of x at the minimum turning point is $\frac{-1+\sqrt{19}}{3}$ (3mks)

(b) The displacement x metres of a particle moving along a straight line after t seconds is given by $x = 4t + 2t^2 - t^3$

(i) **Find** its initial acceleration (2mks)

(ii) **Calculate** the time when the particle was momentarily at rest. (2mks)

(c) (i) **Find** the values of x where the curve $y = x^2(x - 2)$ crosses the x-axis. (1mk)

(ii) Hence **find** the area enclosed by the curve $y = x^2(x - 2)$, the lines $x = 0$, $x = 2\frac{2}{3}$ and the x-axis. (2mks)

24. The marks of 50 students in a mathematics test were taken from a form 4 class and recorded in the table below.

Mark (%)	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	2	5	7	9	11	8	5	3

(a) On the grid provided, **draw** a cumulative frequency curve of the data. (3mks)
Take 1cm to represent 5 students on the vertical scale and 1cm to represent 10 marks on the horizontal scale.

Graph

(b) From your curve in (a) above

(i) **Estimate** the median mark. (1mk)

(ii) **Determine** the Interquartile deviation. (2mks)

(iii) **Determine** the 10^{th} to 90^{th} percentile range. (2mks)

(c) It is given that students who score over 45 marks pass the test. Use your graph in (a) above to **estimate** the percentage of students that pass. (2mks)