Section 1 (50mks)

1. Evaluate without using a calculator
   (3mks)

   $2\frac{1}{4} - 1\frac{3}{4} \div \frac{5}{8}$

   $\frac{4}{5}$ of $2\frac{1}{2} - 2\frac{2}{5}$

2. Use square roots and reciprocal tables only to evaluate the following giving your answers to 4 significance figures
   (3mks)

   $\frac{4}{124.3} + \frac{5}{0.43}$

3. Find the least number of exercise books such that when divided by either 15, 20 or 25 students the teacher remains with 5 books for his use
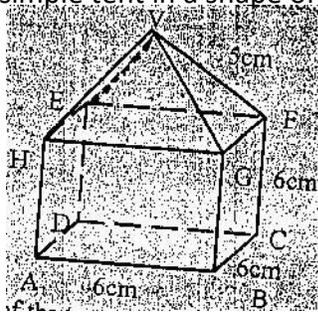   **3mks**

4. Find the equation of perpendicular bisector of line AB if the co-ordinates of A and B are (-2,6) and 6,2) respectively

   3mks

5. Simplify $\dfrac{2 + \sqrt{3}}{2 - \sqrt{3}}$ + $\dfrac{2 - \sqrt{3}}{2 + \sqrt{3}}$ giving your answer in the form of $a + b\sqrt{c}$ **3mks**

6. The surface area of two similar bottles is 12cm² and 108 cm² respectively. If the larger one has a volume of 810cm³. Find the volume of the smaller one

   3mks

7. The diagram shows a simple tent in a shape of a cube with a right pyramid top

a. Draw the net of the tent   **(1mk)**

b. Determine the surface area of the figure
     (3mks)

8. Solve the equation for 0 360

$$10Cos^2 + sin = -1$$

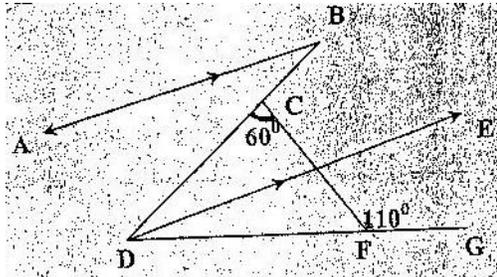**(4mks)**

9. Find the integral values of x for which -3-3x -6 and x-5 $-^2/_3$ satisfy.
   (3mks)

10. The figure below AB is parallel to DE. The line DE bisects BDG. DCF = 60 and CFG =110. Calculate ABD
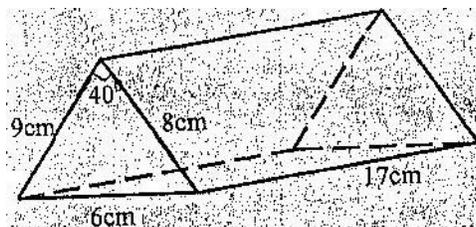   **(2mks)**

11. The length of diagonal of a rectangular flower bed is 24.6m and the length of one side is 18.9m. Find the perimeter of the flower bed.
    (3mks)

12. Find the capacity of the figure given below in litres.
    (3mks)

13. Use logarithms to evaluate

$$\frac{1.23 \times 0.0089}{(75.46)^{0.5}}$$

(4mks)

14. A tourist exchanged x US Dollars for Kenya Shillings when he arrived in Kenya. He spent three days in the country and paid Kenya shillings 45600 for expenses. He later left the country and exchanged the remainder back to US Dollars. He went back with 1200 US Dollars. Find the value of x.

    The exchange rates were as follows

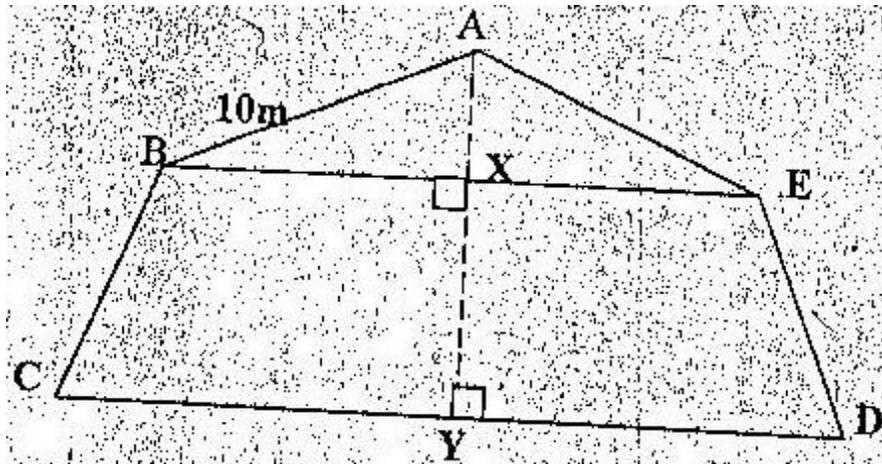   Buying 1 US Dollar = Kshs 76.40

    Selling US = 76.60
    (3mks)

15. The diagram below shows a vertical front face of a factory. AB = AE 10m. BAE 60, CD = 15m, XY = 5m. Calculate the area of the front face.
    (3mks)

16. A plain square piece of metal is 20mm thick and has mass of 4kg. If 1cm³ of the metal weighs 3.5g, calculate the length of the piece of metal in centimeters.
    (3mks)

17. Given the quadrilateral PQRS below is inscribed in a circle of centre O and radius 7cm and angle RST = 60
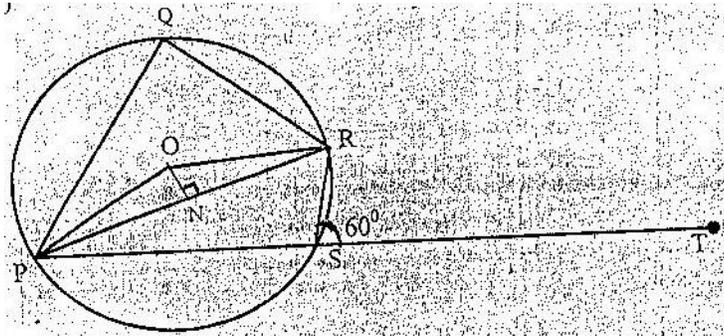
a) **Giving reasons find the value of:**

PQR   **(2mks)**

ii. PQR (obtuse)   **(2mks)**

b) **Find the;**

i.   Length of ON
         (3mks)

ii.   Area of major segment PQR to 2dp.
         (3mks)

18. A particle moves from rest and attains a velocity of 10m/s. after 2seconds it then moves with this velocity for 4 seconds. It finally decelerates uniformly and comes to rest after another 6 seconds

a) Draw a velocity time graph for the motion of this particle
     (3mks)

graph

b) From the graph find:

   i. The acceleration during the first two seconds.
        (2mks)

   ii. The uniform deceleration during the last six seconds
        (3mks)

   iii. The total distance covered by the particle
        (2mks)

19. The triangular OQP is such that OP = p, OQ = q. A point R divides OP in the ratio 1:3 and that 2PS =5QS.OS and RQ meet at T

a) Determine in terms of p and q the following vector
   i.   PQ
                (1mk)

   ii. OS
                (1mk)

   iii. OR
                (1mk)

b. Given that OT = nOS and RT =mRQ where m and n are constants

    Determine m and n hence the ratio OT : TS

(c). Write OT in terms of p and q
            (1mk)

20. On the grid provided
   a) (i) Draw the figure ABCD where A(1,2), B(7,2), C(5,4), D(3,4)

   (ii) Draw on the same grid the image ABCD of $A^1B^1C^1D^1$ under a rotation of -90 about the origin.
               (2mks)

   (iii) Also on the same grid draw the image $A^{11}B^{11}C^{11}D^{11}$ of ABCD under a reflection in line y = -x. state the coordinates of $A^1B^1C^1D^1$
         (3mks)

   b) $A^{111}B^{111}C^{111}D^{111}$ is the image of $A^{11}B^{11}C^{11}D^{11}$ under the reflection in the line x = 0. Draw the image $A^{111}B^{111}C^{111}D^{111}$ and state its coordinates
         (2mks)

   c) Describe a single transformation that maps $A^{111}B^{111}C^{111}D^{111}$ onto ABCD **(2mks)**

graph

21. The table below shows marks obtained by a hundred candidates in an examination. Fill in the spaces for the cumulative frequency in the table below. **(1mk)**

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	4	9	16	24	18	12	8	5	3	1
cumulative frequency										

(a) Determine

   i. The median **(3mks)**

   ii. The inter quartile range. **(5mks)**

(b) Determine the range of marks between which the middle 50% lies
(1mk)

23. A father has a son and a daughter who will sit for their final exam this year. The probability that the son will fail is 20% and that of the daughter will fail is 10%. Calculate the probability that:-

a) Both pass the exams
(2mks)

b) None passes their final exams
(2mks)

c) Only one passes the final exam
(2mks)

d) The daughter passes but the son fails the final exams
(2mks)

e) The son passes but the daughter fails the final exam
(2mks)

24. Four points B, C, Q and D lie in the same plane. Point B is 84km due south – west of point Q. point C is 100km on a bearing of 560 E from Q. point D is equidistant from B and C

a) Using the scale 1cm represent 10km, construct a diagram showing the position B, C, Q and D with a ruler and a pair of compasses only
(5mks)

b) Determine the:

i. Distance between Band C
(1mk)

ii. Bearing of D from D
(2mks)

iii. The distance and bearing of D from Q
        (2mks)

1. Given that $y = 3x - 1 + 2x^2$

a) On the grid provided, draw the graph for the given function in the range -4

        (5mks)

graph

b) On the same axes draw the line y = 3x =1.
        (2mks)

c) Hence find the solution of the equation $3x - 1 + 2x^2 = 3x + 1$
        (2mks)

d) Form a quadratic equation which is satisfied by the values of x obtained in part (c) above
(2mks)

ELDORET EAST INTERSCHOOL EXAMINATION – 2010

Kenya Certificate of Secondary School

FORM FOUR

121/2

MATHEMATICS

PAPER 2

MARCH / APRIL 2010

$2^{1}/_{2}$

1. All prime numbers between 20 and 40 are arranged in descending order to form a number

i. Write down the number formed
(1mks)

ii. State the total value of the third digit of the number
(1mk)

2. Evaluate without using tables or calculator
(3mks)

$$\frac{0.3773 \times 0.24}{0.042 \times 4.312}$$

3. Solve for x in $(\log_{10} x)^2 + \log_{10} x^2 = \log_{\frac{1}{2}} (\frac{1}{8})$
(4mks)

4. In what ratio must Kapkatet tea costing Kshs 50 per 500g be mixed with Nyamache tea costing Kshs 35 per 500g so that by selling the mixture at Kshs 50 per 500g, a profit of 25% is made?
(3mks)

5. The dimension of a rectangle are 20cm and 30cm. if there is an error of 5% in each of the measurement, find the minimum possible area of the rectangle
(3mks)

6. Evaluate: $9 \div 1$ of $(-1) \times 4 \div 12$
(2mks)

7. Solve the equation for x:-

. $\dfrac{X-2}{X+2} + \dfrac{x^2 - 2x}{x^2 - 4} = \dfrac{-2}{3}$
(3mks)

b). Given that AB = 2 and CD = (6) are parallel, find k hence evaluate CD
(3mks)

$$\begin{pmatrix} 3 \end{pmatrix} \quad \begin{pmatrix} k-1 \end{pmatrix}$$

9. The sum of the digit number is 15. When number is subtracted from the number formed by reversing the digits, the difference is 27. Find the number
(3mks)

10. Expand $(2-x)6$ in ascending power of x. use the first four terms of the expansion to obtain $(1.998)6$ correct to 5 decimal places.
(4mks)

11. If Tanx = 12/5. Find the value of Sinx + 2Cosx without using mathematical tables
or calculators   1 - Sinx
(3mks)

12. In the figure below, RU is a tangent to the circle at S and PT = PQ
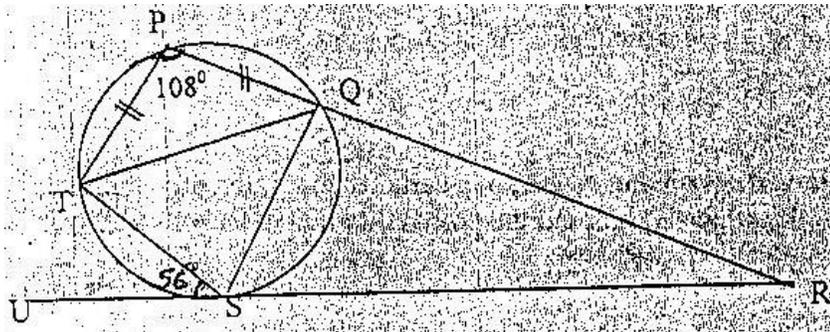
Given that TPQ = 108 and TSU =56

Find:

    i. QTS
          (2mks)

    ii. QRS
    (2mks)

13. A student spent 1/3 of his pocket money in buying cakes and 4/9 of the
remainder in buying pens. If he was left with KSh. 400 at the end of the term for
transport to his home, how much money did he have at the beginning of the
term?   **(3mks)**

Answer five questions ONLY in this section

17. In this section use a pair of compasses and a ruler only.

    a) Construct triangle ABC such that AB = 6cm, BC = 8cm and <ABC = 120
        (**2mks**)

    b) Draw a perpendicular line from A to CB produced and find its length on your
        diagram in (a) above.

    c) On the diagram construct the locus of the points which are:-

        i.   Equidistant from A and C and label P1
             (**2mks**)

        ii. 3cm from B and within triangle ABC and label P2
             (**1mk**)

        iii. Equidistant from AB and AC and label P3
             (**1mk**)

        iv. Shade region within triangle ABC containing the points which are closer
             to A than C, closer to AC than AB and more than 3cm from B
             (**2mks**)

18. Mr. Hassan is a teacher in a technical institute. He earns a basic salary of Kshs. 33600, house allowance of Kshs 12,000, medical allowance of KShs 2680 and commuter allowance of Kshs 2485. He is entitled to a personal tax relief of Kshs 1162 per month. He also has an insurance scheme for which he pays a monthly premium of Kshs 2400. He is entitled to a relief on the premium at 15% of the premium paid. Use the taxation scheduled to answer the question below.

Income (k£ p.a)	Rate (%)
1 – 5808	10%
5809 – 11280	25%
11281 – 16752	20%
16753 – 22224	25%
22225 and above	30%

a) Calculate how income tax mr. Hassan pays per month.
   (7mks)

b) Mr. Hassan's other deductions per month are:

   Cooperative society contribution Kshs 2500

   Loan payment   Kshs 8500

   WCPS   2% of basic salary

   Union dues   2% of basic salary

   NHIF   Kshs 320

   Calculate his net salary per month
   (3mks)

19. Triangular PQR has vertices at A (2, 2), B (5, 3), and C (4, 1) it's mapped into triangle $A^1B^1C^1$ by a transformation whose matrix is 1   -2
                                                                                    -2   1

a) On the grid provided draw triangles ABC and $A^1B^1C^{-1}$

   (4mks)

b) Triangle ABC is then mapped on to triangle ABC whose vertices are A^{11} (-2 -2), B^{11} (-5 -3), C^{11} (-4 -1). On the same axes draw triangle ABCD and describe the transformation which maps triangle ABC onto triangle ABC

   (2mks)

c) If triangle A^{11} B^{11} C^{11} is mapped onto triangle ABC, find the matrix of this transformation.

   (4mks)

graph

20. Write down the first three terms of the sequence whose n^{th} term is 2^{n-1}
(2mks)

a) Mrs. Owino was employed by an NGO on contract for a certain number of years. Her basic salary for the first year was Kshs 580,000 and her last basic salary was Kshs 630,400. By the end of the contract she earned a total amount of Kshs 4,841,000. If the annual increment was constant, calculate:-

i. The period of the contract
(4mks)

ii. The annual increment
(2mks)

iii. The annual basic salary in the third year of the contract
(2mks)

21.   The figure below is a square based pyramid ABCDV with AD = DC = 6cm and height VO = 10cm
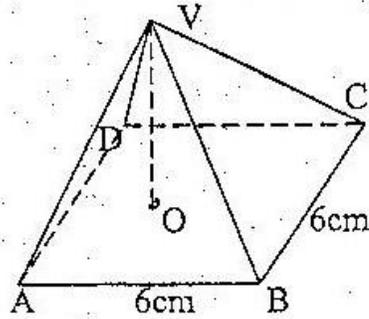
a) State the projection of VA on the base
(1mk)

b) Find:

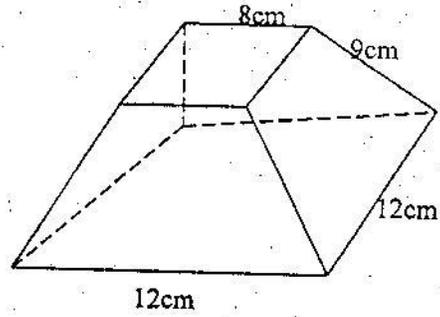   i.   The length VA
         (2mks)

   ii.   The angle between VA and the plane ABCD
         (2mks)

   iii. The angle between planes VCD and ABCD
         (3mks)

   iv.   Volume of pyramid
         (2mks)

22. The figure below shows a frustum of pyramid with a square top of side 8cm and square base of 12cm. the slant edge of the frustum is 9cm '

a) Calculate the total surface area of the frustum
   (6mks)

b) Calculate the volume of the solid frustum
   (4mks)

23. A quantity y partly varies as x and partly varies as the square of x. when x = 2, y = 2 and y = 12 when x = 2

i. Determine the relationship between y and x
    (5mks)

ii. Find the value of y when x = 5
    (2mks)

b). Another quantity p varies directly as r and inversely as the square root of t. find the percentage change in p if r increases by 20% and t decreases by 19%
    (3mks)

24. X and y are believed to be connected by the equation y = mx2 + kx. Experimental values of x
   and y are as recorded in the table below

X	1	2	3	4	5	6
Y	9	20	33	48	65	84

a. Using the table above draw a suitable straight line on the grid given below
   (5mks)

b. Use it to determine the values of m and k
   (3mks)

c. Write down the equation connecting x and y
   (2mks)