Name…………………………………………………Index No……………………/………

121/1

MATHEMATICS   **Candidate's Signature……………………**

Paper 1

                                                    Date…………………………………

2 ½ Hours

LANY ACHIEVERS JOINT EXAMINATION END TERM 2 2018

Instructions to Candidates
1.   Write you name and index number in the spaces provided above.
2.   Sign and write the date of examination in the spaces provided above.
3.   This paper consist **TWO** sections: section **I** and section **II.**
4.   Answer all the questions in section **I** and **five** questions from section **II**.
5.   All answers and working must be written on the question paper in the spaces provided below each question.
6.   **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question**.
7.   **Non-programmable** silent calculators and KNEC mathematical tables may be used, except where stated otherwise.
8.   *Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.*

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 14 printed pages

1. Express 21952 and 2744 as a product of their prime factors hence evaluate.   (3mks)

    $$\frac{21952}{2744} \; ^{1/3}$$

2. Use logarithms to evaluate,   (4mks)
    $$\frac{0.418 \times 0.032}{0.92^2 \times 297}$$

3. $P^1(1,4)$ is the image of $P(1,-2)$ under an enlargement, scale factor $-\frac{1}{2}$. Calculate the centre of enlargement.   (3mks)

4.   The scale of a map is 1:200 000. Calculate the actual area in hectares of a plot measuring 5cm, 7cm and 10cm on the map. Give the answer correct to 2 significant figures. (3mks)

5.   Solve for x in the equation.   (3mks)
        $2^{2x+3} - 6(2^x) + 1 = 0$.

6.   The product of the digits of a two-digit number is 24. If the digits are reversed, the number increases by 18. Find the number.
                                                                                        (4mks)

7.   The minute hand of a wall clock is 6cm long. Find the area it sweeps out between 1:25pm and 2:05pm.   (2mks)

8. Simplify the expression: (3mks)

$$\frac{2x^2 - 3xy - 2y^2}{8x^2 - 2y^2}$$

9. The displacement of a particle moving in a straight line is given by $s = t^4 - 12t^2$, where **s** is in metres and **t** is in seconds.
    Find:
    (i) The average velocity from t = 1 and t = 4. (2mks)

    (ii) Acceleration when t = 3. (2mks)

10.

ABCD is a rhombus where AC = 8cm and BD = 6cm.
Calculate:
(i)   The area of the rhombus.   (2mks)

(ii)   The perpendicular height from D to line AB.   (2mks)

11.   What is the mass in kilograms of a metallic hemispherical bowl whose external and
       internal radii are 21cm and 17.5cm respectively if its made of material whose density is
       9.3g/cm³? (π = 3.142).   (3mks)

12.   The midpoint of line AB is (3,-2).   The co-ordinates of B are (8,2). Find the co-
ordinates   of A.
       (3mks)

13. Evaluate without using tables or calculator.
    $\log_2 {}^4/_7 + \log_2 {}^3/_2 - \log_2 {}^3/_{14}$ (2mks)

14. Give point A = i+3j, B = 2i +j and C = 3i – j, show that the points are collinear. (3mks)

15. Find the equation of a line passing through point (5,3) and marking an angle of 60° with the x-axis.
    (3mks)

16. Find the equation of a line which passes through the point of intersection of the lines y+2x=8 and x-2y + 6 = 0 and the point (4,3).
    (3mks)

SECTION II (50MKS)
Answer only Five questions in this section

17. Members of school's students council decided to construct a school noticeboard at a cost of Ksh 4000. Each was to contribute the same amount of money. Fifteen members failed to make their contributions and as a result each of the others had to pay sh 60 more.

   (a)   Find the number of members of the council.   (6mks)

   (b)   What was the percentage increase in the contribution per member?   (4mks)

18. The vertices of a triangle are P(3,6) Q(2,8) and (1,7).
   The triangle undergoes a half-turn about the point (0,4).
   (a) Draw triangles PQR and its image P'Q'R'.   (3mks)
   (b) P'Q'R' is then reflected in the line x = 0. Draw P"Q"R", the image of P'Q'R'
                                                                          (1mk)
   (c) Describe a single transformation that would map PQR onto P"Q"R".   (2mks)
   (d) P"Q"R" is finally translated through vector   2   to P"'Q"'R"'. Draw triangle
        P"'Q"'R"'   - 1   (4mks)

19. Using a ruler and a pair of compasses only;
   (a) Construct a parallelogram PQRS where PQ = 10cm, RS = 7cm and angle PQR = 150°. Bisect angle PQR and SPR so that the bisectors meet at X. (6mks)

   (b) Construct a perpendicular from X to meet PQ at M. Measure XM.   (2mks)

   (c) Calculate the area of triangle PXQ.   (2mks)

20.   The figure below shows a right pyramid on a square base ABCD of side 12cm.   The top
        is a square WXYZ of side 5cm. The slant edges are 6cm long.

        Calculate;
        (a)   The height of the frustrum.   (2mks)

        (b)   Volume of the frustrum.   (4mks)

        (c)   The surface area of the frustrum.   (4mks)

21. A woman standing on a cliff throws a stone vertically upwards with velocity of 20m/s. The distance, **h** metres, covered by the stone after time, **t** seconds, is given by
$h = 4t (9-2t) + 1.5$.

(a) (i) Complete the table below for values of h and t. (2mks)

t	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
h	1.5		29.5	37.5					17.5	-18.5	

(ii) Draw a graph of h against t using a scale of 2cm to represent one unit on the x-axis and 1cm to represent 5 units on the y axis.

(b) How high above the cliff is the stone after 1.2 seconds? (1mk)

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(c)   After how many seconds is the height of the stone 20m above the cliff?   (1mk)

(d)   What is the greatest height reached by the stone and after how many seconds is this attained?   (1mk)

(e)   At what height from the top of the cliff is the stone initially thrown?   (1mk)

(f)   For how many seconds is the stone more than 15 metres above the top of the cliff?

(1mk)

22.   Four towns are such that Naivasha is 84km directly to the north of Nakuru and Nyahururu is on a bearing of 295º from Nakuru at a distance of 60km. Ol'Kalou is on a bearing of 340º from Nyahururu and a distance of 30km. Using a scale of 1cm to represent 10km, make an accurate scale drawing to show the relative positions of the four towns.   (5mks)

Find:
(a)   The distance and bearing of Naivasha from Nyahururu.   (2mks)

(b)   The distance and bearing of Ol'Kalou from Naivasha.   (2mks)

(c)   The bearing of Nakuru from Ol'Kalou.   (1mk)

23.   George left Tororo at 8.00 am and travelled towards Eldoret at an average speed of
        64km/h. Bill left Eldoret at 8.30am and travelled towards Tororo at the same speed. The
        two towns are 384km apart.
        (a)   At what time did they meet?   (3mks)

        (b)   How far from Eldoret was their meeting point?   (2mks)

        (c)   How far apart were they at 10.30am?   (5mks)

24.   The table below shows some values of the function $y = x^2+2x-3$.

x	-6	-5.75	-5.5	-5.25	-5	-4.75	-4.5	-4.25	-4.0	-3.75	-3.5	-3.25	-3
y	21	18.26		14.06		10.06	8.25		5		2.25	1.06	0

(a)   Complete the table.   (2mks)

(b)   Use the mid-ordinate rule with six ordinates, estimate the area of the region
bound   by the curve and the lines x = -6 and x = -3 and y = 0.   (3mks)

(c)   (i)   By integration, find the actual area of the region in (b) above.   (3mks)

(ii)   Calculate the percentage error arising from the estimate.   (2mks)

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