KING'S COLLEGE, BUDO

DEPARTMENT OF MATHEMATICS

S.4 MATHEMATICS TEST 4

2hours 30 minutes

INSTRUCTIONS TO CANDIDATES.

*Answer **all** questions in section **A** and not more than five questions in section **B***

Any additional questions answered shall not be marked

All necessary working must be clearly shown with the rest of the answers on the answer sheets provided.

Graph paper is provided

Silent non – programmable scientific calculators and mathematical tables with a list of formula may be used.

## SECTION A

Answer all questions in this section.

1. Find the solution set of the equation $(x-3)^2 = 4^2$ (04marks)

2. Given that $124_n = 52_{ten}$. Determine the value of natural number n. (04,marks)

3. Make x the subject of the formula , A = $\sqrt{\dfrac{mx-p}{r-nx}}$ (04marks)

4. Factorize completely $a^2 - 2ab - 5a + 2b + 4$ (04marks)

5. Solve for x in $\dfrac{x-3}{5} - \dfrac{x+2}{3} = \dfrac{x}{6} - \dfrac{2}{3}$ (04marks)

6. Find the equation of the line with x- intercept $\dfrac{-3}{2}$ and y- intercept -3 (04marks)

7. An object P(-1, 3) is mapped onto the final image P^{11} by two successive transformations represented by the matrices $M = \begin{pmatrix} 1 & 2 \\ -2 & 1 \end{pmatrix}$ followed by $N = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$. Find the coordinates of P^{11}.

8.   Use logarithm tables to evaluate $\sqrt[3]{0.9867}$ (04marks)

9.   Given that point A(-8 , 6) and vector **AB** $= \binom{12}{4}$. If M is the mid-point of AB
      Find   (i)   column vector **AM**

             (ii)   co-ordinates of M

10.   In a class of boys and girls, the average age is $15\frac{1}{2}$ years. The class has 12 boys whose
      average age is $16\frac{3}{4}$. Find the size of the class if the average age of the girls is 15 years.
                                                                           (04marks)

SECTION B

Answer any five questions in this section.

11.   (a)   Solve the simultaneous equations, $log_4(2x + y) = 2$, $log_3(5x + 3y) = 2$

      (b)   Write down the inverse of $A = \begin{pmatrix} 3 & -4 \\ 5 & 7 \end{pmatrix}$ and hence solve the simultaneous
             equations 3x – 4y = 10 and 5x + 7y = 3

12.   Dray the graph of $y = 3x^2 - 2x - 8$ for $-3 \le x \le 3$. Use the graph to solve the
      following equations

      (a) $3x^2 - 2x - 8 = 0$

      (b) $3x^2 + x - 5 = 0$

13.   In the diagram below, **OA**= a and **OB** = b . Points D and E are such that $AD = \frac{1}{3}OB$
      and $OE = \frac{1}{3}OA$
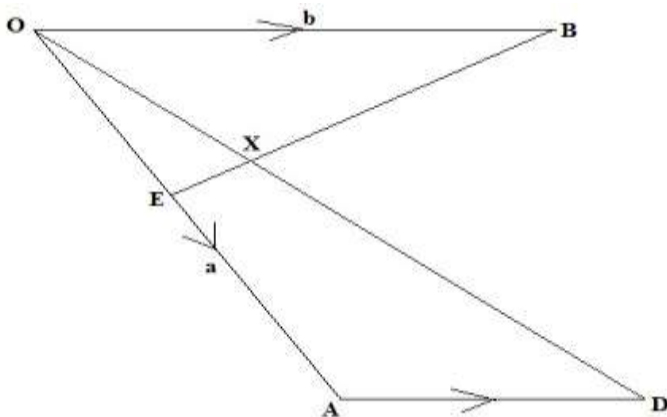
      (a)   Express **OD** and **BE** in terms of **a** and **b**

      (b)   If **OX** = k **OD** and **BX** = h **BE**, express **OX** in two different ways.

(c)   Using the expressions in (b) above, determine

(i)   the values of k and h

(ii)   **OX** in terms of **a** and **b** only.

14.   (a) Find the equation of a line which is a perpendicular bisector of a line segment AB

such that A is (-2 , 3) and B is (6, -9)

(b) In the figure below, ABC is a right-angled triangle where $< BAC = 60^0$ and AB =
8cm. ABN is a sector of a circle, centre A . Find the perimeter and area of the
shaded region.
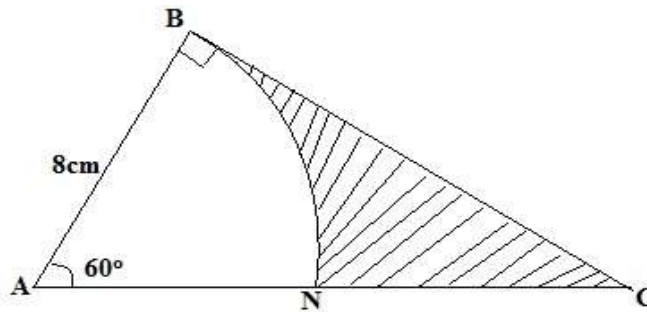
15.   The minor sector, AB , of a circle of radius 21cm subtends an angle of 120°at the centre
of   the circle.
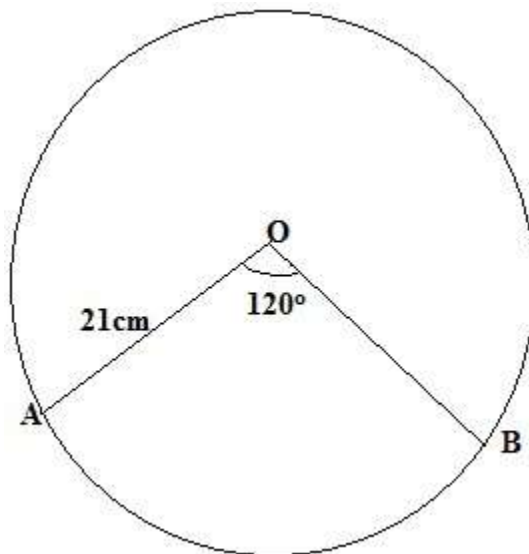
(a)   Find the area of sector AB

(b)   Find the perimeter of sector AB

(c) Sector AB is folded to a right circular cone.

   Calculate

   (i)   radius of the cone

   (ii)   height of the cone

16.   The following are the marks obtained by s.4 students of a certain school.

Mark	Frequency
10 – 19	2
20 – 29	6
30 – 39	10
40 – 49	16
50 – 59	24
60 – 69	20
70 – 79	12
80 – 89	8
90 – 99	2

(a) Calculate the mean mark using assumed mean of 54.5

(b) Draw a cumulative frequency curve(ogive) and use it to estimate

   (i)   median mark

   (ii)   the inter quartile range

   (iii)   pass mark if $\frac{7}{10}$ of the students passed.

17.   Points M and N are marked on the sides AB and AD of a square ABCD of sides 10cm such that AM = AN = t cm .
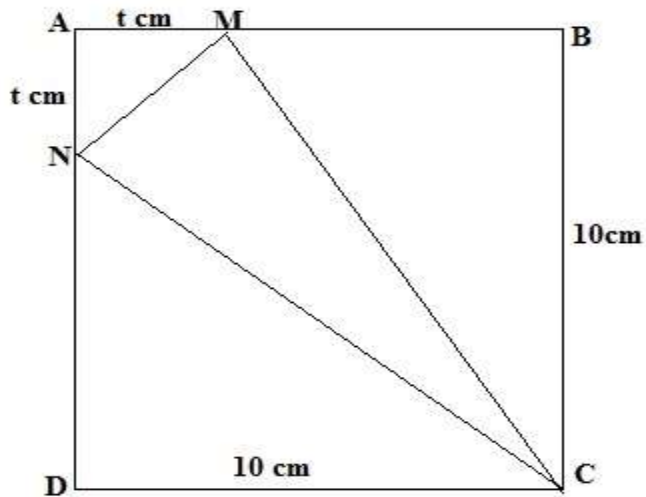
(a) Find the area of triangle MNC in terms of t.

(b) Given that the area of MNC is 48cm^2 , show that t^2 – 20t + 96 = 0. Hence solve for t

END