DEPARTMENT OF MATHEMATICS

S.4 MATHEMATICS PAPER 1 (456/1).

TIME: 2 hours 30 minutes.

Instructions

Answer **ALL** questions in section **A** and only **five** questions in section **B**

SECTION A

1. Express $X^2 + X - 6$ in the form $(X + a)^2 - b$ hence solve $X^2 + X - 6 = 0$.
2. Make X the subject of the formula $M = XR - (XT + 2K)$.
3. By matrix method solve: $y - x = 5$.
                             $3x + 2y = 0$.
4. Under enlargement scale factor 2 , the image of A(3 , 4) is A'(-1 , 7). Find the centre of enlargement.
5. Given that $\begin{pmatrix} x + 2y & 14 \\ -3 & y - 2 \end{pmatrix} = \begin{pmatrix} 4 & 14 \\ -3 & 7 + 3x \end{pmatrix}$, determine the values of x and y.
6. Find the equation of the line passing through (3 ,- 4) which is perpendicular to the line $2y = 7 - x$.
7. Given that $a^2 - b^2 = 63$. And $(a + b) = 21$. Find the values of a and b.
8. Find the exact value of: $\dfrac{\sqrt{3}}{2} \sin 60° + \dfrac{1}{2} \cos 60$.
9. Three boys John , Micheal , and Tom share Sh. 4000. Given that Tom gets six times as much as Micheal and John gets half of what Tom gets , find how much money each boy gets.
10. Calculate the area of triangle ABC given that AB =8 cm, BC = 10 cm and angle ABC = 60°.

SECTION B

11. The marks obtained by a class of 40 pupils in the English test are given below.

$$50 \quad 71 \quad 40 \quad 48 \quad 61 \quad 70 \quad 30 \quad 62$$

$$44 \quad 63 \quad 60 \quad 51 \quad 55 \quad 25 \quad 32 \quad 65$$

$$54 \quad 62 \quad 65 \quad 50 \quad 45 \quad 40 \quad 25 \quad 45$$

$$48 \quad 45 \quad 30 \quad 38 \quad 30 \quad 28 \quad 24 \quad 48$$

$$30 \quad 48 \quad 28 \quad 35 \quad 50 \quad 48 \quad 50 \quad 60$$

a) Using class interval of 5 marks , construct a frequency distribution table starting with a class 20 – 24.
b) Represent this information on a histogram and use the histogram to estimate the modal mark.
c) Estimate the mean using the working mean of 47.

12. a) What is the probability of throwing with a die :
   i)   an odd number,
   ii)   a number greater than 2.

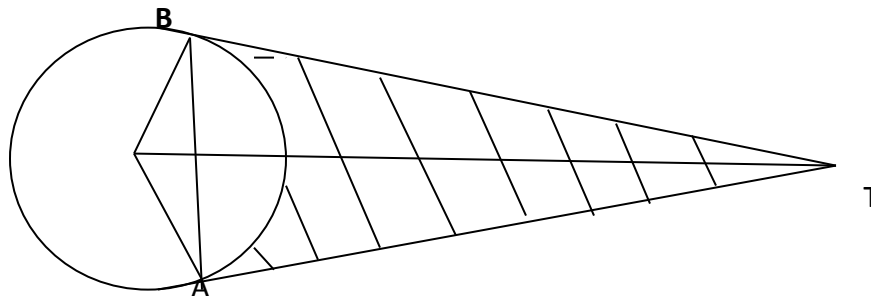   b) Two dice are thrown. The score is the difference of the numbers showing on the top faces on the two dice. Find

   i) The probability space.

   ii) The probability that the difference is greater than or equal to 3.

13. (a) Draw a graph of Y = X^2 – 4X + 3. For -1 ≤ X ≤ 5.
   (b) Use your graph to solve the equations below:
      (i) X_2 – 4X + 3 = 0
      (ii) X^2 – 6X + 8 = 0

14.

The figure above shows a circle with centre 0 , TA and TB are tangents drawn meeting the circle at A and B respectively . Angle ATB = 44º, and the radius is 10 cm.
 Calculate:

(a) The length AT, OT, and the chord AB.

(b) The distance OC of the chord from the centre.

(c) Area of the shaded region.

15. (a) using a ruler and a pair of compasses only , construct triangle ABC with angle ABC = 120^0, AB = 4 cm and BC = 9 cm.

(a) Construct a perpendicular from C to meet AB produced at M.

(b) Circumscribe triangle BCM and state its radius .

16. Triangle PQR has vertices P (1 , 4) , Q (3 , - 2) and R (- 2 , - 5). PQR is given a transformation $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ to produce P'Q' and R' followed by a transformation $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ to produce P'' Q'' and R''.

a) Write down the image points of :

(i)   P'Q'R'

(ii)   P"Q"R"

b) Write down a single matrix of transformation that maps PQR to P"Q"R" .

c) Write down a single matrix of transformation that maps P"Q"R" back to PQR.

17. (a) By shading the un wanted regions. On the same axes , show the region satisfied by the inequalities below: Y ≥ 2X – 4 , Y ≥ - X + 6 and Y ≤ 6.

(b) Find the area of the un shaded region.

(c) Find the maximum and minimum of X + Y. and X- Y

END
God bless u