FORM 4 MATHEMATICS PAPER 2 END OF TERM I EXAMINATION. 2015.

SECTION 'A'   Answer all the questions.

1. Form the quadratic equation given the roots are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ (3mks

2.   Solve for X in the equation   (3mks

$\frac{1}{2} \log_2 81 + \log_2 (x2 - x/3) = 1$

3.   Make n the subject of the formula   (4mks

$$P = \sqrt{\left(\frac{a^2 + b}{B - m^n} \right)}$$

4. Given the coordinates of A(3,5,-8) and B(9, - 34) Find
i)the midpoint of AB   (2mks

ii)$|\vec{AB}|$ (2mks

5. A triangle PQR is such that $\angle PQR = 25°$, length QR = 7.5cm. If the area of the triangle is 38cm. Find the length PQ (3mks)
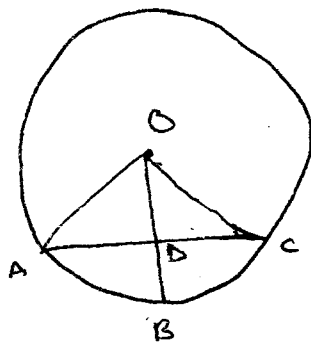
6. Find the value of X for which the matrix below has no inverse.   (2mks

$$\begin{pmatrix} X-1 & 2 \\ X-1 & X \end{pmatrix}$$

7.   Solve for t

$$(\text{Log } t)^2 - \log t^{15} + 56 = 0$$ (4mks

8.   In the figure below, ADC is a chord of a circle Centre O, through A, B and C. BD is a perpendicular of AC, AD = 3cm and BC = 1 cm, Find the perimeter of the sector correct to I decimal place.   (5mks

9.   Simplify the expression (2mks

$$\frac{a^4 - b^4}{a^3 - ab^2}$$

10. Given that log4 = 0.6021 and log 6 ≑ 0.7782 without using mathematical table or a calculator evaluate log 0.096.

11. Solve for X   (3mks

$$3/2 - 5x/3 > 8 + \frac{x}{2}$$

12. Two lines AB and PQ are perpendicular to each other. A point A(1,4) and B(5 , 6). If P is (3, 2) find the equation of line PQ   (3mks

13. Solve the following simultaneous equations   (3mks

    $Y = 4x + 7$
    $5y + 6x = 17$

14. $6 \log 2 - \log (2x + 1) = 2 - \log (3x + 2)$ (4mks

15. The ratio of goats to cows in a farm is 2:5 while the ratio of sheep to goats is 3:4. If there are 15 sheep, how many animal are there in the farm.   (3mks

16. Use logarithms to evaluate   (4mks

$$\sqrt{\frac{34.635}{(0.0052 \times 4.267)}}$$

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Answer any Five questions.

17. A variable Y is thought to change with time according to the law $Y = at + b$ where a and b are constants. The table below gives values of t and y.

T	1	2	3	4	5	6
Y	4.7	6.8	9.0	`11.9	12.9	15.1

a) Plot a suitable graph and determine the values of a and b.   (7mks

b)   Use your answer in (a) above to write down the law connecting Y and T

c)   Use your law to estimate
i)   Value of Y when $t = 3.5$ (1mk

ii)   Value of t which gives $y = 8$ (1mk

18. The points A(2,6) B(1,1) c(3,3) and D(5,3) are vertices of a quadrilateral ABCD
a) Plot the points A B C and D on the grid provided and joint them to form the quadrilated ABCD.   (2mks

b)   A' B' C' D' is the image of A B C D under rotation of positive 90o about the origin on the same graph. Draw the large image of A'B'C'D' of A B C D.   (2mks

c)   A"B"C"D"   is the image of A'B'C'D' under reflection in X – axis on the same graph draw
the image   A"B"C"D".   (2mks

d)   A"B"C"D" is the image of A B C D under a reflection Mark the mirror line M of this
reflection and state its equation.   (2mks

e)   Write down the co-ordinates of the images A' B' C' D' and A" B" C" D".   (2mks

9 🌸.   A square O A B C with co ordinates (O, O) A(-1, 0) B(-1,1) C(0,1) undergoes a shear with
X – axis invariant such that B is mapped onto C on the same set of axis. Using the graph
provided plot.

a)Square)ABC and its graph image O'A'B'C' under the shear.   (2mks

b)   O" A" B" C" the image O'A'B'C' under reflection in the line X – axes.   (2mks

c)   O''' A''' B''' C''' the image of O" A" B" C" under a positive three quarter turn about the origin.   (2mks

d)   Determine a single matrix that maps O A B C onto O''' A'''; B''' C'''   (2mks

e)   Determine a single matrix that maps O''' A''' B''' C''' back to A O B C.   (2mks

20. Each of three bags X Y and Z contain 12 balls made up as follows.

Bag X	4 red	4 white	4 black
Bag Y	3red	6 white	3 black
Bag Z	6 red	2 white	4 black

A bag is choosen at random, a ball drawn from it and replaced and then a second ball drawn from it Find the probability that

i)a) Both balls are red   (2mks

b)   the first should be black and the second white   (3mks

ii)Two dice are loaded so that in each the probability of a six turning up is ½ and probability of the dice on through simultaneously, find the probability of obtaining a total score of 9 or more.
(5mks

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5. In the figure below O is the centre of a circle of radius 4cm BC = 5cm AB = 7cm and NBT is a tangent to the circle at B.
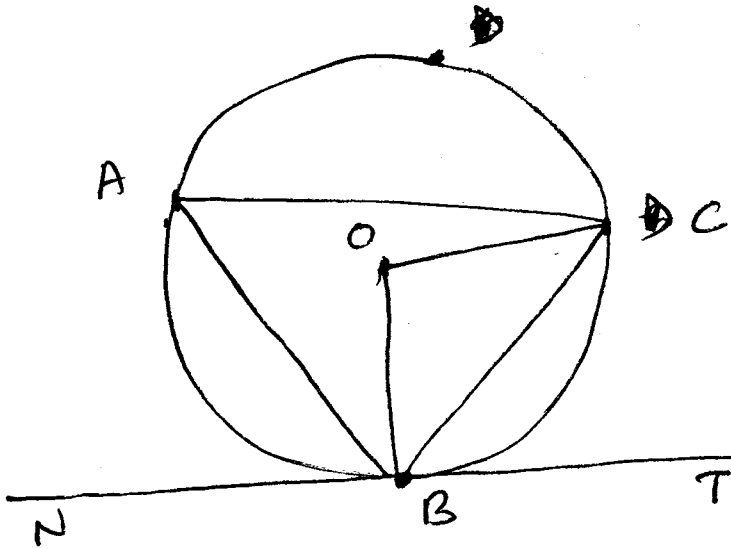
Calculate

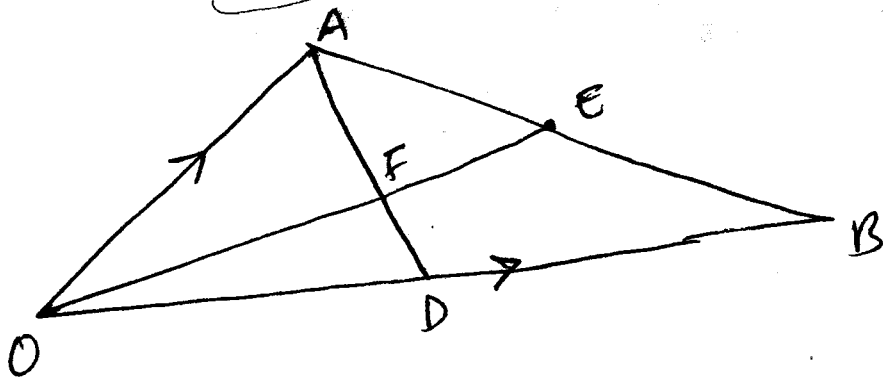   i)   OBC   (2mks

   ii)   TBC   (2mks

   iii)   BAC   (2mks

   iv)   ABO   (2mks

   v)   ADC   (2mks

2²

6. In the triangle OAB, E is the midpoint of AB, OD: DB = 2:3 and F is the point of intersection of OE and AB

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a) Given that OA = a   OB = b express OE and AD in terms of a and b   (2mks

b)   Given distance that AF = t AD and OF = S O E, find the values of S and T (5mks

c)   Show that O, F and E are collinear   (3mks