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MATHEMATICS
Paper 1
June./July.2022
2½ hours.

KAGADI JOINT MOCK EXAMINATIONS CONSULT

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *questions in section* **A** *and any* **five** *questions from section* **B**.

Any additional question(s) answered will **not** *be marked.*

All *necessary calculations must be done in the answer booklet(s) provided. Therefore, no paper should be given for rough work.*

Graph paper is provided.

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

Turn Over

SECTION A :(40MARKS)

Answer **all** *questions in this section.*

1. Make b the subject of the formula $t = 20 - \frac{a-b^2}{a}$. *(04marks)*

2. The operation $*$ is defined as " the difference of two squares"

(a) Express this operation in algebra form. *(02marks)*

(b) Evaluate $4 * -1$. *(02marks)*

3. Factorize completely: $25a^3 - ab^2 - b^3 + 25a^2b$. *(04marks)*

4. Solve the inequality: $\frac{x+3}{3} - \frac{x+2}{2} < \frac{x+4}{4}$. *(04marks)*

5. A man is 37 years old and his son's age is 8 years. How many years ago was the product of their ages 96? *(04marks)*

6. The mean of numbers: 25 , 30 , 15 , 20, x , 16 , and 26 is 20.

Find the:

(i) value of x. *(02marks)*

(ii) median *(02marks)*

7. Building A is 40m high. The angle of depression of the top of building B from the top of A is 26^0 . If the two buildings are 10m apart , find the height of building B. (*Give your answer to 2 decimal places*). *(04marks)*

8. Use matrix methods to solve the pair of simultaneous equations:

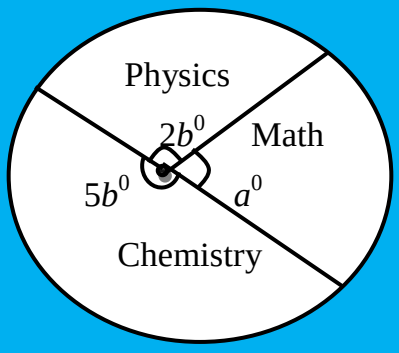
$$2y - 3x = 13$$
$$3y + x = 3$$ *(04marks)*

9. A coin and a a regular tetrahedron with 4 sides were tossed once.

(i) Write down the possibility space.

(ii) Find the probability that a tail and a prime number will show up. *(04marks)*

10. The pie – chart represents the number of students taking one of the subjects from Math, Physics and Chemistry. Given that $a + 2b = 150^0$ and the total number of students is 120.



Find the number of students taking each subject. *(04marks)*

SECTION B: (60MARKS)

Answer any **five** *questions from this section.* **All** *questions carry equal marks.*

11. (a) Given that $\begin{pmatrix} x & y \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ -y \end{pmatrix} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$, find the possible values of x and y. *(06marks)*

(b) The total cost of 2 pens and 3 rulers is Shs 8000. Five similar pens costs Shs 3000 more than the cost of one ruler.

(i) Write down two equations to describe the above purchases.
(ii) Find the cost of one pen and one ruler. *(06marks)*

12. (a) Copy and complete the table below. *(03marks)*

x	-4	-3	-2	-1	0	1	2	3	4
$y = x^2 + x - 8$					-8				12
$y = 4 - x - x^2$					4				-16

(b) Plot on the same axes the graphs of $y = x^2 + x - 8$ and $y = 4 - x - x^2$ for $-4 \leq x \leq 4$.

(*Use a scale of* 2*cm* **:** 1*unit on the* $x-$ *axis and* 1*cm* **:**2 *units on the* $y-$ *axis*). *(07marks)*

(c) Use your graphs to solve the equation: $x^2 + x - 8 = 4 - x - x^2$. *(02marks)*

13. Using a pencil, a ruler and a pair of compasses only,

(a) Construct a quadrilateral *ABCD* such that $\overline{AB}$ = 5cm,

angle *ABC* = 135^0, $\overline{BC}$ = 7.4cm, angle *DAB* = 60^0 and $\overline{AD}$ = 9.0cm.

(07marks)

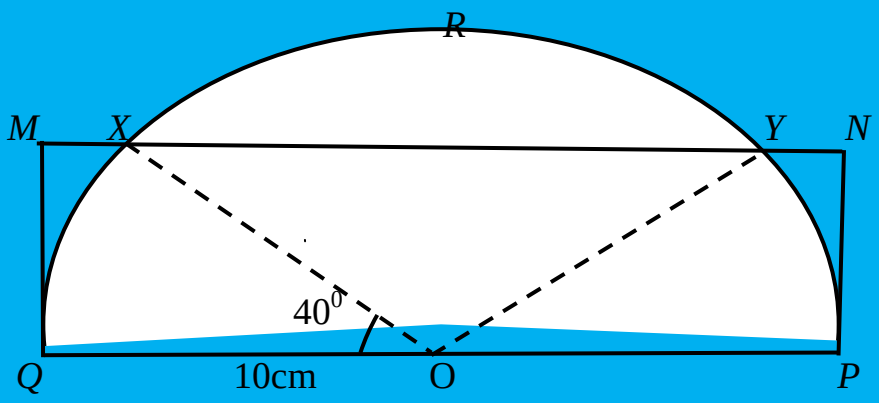
(b) From point *D*, construct a perpendicular line to meet line $\overline{AB}$ at point *E*.

(01mark)

(c) Circumscribe triangle *AED*. *(02marks)*

(d) Measure the length *DE* and the radius of the circle. *(02marks)*

14. In the figure below, *QXRYP* is asemi−circle with centre O and the radius 10cm is parallel to the diameter *QP*. Angle *XOQ* = 40^0.



(a) Find the length of :

(i) the arc *XRY* *(03marks)*

(ii) *MQ* *(03marks)*

(iii) *MX* *(03marks)*

(b) Calculate the perimeter of the figure. *(03marks)*

15. Agroup of members had to raise Shs 3600000 to buy a plot of land .Each member was to contribute the same amount of money .Before the money was contributed, 10 members dropped out.

(a) Write an expression for each members' contribution:

(i) before 10 members dropped out *(01mark)*

(ii) after 10 members dropped out. *(02marks)*

(b) After 10 members dropped out,each member had to raise Shs 60000 more. Find;

(i) the original number of members in the group. *(07marks)*

(ii) how much each member contributed. *(02marks)*

16. (a) Triangle ABC with coordinates $A(2, 1)$, $B(4, 1)$ and $C(4, 4)$ is reflected in the line $x = 0$ to get a triangle $A^1B^1C^1$. Triangle $A^1B^1C^1$ is then given a negative quarter turn about the origin to get $A^{11}B^{11}C^{11}$.

(a) Use $I(1, 0)$ and $J(0, 1)$ to find the matrix of ;

(i) reflection in the line $x = 0$ *(02mark)*

(ii) rotation of a negative quarter turn about the origin. *(02mark)*

(b) Use the matrices in (a) above to find the coordinates of :

(i) A^1, B^1 and C^1. *(03marks)*

(ii) A^{11}, B^{11} and C^{11}. *(03marks)*

(c) Determine matrix for the single transformation which maps $A^{11}B^{11}C^{11}$ back onto ABC *(02marks)*

17. A Linda intended to buy x kg of rice and y kg of beans. The total mass of rice and beans was atleast 10kg. The cost of rice was Shs 3000 per kg while that of beans was Shs 2000 per kg. She intends to buy atleast more rice than beans and she had only shs 30,000 to spend.

(a) Write down three inequalities to represent the given information. *(03marks)*

(b) Represent the inequalities above on a graph. *(06marks)*

(c) Find the maximum quantity of each commodity Alinda bought and how much money she spent. *(03marks)*

END