

TORORO GIRLS' SCHOOL
MID-TERM 1 EXAMINATIONS 2018
S.3 MATHEMATICS

Time: 2hours 30minutes

- Answer all questions in section A and any five(5) from section B.

Section A(40 marks)

1. (a) Solve the equation: $3(p-2) = 5$.
 (b) Make a the subject of the formula: $b(a-c) = d$. **(04 marks)**

2. Given that $f(c) = \log_{10} c$, find;
 (a) $f^{-1}(c)$
 (b) $f^{-1}(3)$. **(04 marks)**

3. Given that $P = \{\text{Triangular numbers between 8 and 40}\}$, while
 $Q = \{\text{Square numbers between 8 and 40}\}$. Find;
 (a) $P \cap Q$
 (b) $n(P \cap Q)$. **(04 marks)**

4. Mandeavu is 65 years old when he receives his pension of shs. 650,000. He chooses to invest all his pension in a microfinance that gives 15% compound interest per annum, with an intention of purchasing himself a bicycle worth shs.859,625 in the future. Determine how old Mandeavu will be the time he acquires the bicycle. **(04 marks)**

5. Simplify the expression: $\frac{x^2 - 2xy + y^2}{x^2 - y^2}$, hence evaluate $\frac{x^2 - 2xy + y^2}{x^2 - y^2}$ when $x = 6$, and $y = 2$. **(04 marks)**

6. The lines $2y + x = 4$ and $y = a + x$ intersect at point $(b, 3)$. Find the values of a and b . **(04 marks)**

7. The volume, V of a fixed mass of a gas is inversely proportional to its pressure, P at constant temperature according to Boyle's law. Copy and complete the table below. **(04 marks)**

Volume, V	27	10	0.0001
Pressure, P	3	100	75

8. Use elimination method to solve the equations: $3x - 5y = -9$ (04 marks)
 $2y + 5x = 16$
9. Rationalize $\frac{2}{\sqrt{5} - \sqrt{3}}$, hence find its value given that $\sqrt{5} = 2.236$, and $\sqrt{3} = 1.732$. (04 marks)
10. In a class, the ratio of boys to girls is 3:2. If five boys leave the class and ten girls join the class, the number of boys will be the same as the number of girls. How many pupils are in the class? (04 marks)

Section B(60 marks)

- 11.(a) Given that $P = \begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix}$. Find;
- P^{-1}
 - P^2
- (c) Grace, Hope and Sam went shopping at Capital shoppers' supermarket in Ntinda. Hope bought 2 dozen exercise books, 5kg of sugar, 4 loaves of bread and 2 tins of Margarine. Grace bought 3kg of sugar, 1 dozen exercise books and 2 tins of Margarine, while Sam bought 3 dozen exercise books, 2 tins of margarine, 4kg of sugar and 2 loaves of bread. Given that a kg of sugar costs shs. 2800, a dozen of books shs.6000, a tin of margarine shs. 1500, and a loaf of bread shs.3500.
- Write the items bought in a 3×4 matrix and the prices of each as a column matrix.
 - By matrix multiplication, find how much each spent. (12 marks)
- 12.(a) Solve for m in the equation: $16^{m-3} \times 4^{m+3} = \frac{64}{2^{-2m}}$.
- (c) Given that $\log_{10} x = \bar{3}.216$, and $\log_{10} y = 1.732$, without using tables or calculators, evaluate;
- $\log_{10}(xy)$
 - $\log_{10} \frac{\sqrt{x}}{y}$
 - $\log_{10} 10x$. (12 marks)

13. Copy and complete the table below for $y = (3x+1)(2x-5)$.

x	-1	0	1	2	3	4
$3x+1$	-2		4		10	
$2x-5$	-7		-3		1	
y	14		-12		10	

- (a) Use your completed table to draw a graph of $y = (3x+1)(2x-5)$.
 (b) Draw on the same axes the line $y = 5$
 (c) Use the two graphs in (b) and (a) to solve the equation $6x^2 - 13x - 10 = 0$. (12 marks)

14. The following marks were scored by 36 students in a mathematics test.

Marks	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	4	6	3	12	2	5	4

- (a) State the;
 (i) Modal class
 (ii) Modal frequency
 (iii) Class width.
 (b) Construct a frequency distribution table and use it to calculate;
 (i) The mean mark
 (ii) The median mark. (12 marks)

15. Given that $f(x) = 3x^2 - 1$, and $g(x) = x + 2$, find:

- (a) $f(2)$
 (b) $g^{-1}(7)$
 (c) The expressions for $fg(x)$ and $gf(x)$.
 (d) The value of x for which $fg(x) = gf(x)$. (12 marks)

16. Triangle with vertices $A(2,2)$, $B(5,2)$ and $C(5,5)$ is given a positive quarter-turn about the origin to form $A^1B^1C^1$. The image $A^1B^1C^1$ is now reflected in the line $y = -x$ to form $A^{11}B^{11}C^{11}$.

- (a) On the same axes show the three triangles ABC , $A^1B^1C^1$, and $A^{11}B^{11}C^{11}$.
 (b) State the coordinates of $A^1B^1C^1$ and $A^{11}B^{11}C^{11}$.
 (c) State the ratio of the area of $A^{11}B^{11}C^{11}$ to ABC . (12 marks)

17. A mad woman is tied on a metallic pole at the Centre of an equilateral triangular field PQR of side $PQ = 600\text{cm}$ enclosed within a rice garden in Bugiri district. Because of her condition, the policeman decides to tie both her legs with the same rope, but to his surprise the mad woman continues to jump haphazardly within the field.
- (a) By accurate construction, help the policeman estimate the maximum length of the rope to be used so as to prevent this mad woman from stepping on the rice and destroying it. (use 1cm to represent 100cm).
 - (b) Calculate the maximum possible area of the field that can be used by the mad woman.

(12 marks)

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