**REPUBLIC OF RWANDA**

**Ministry of education**

**Western province**

**RUSIZI District /GS Saint Pierre NKOMBO**

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## HOLIDAY PACKAGE OF CORE MATHEMATICS

***SUBMISSION: First day of term 1/2025-2026***

**SECTION A/55MARKS**

1. Convert 20 grades to radians **(3 marks)**
2. Consider the predicate $p(x,y):"y = x + 3"$. *What are the truth values of the propositions p(1,2) and* $p(0,3)$ **(3 marks)**
3. Study the parity of the following function $g(x) = x(x^2 + x)$ **(3 marks)**
4. Robet's father is 4 times as old as Robert. After 5 years, father will be three times as old as Robert. Find their present ages. **(3 marks)**
5. Discuss about the solution of the equation $\frac{m}{x-1} = \frac{3m-4}{x-2}$ **(3marks)**
6. Use completing of the square to solve $x^2 - 7x + 5 = -5$ **(4 marks)**
7. Find the equation of the tangent and the equation of the normal to the curve $f(x) = x^2 - 4x + 6$ at $x = 6$ **(4 marks)**

8. Write $\vec{w} = (3,2)$ as a linear combination of $\vec{u} = (2,4)$ and $\vec{v} = (-2,3)$ **(4marks)**

9. Find the image of point B(5,4) by rotation of centre (2,1) and angle $45^0$ **(4marks)**

10. Find derivative of $f(x) = \frac{3x^3+1}{x^2+4}$ **(4 marks)**

11. Given that $log2 = 0.30$ , $log3 = 0.48$ and $log5 = 0.69$. Calculate

(a) $log150$ **(2 marks)**

(b) $log0.2 + log10$ **(2 marks)**

12. Construct the Cayley table for the operation * defined by $x * y = 2x^2 - 3y$ in set $A = \{0,2,4,6,8\}$ .Use that table to solve

(a) $x * 4$ **(2 marks)**

(b) $3 * x$ **(2 marks)**

13. Solve in set of real number $\sqrt{x-1} = \sqrt{2x+1}$ **(4 marks)**

14. Evaluate the following limits:

a) $\lim_{x\to-\infty} \frac{3x}{\sqrt{9x^2-3x+6}}$ **(2 marks)**

b) $\lim_{x\to1} \frac{\sqrt[3]{x}-1}{x-1}$ **(2 marks)**

15. Determine all the numbers c which satisfy the conclusions of the Mean Value Theorem for the function $f(x) = x^3 + 2x^2 - x$ on $[-1,2]$ **(4 marks)**

**SECTION B: ATTEMPT ONLY ALL QUESTIONS (75 Marks)**

16. Given the vectors $\vec{u} = (2, k)$ and $\vec{v} = (3, -2)$ , Calculate the value of k so that the vectors $\vec{u}$ and $\vec{v}$ are:

(b) (a) perpendicular **(5marks)**

(c) (b)parallel **(5marks)**

(d) (c)make an angle of $60^0$. **(5marks)**

17.(a) Given the function $f(x) = \begin{cases} \frac{x^2+2x-3}{x+3} & if\ x \neq -3 \\ k & if\ x = -3 \end{cases}$

Determine the value of $k$ for which the function is continuous at $x = -3$ **(5marks)**

(e) Discuss the parametric equation: $(10 - \beta)x^2 - 6x + \beta = 0$ **(7 marks)**

(f) Transform in simple radical $\sqrt{5 + 2\sqrt{6}}$ **(3marks)**

18. a) Solve in the set of real numbers: $2x^4 - 7x^3 + 10x^2 - 7x + 2 = 0$ **(10marks)**

b) Simplify completely: $\frac{3log\sqrt{2}+log24-log3}{\frac{13}{2}log64-log128^{-1}}$ **(5marks)**

19 a) A person standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is $45^0$ . When he retreats 50 metres from the bank, he finds the angle to be $30^0$ .

Find the breadth of the river and the height of the tree. (**9marks)**

b) Suppose your parents invest 10,000 FRW in a savings account for college at the time you are born. The average interest rate is 4% and is compounded quarterly. How much money will be in the college account when you are 18 years old? (**6marks)**

20.Let $f(x) = \frac{-3x^2+2}{x-1}$

a. Determine the domain of definition of $f(x)$ (**1marks)**

b. Calculate the limits around the domain of definition and deduce the equations of the asymptotes to the curve of $f(x)$ (**4marks)**

c. Study the variation sense of $f(x)$ and draw the variation table (**5marks)**

d. Determine the coordinates of the points of intersection of the curve with axis coordinates.

**(2marks)**

e. Sketch the graph of $f(x)$

(**3marks)**

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