***REPUBLIC OF RWANDA***

***EASTERN PROVINCE***

***GATSIBO DISTRICT***

***PERIOD: SECOND TERM***

***CLASS: S2 ALL***

***ACADEMIC YEAR: 2022/2023***

***DATE…/03/2022***

 ***ORDINARY LEVEL MATHEMATICS EXAMINATION***

 ***SUBJECT: MATHEMATICS***

 ***DURATION: 3HOURS***

1. *You may use mathematical instruments and a calculator where* ***necessary****.*

$2. This paper has two sections:A and B.$

$ SECTION A:Attempt ALL questions. (45marks) $

$$ SECTION B:Attempt QNLY THREE questions (55marks)$$

$3.Show all your working.Marks will not be awarded for the answers $

$ without$$all working steps$

*4. Use only a* ***blue******or******black ink pen only*** *to write your answers and* ***pencil*** *to*

 *Draw diagrams*

 ***SECTION A (ATTEMPT ALL QUESTIONS: 55MARKS)***

$1.Workout the value of \frac{4r^{2}-t}{5} when r=3 and t=1 \left(3marks\right)$

$2.Simplify completely without using calculator:$

$ \left(2^{-3}×16^{\frac{1}{2}}\right)\left(81^{\frac{3}{4}}×27^{-\frac{1}{3}}\right) (4marks) $

$3. Expand \left(2x-3\right)^{2}-\left(x+1\right)^{2} (3marks)$

$4.In the class of 40 students, 26play foot ball and 20 play volly boll,$

$17 play both games.$$How many students play no game at all? (4marks)$

$ 5.Simplify the following surds \sqrt{12}×3\sqrt{60}×\sqrt{45} (4marks)$

$6.Simplify and rationalise the following denominator \frac{\sqrt{5}}{\sqrt{15}+\sqrt{10}} (4marks)$

$7. 100,000Rwf was invested. the simple interest after 2 years was 16000Rwf. $$ find the percentage interest rate per annum. (4marks)$

$8.Simplify the following completely \frac{32 ^{\frac{3}{4}}×16^{ 0}×8 ^{\frac{5}{4}}}{128 ^{\frac{3}{2}}} (4marks ) $

$9. Factorise the fillowing quadratic equations and solve them:$

$ \left(a\right) x^{2}-4x+3=0 (3marks)$

$$ \left(b\right) 3x^{2}+13x+12=0 \left(4marks\right)$$

$10. \left(a\right) If f\left(x\right)=\frac{2x-4}{3} find the inverse function of f^{-1}\left(x\right) \left(4marks\right) $

$\left(b\right)If f\left(x\right)=2x+3 and g\left(x\right)=3x-1 Calculate \left(f0g\right)\left(x\right) (3marks) $

$11.Solve, using cramer^{'}srule the followong simultaneous equations:$

$$ \left\{\begin{array}{c}3x+7y=15\\5x+2y=-4\end{array}\right. (4marks)$$

*12*$.The sum of two numbers is 120 and their differen ce is 18.$

$ Find the two numbers (3marks) $

$13.Solve the simultaneous inequalities and illustrate the solution set $$ on the number line \left\{\begin{array}{c}\frac{1}{3}\left(2x-4\right)\leq 2x-1\\\frac{1}{2}x-\frac{1}{6}x\leq \frac{2}{3}\end{array}\right. (4marks)$

$$SECTION B: ATTEMPT ONLY THREE QUESTIONS (45MARKS)$$

$14.\left(a\right) In the Trapezium below, E is the midpoint of \overbar{AD}, find the value of x, $

$given that \overbar{AB} = 6x^{2} – 36 and\overbar{ EF} = 2x^{2} – 3x. (8marks)$

 *D C*

 *E F G*

$A$ *B*

$$\left(b\right) Calculate the length of the third side of the right-angled triaw:ngle in the figure belo$$

 *B X cm A* $(7marks)$

 *7cm*

 *C 25cm*

$ $ $15. Given that f\left(x\right)=x^{3}+5x^{2}-4x-20 $

$\left(i\right)Show that x-2 is afac5tor of f\left(x\right) (5marks) $

$ \left(ii\right) Factorise completely f\left(x\right) (6marks) $

$ \left(iii\right) Solvethe equation f\left(x\right)=0 (4marks)$

$16.\left(a\right)The cost of 3pincels and 4 exercise books is 1,350Rwf, the cost of 5 pincils and$

$ 6 exercise books is 2,050Rwf. Find the cost of 10 pincils and 20 exercise$$books.$

$Pincils and exercise books are the same type.$***(8marks)***

$(b). A cow produced 800 litres of milk in one week. In the following week its milk production$

$ Increased by 30\%. What amount of milk did it produce in the week. \left( 7marks\right)$

$17. Draw on the same graph the following simultaneous equations and from $

$the grap find the poimt of intersection of those two lines $

$\left\{\begin{array}{c}2x-y=-1\\x-2y=4\end{array} (15marks)\right.$

$18.\left(a\right)Given that \vec{a}=\left(\genfrac{}{}{0pt}{}{3}{4}\right) , \vec{b} = \left(\genfrac{}{}{0pt}{}{1}{6}\right), \vec{c }=\left(\genfrac{}{}{0pt}{}{2}{-3}\right), find: \left(i\right) \vec{ a }+\vec{ b} (3marks)$

$\left(ii\right) \vec{ a}-\vec{ c} (3marks)$

$ \left(b\right)Find the midpoint of the points A \left(3, 8\right)and B \left(-9, 2\right). (4marks)$

$\left(c\right) Given that \vec{a} = \left(\genfrac{}{}{0pt}{}{k}{-1}\right) and \vec{b} = \left(\genfrac{}{}{0pt}{}{5k-32}{3x-16}\right) find the values of k and x that$

$ can balance the two vectors if \vec{a}=\vec{b} (5marks)$

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