**MINEDUC . DATE: 19-04-2020**

**KICUKIRO DISTRICT.**

**NYARUGUNGA SECTOR . CLASSES S5( MPC,MCB,PCM and MEG)**

**ECOLE SECONDAIRE KANOMBE/EFOTEC.**

**MATHEMATICS QUESTIONS RELATED TO SINIOR FIVE CLASSES**

 **PAPER 3**

**Q1**.$Given that sin\frac{π}{4}=\frac{\sqrt{2}}{2}, and sin\frac{π}{3}=\frac{\sqrt{3}}{2}, without using a calculator, $

$$find the exact value of cos\frac{5π}{12} and sin\frac{5π}{12} $$

**Q2**.$Solve for x in the set of all real numbers :$

$$a)4^{5-9x}=\frac{1}{8^{x-2}} $$

$$b)2^{x+7}=4^{5x+2 }$$

**Q3.**$with a help of a truth table, show that the logical statement \left(p⋀q\right)⋀∽\left(p⋁q\right)$

$$is a contradiction $$

**Q4.**$a person standing on the bank of a river observes that the angle substended by a tree $

$$on the opposite bank is 60^{0}.when he retreats 40metres from the bank, he finds the angle to be 30^{0}.$$

$$with a help of a well labelled diagram , find :$$

$$a) the width of the river $$

$$ b) the height of the tree $$

**Q5**.$rewrite the following functions without absolute value symbol, and $

$$simplify completely where necessary: a)f\left(x\right)=\frac{x^{2}-1}{\left|x-1\right|} $$

$$ b)\left|x-2\right|-1+\frac{1}{x^{2}} $$

**Q6**$let\*be a binary operation defined on the set Z of all integers by x\*y=x+y+3 $

$$a) determine whether the operation is associative or commutative $$

$$b) find the identity element for the operation $$

$$c) can you find a symetric\left(inverse\right)of any integer?what is it? $$

**Q7.**$a) write log\_{a}\left(\frac{x^{3}\sqrt{x^{2}+1}}{\left(x+1\right)^{4}}\right) as a sum and difference of logarithm by expressing all powers $

$$as factors $$

$$b)given the logarithmic expression log\_{a}x+log\_{a}9+log\_{a}\left(x^{2}+1\right)-log\_{a}5.$$

$$rewrite the expression using a single logarithm $$

**Q8**.$two ship leave port A, at the same time and the first travels at 5km per hour on $

$$the bearing of 46^{0}, another travels 9km per hour on a bearing of 127^{0}.$$

$$by using a well labelled diagram,determine how far apart are the two ship? $$

**Q9**.$consider the predicate p\left(x\right):x-6=2 and q\left(x\right);x>7 ,$

$$ if the universe of discourse is the set of all real number, give the truth vallue of the $$

$$proposition \left(∃x\right)q\left(x\right)∧∽\left(∀x\right)p\left(x\right) $$

**Q10**.$a) find the exact value of 3.\left[\left(2.3\right)^{-1}.\frac{1}{2^{3}}\right]^{-1}.\left(3.2^{2}\right)^{-2} , where the dot$

$$ means multiplication $$

$$b)simplify the trigonometric ratio \frac{tanθ-cotanθ}{tanθ+cotanθ}+2cos^{2}θ $$

**Q11.**$The estimated daily production X at a refinery is given by \left|x-200,000\right|\leq 250,000,$

$$ where X is measured in barrels oil.determine the high an the low production level $$

**Q12.**$a) given that Z=3secθ , rewrite the expression \sqrt{z^{2}-9}, where 0\leq θ\leq \frac{π}{2} ,$

$$ without radical. $$

$$ b)convert 33.214^{0 }to D^{0}M^{'}S^{''} $$

**Q13**.a) solve in the set of real number $log\_{3}(x+8)+log\_{3}x=2 $

 b)by substituting $e^{x}=m $, solve the equation $e^{2x+2}+e^{x-2}=6e^{-2}$

**Q14**. A) find the domain of definition of the function $f\left(x\right)=sin^{-1}(x+2)$ and interpret the result on a number line

 b) solve : i) 2cos$θ$+$\sqrt{2}=0$

 ii)$sin^{-1}(\frac{4x}{5})=\frac{π}{6}$

**Q15**.Bacteria in a culture increase at the rate of proportional to the number present, and is modelled by the exponential function $A\left(t\right)=100e^{kt}$, where A(t) is the number of bacteria at time t, t is the time taken for bacteria to grow up, and k is the constant of increase.

1. What was the initial bacteria?
2. If the number of bacteria increase from 1000 to 2000.
3. Find the value of the constant k
4. How many bacteria will be present after $1\frac{1}{2} hours$
5. How long will it take for the population to become 4000?

**Q16**. a) By finding the value of x in terms of variable y, find the inverse of the function

 $y=-1+tan⁡(\frac{4x}{5})$

 b) Differentiate the following function with respect to the variable x

 i)$ y=x^{2}-2sin2x$

 ii)$ y=tan^{-1}\sqrt{x^{2}+1}$

**Q17**.a) using the substitution $cos^{2}θ=1-sin^{2}θ, $solve the equation $cos^{2}θ-sin^{2}θ+sinθ=1$

1. By changing $sin^{2}x$ into $1-cos^{2}x$, solve the equation $sin^{2}x-cos^{2}x=1+c$

 **END.**