COLLEGE SAINT ANDRE **TERM 1**

P.O.BOX: 55 KIGALI

MATHEMATICS REVISION EXERCISES (S5 All)

GEOMETRY

1. **A line which connects any two points on a circle is known as**
   A. perimeter
   B. diameter
   C. chord
   D. radius

2. **Considering Cosine Rule of any triangle ABC, possible measures of angle A includes**
   A. angle A is obtuse
   B. angle A is acute
   C. angle A is right-angle
   D. all of above

3. **Surface area of hollow cylinder with radius 'r' and height 'h' is measured by**
   A. $2\pi r - h$
   B. $2\pi r + h$
   C. πrh
   D. $2\pi rh$
4. **If radius of a circle is increased by 30% then its area is increased by**
   A.40%
   B.69%
   C.70%
   D.50%
5. **Volume of a cylinder with radius 'r' and height 'h' is measured by**
   A.$\pi r^2/h$
   B.$\pi h^2/r$
   C.$\pi r^2 h$
   D.$\pi r \times h$

6. **$1 - \cos\alpha/\sin\alpha =$**
   A. $\tan\alpha/2$
   B. $-\tan\alpha/2$
   C. $-\cot\alpha/2$
   D. None of Above

7. For Cosine Rule of any triangle ABC, b^2 is equal to

A. $a^2 - c^2 + 2ab \cos A$
C. $a^2 + c^2 - 2ac \cos B$
B. $a^3 + c^3 - 3ab \cos A$
D. $a^2 - c^2\ 4bc \cos A$

8. In a triangle ABC, if angle A = 72° , angle B = 48° and c = 9 cm then $\hat{C}$ is

A. 69°
C. 60°
B. 66°
D. 63°

9. If a = 9.7 cm, angle B = 64° and c = 8.8 cm then area of Δ ABC is

A. 38.36 cm^2
C. 25 cm^2
B. 42.36 cm^2
D. 24.35 cm^2

10. In third quadrant, we have

A. positive sine and negative cosine

B. negative sine and positive cosine

C. positive tangent and negative cotangent

D. both tangent and cotangent are positive

11. If $\sin\phi = \frac{3}{4}$ and $\frac{\pi}{2} < \phi < \pi$, find the value of $\tan^2\phi - \sec\phi$

12. Prove that

a) $\sqrt{\frac{1-\cos x}{1+\cos x}} = \operatorname{cosec} x - \cot x$

b) $\sqrt{\sec^2 A + \operatorname{cosec}^2 A} = \tan A + \cot A$

13. Simplify $\frac{\sin\varphi}{\cos(90^0+\varphi)} - \frac{\sin(180^0-\varphi)}{\sin(\varphi)} + \frac{\cot(90^0+\varphi)}{\tan\varphi}$

14. Find the intersection of the circle $x^2 + y^2 - 14x + 12y + 69 = 0$ and the line $x + y = 1$

15. Show that the vector $\vec{w}$ = (14, 3) is a linear combination of vectors $\vec{u}$ = (4, 3) and $\vec{v}$ = (2, –1)

PROBABILITY AND STATISTICS

16. Which of these numbers cannot be a probability?
    a) -0.00001
    b) 0.5
    c) 1.001
    d) 0
    e) 1
    f) 20%

17. Two dice are rolled, find the probability that the sum is
    a) equal to 1
    b) equal to 4
    c) less than 13
18. A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head.
19. A card is drawn at random from a deck of cards. Find the probability of getting the 3 of diamond.
20. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?
    A. 10/21
    B. 11/21
    C. 2/7
    D. 5/7
21. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

    A. 1/15
    B. 25/57
    C. 35/256
    D. 1/221

22. In a school election with three candidates, Joe received 120 votes, Mary received 50 votes, and George received 30 votes. What percentage of the total number of votes did Joe receive?
    A) 60% B) 66 2/3 % C) 80% D) 120%

23. A set of 24 cards is numbered with the positive integers from 1 to 24. If the cards are shuffled and if only one is selected at random, what is the probability that the number on the card is divisible by 4 or 6?
    A) 1/6 B) 5/24 C) 1/4 D) 1/3 E) 5/12

24. Ten different teams played football during one season. At the end of the season the top goal scorers from each team scored the following number of goals:
    10, 5, 18, 2, X, 4, 10, 15, 11, 4
    If the mean number of goals scored is 9,
    What is the: a) Value of X?
    b) The median and inter-quartile range (IQR)
    c) The mode and the range

25. The table shows the number of children in the family for 35 families in the certain area.

Number of children	0	1	2	3	4	5
Frequency	3	5	12	9	4	2

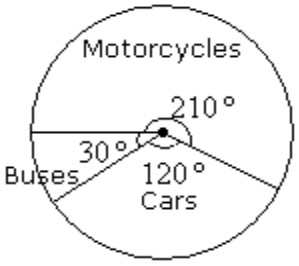
a) Draw the trees diagram of this statistics distribution.
b) Find the mode and the median.
c) Find the mean and the range
d) Find the standard deviation (correct to 3 d.p.).

26. The following data represent the age distribution of a sample of 70 women having multiple-delivery births in 2018.

Age	Number
15 – 19	1
20 – 24	5
25 – 29	16
30 – 34	28
35 – 39	17
40 – 44	3

a) Find the modal class and the median class.
b) Estimate the mode and the median.
c) Find the mean age of this distribution.

27. The following pie chart shows a survey of the numbers of cars, buses and motorcycles that passes a particular junction. There were 150 buses in the survey.



a) What fraction of the vehicles were motorcycles?
b) What percentage of vehicles passing by the junction were cars?
c) Calculate the total number of vehicles in the survey.
d) How many cars were in the survey?

NUMERICAL ANALYSIS

28. Write a rule for the nth term of the sequence 32,47,62,77,… . Then, find a12.
29. Find the 14th term of the arithmetic sequence 4, 7, 10, 13,……
30. *Insert 15 AMs between 71 and 23*
31. Solve the equations

a) $81^{n} = 3$ (b) $9^{(n-3)} \times 81^{(1-n)} = 27^{-n}$ (c)) $9^{(n+1)} + 3^{(2n+1)} = 36$

32. Solve in R: $(x + 3)(x - 2) > 0$
33. Use quadratic equation to find two numbers which have the sum 17 and the product 30

34. Evaluate the limit of $\lim_{x\to 1}\dfrac{x^3-1}{x-1}$

35. Given that $\log 2 = 0.30$, $\log 3 = 0.48$ and $\log 5 = 0.69$

Calculate $\log\left(\dfrac{15}{2}\right) - \log 4 + \log 30$

36. For what value of k is the matrix A=$\begin{bmatrix} 5 & -2 \\ k-1 & 4 \end{bmatrix}$ singular?

37. Find the compound interest on 10000frw at 12% rate of interest for 1 year, compounded half-yearly.
38. Find the present value of $5000 to be received in 2 years if the money can be invested at 12% annual interest rate compounded continuously.
39. Investment A is worth $70 thousand, and is growing at a rate of 13% per year compounded continuously. Investment B is worth $60 thousand is growing at a rate of 14% per year compounded continuously. After how many years will the two investments have the same value?
40. Consider the function $f(x) = \dfrac{x^2}{x-1}$,
    a) Find the domf of $f(x)$
    b) Calculate the limits at the boundaries of the domf
    c) Write the equation(s) of the asymptote(s) of $f(x)$
    d) Find the root(s) of $f(x)$