EAGLES NEST SECONDARY SCHOOL
SENIOR THREE HOLIDAY PACKAGE 2022
MATHEMATICS
SECTION A

1. Express 2.36 as an improper fraction in its simplest form.
2. If q = 14, b = 8 and $\frac{a}{c} + \frac{a-1}{2c} = b$. Find the value of c.
3. A line is given by the equation 45-15x+3y = 0. Find the co-ordinates of its x-axis.
4. Given that f(x) = 2x+4 and g(x) = x+5. Find fg(x). Hence evaluate fg(4).
5. Expand the expression a $(1-\frac{ax}{2})^2$
6. If a∗b = $\frac{a}{b} + \frac{b}{a}$ Evaluate $\frac{1}{2} * \frac{2}{3}$
7. Make c the subject from the expression a = b-$\sqrt{b^2+c^2}$
8. The point R(10,7) is reflected in the line y = x given point S. Given that M is the midpoint of RS. Find the coordinates M.
9. Find the areas of a triangle whose sides are 13cm, 24cm and 13cm.
10. Given that sets;

    A = {All natural numbers less than 30}

    B = {All prime numbers between 10 and 30}

    Find;

    (i) AnB

    (ii) n(AnB)[1]
11. A butcher sells 5Kgs of meat at Shs. 10,000. If the cost of meat is increased by 20%. Find the weight of meat which can be bought at Shs. 3,600.
12. If $\begin{pmatrix} 2 & 4 \\ -3 & 3 \end{pmatrix} + K\begin{pmatrix} 3 & 1 \\ 0 & n \end{pmatrix} = \begin{pmatrix} 8 & 6 \\ -3 & -1 \end{pmatrix}$

    Find the value of K and *n*.

13. The data given below represents the ages in years of 30s senior your students of a certain school. Draw a histogram, find the modal age.

Ages	15-17	18-20	21-23	24-26
No. of Students	7	11	9	3

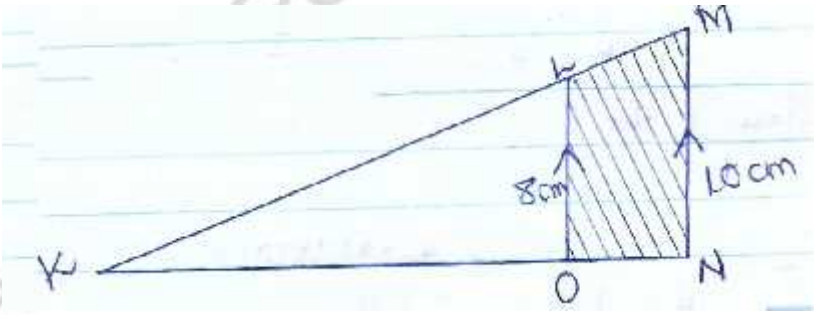
14. Use the prime factor method to find the cub root of 3375.
15. Under an enlargement of scale factor3, the image of the point (0,3) is P(4,5). Find the co-ordinates of the centre of enlargement.
16. In a Revenue Authority Department, the tax earned income is calculated as follows;

    The first Shs. 120,000 is tax free and the remaining income is taxed at 25%. Find the tax payable on an earned income of;

    (a) Sh. 100,000

    (b) Shs. 440,000
17. Given A= $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ $and\ B = \begin{pmatrix} -1 & -2 \\ 0 & 1 \end{pmatrix}$

    Evaluate = $(A+B)^2$
18. Given that V is inversely proportional to t^2 and v =25 when t=2, find v when t =5.
19. Study the diagram below.



    If KN = 14cm, find the area of the shaded region.
20. The figure below shows a net of a cane which can be folded to form a right circular cone

Calculate the radius of the cone formed.

SECTION B

21. Given that $\frac{1}{3x-4} + \frac{x}{x+1} = 1$, Solve for x

    (b) Solve the simultaneous equations

    $x^2+4y^2 = 4$

    $y = x-1$

22. (a) Given that $212_n - 25_{nine}$. Find the base that n represents.

    A container has a volume of 6400cm³ and a surface area of 8000cm³. Find the surface area of a similar container which has a volume of 2700cm³.

23. Using a pencil, a ruler and a pair of compasses only, construct a triangle ABC in which AB=9.2cm and angle CAB=45º and angle ABC=75º.

    (a) Measure the length BC.

    (b) Draw a circumscribing circle through the points A,B and C

    (c) Measure the radius of the circles.

24. Determine the range corresponding to the domain

    {-3,-2,0,1,3,4} for the mapping $x \rightarrow x^2+1$

    Represent the mapping in (1) on an arrow diagram.

    (b) Given the functions h(x) = x+2, g(x) = x² and f(x) - -x. Find the values of x for which gh(x) = f(x).

25. In a certain school a sample of 100 students was picked randomly. In this sample it was found that 78 students play Netball (N) 82 play volley ball(v) 53 play tennis

(T) and 2 do not play any of the three games. All those that play also pay volley ball, 48 play all the 3 games

(a) Represent the given information on a Venn diagram.

(b) How many students play both netball and volley ball but not tennis?

26. (a) The matrix $\begin{pmatrix} 0 & 4 \\ 3 & -1 \end{pmatrix}$ is pre-multiplied by the column Matrix $\begin{pmatrix} x \\ y \end{pmatrix}$ *to give* $\begin{pmatrix} -8 \\ x \end{pmatrix}$. Find the values if x and y.

(b)Given that matrix P=$\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$ *and* $Q = \begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$. Find

(i) PQ

(ii) a 2x2 matrix R such that QR=P

27. A manager of an industry earns a gross salary of shs. 200,000 per month which includes an allowance of Shs. 500,000 tax free. The rest of her income is subjected to an income tax which is calculated as follows;

7.5% on the first Shs. 800,000

12.5% on the next Shs. 500,000

20% on the next Shs. 100,000

30% on the next Shs. 60,000

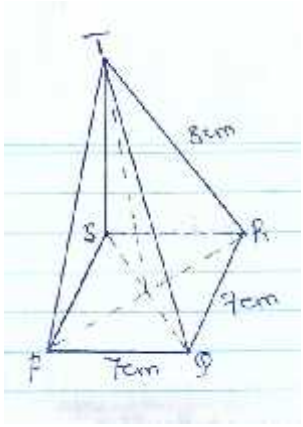
35% on the remainder

a. Find her taxable income
b. Calculate her monthly income tax
c. Express her monthly income tax as a percentage of the monthly gross salary.

28. Use the graphical method to solve the simultaneous equation $y=3x^2-3x$ and $y-10-5x$ for $-3 \leq x \leq 3$

29. Draw a table showing the values of $\sin 2\theta$ for $0^o \leq \theta \leq 90^o$, Using values of θ at interval of 15^o.

30. In the figure below PQRST is a right pyramid on a square base PQRS of side 7cm. Each of the slanting edge is 8cm.



Calculate the;

a. Height of the pyramid, correct to two decimal places.
b. Angle between the plane PTS and the base.
c. Volume of the pyramid, correct to one decimal place.

31. The table shows the weight in kilogrammes of 30 pupils,

48	44	32	52	54	44
53	38	37	35	53	46
59	51	32	37	49	42
48	59	52	40	54	46
45	62	35	54	48	35

(i) Construct a frequency distribution table starting from 30-34.
(ii) Estimate the man weight of the pupils
(iii) Draw a histogram and estimate the modals weight

32. A driver of a car covered a distance of 60cm at 10km/hr. A lorry driver covered the same distance but took half an hour more:

i). Calculate;

- time taken by the lorry driver
- Average speed of the lorry driver

b) A traffic police patrol car travelling at 120km/hr is chasing a taxi 0.5km away and travelling at 100Km/hr. How far must the police a patrol can travel inorder to catch up with the taxi.

33. The cost C, of operating a day school for one day is partly constant and partly varies as the no. of students n. It costs Shs. 40,000 to run the school when there are 500 students and Shs. 64,000 when there are 900 students. Form an equation relating C and n

    (c) What would be the cost of running a school when there are 700 students?