

MATHEMATICS

S.2 MATHEMATICS HOLIDAY PACKAGE SEPTEMBER 2018

- Factorize completely $a^2 - b^2$. Hence evaluate $3.14^2 - 0.14^2$.
- Solve for x in the equation $2(x^2 + 4x + 4) = 5 + x$.
- Factorize the expression $3x^2 - 10x + 3$. Hence find the values of x when
$$3x^2 - 10x + 3 = 0$$
- The average of 5 numbers is 12. When a sixth number is added their total become 68kg. Calculate the value of the sixth number.
- (a) Solve the inequality $m^2 + m - 6 \leq 0$.
(b) Illustrate your answer on a number line.
- (a) On the same axes draw the graph of $y = 10 + 4x - x^2$ and $y = x + 5$ where $-2 \leq x \leq 6$.
(a) Use the graphs to solve :
(i) $10 + 4x - x^2 = 0$
(ii) $5 + 3x - x^2 = 0$
- Given that $a = \begin{pmatrix} 3 \\ x \end{pmatrix}$, $b = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$ and $c = \begin{pmatrix} y \\ -5 \end{pmatrix}$. Find the values of x and y such that
$$2b + c = 3a$$
- Given that $g(x) = ax + b$, $g(2) = 6$ and $g(-4) = 3$. Find the values of **a** and **b**.
- If $125_n = 85_{ten}$, find n .
- Without using tables or calculator, evaluate:
$$\frac{2.15 \times 41.35 - 21.35^2}{0.02}$$
- A shopkeeper bought an item at Shs.5,500 and sold it at 30% ,more than the buying price. Find the shopkeeper`s:
(a) Selling price,
(b) Profit.
- Use mathematical tables to evaluate:
$$\frac{0.0875 \times 0.0243}{0.003142}$$
- (i) Determine the range corresponding to the domain $= \{-3, -2, 0, 1, 3, 4\}$ for the mapping $x \longrightarrow x^2 + 1$.
(ii) Represent the mapping in (i) on an arrow diagram.
- Solve the quadratic equation $2x^2 - 3x - 20 = 0$.
- The length of a rectangular carpet is 5 metres more than its width .If its area is $24m^2$, find the width of the carpet.

16. Solve the equation; $\frac{5x+2}{3} - \frac{7x+2}{5} = 2$

17. Copy and complete the table below for $y = (3x + 1)(2x - 5)$.

x	-1	0	1	2	3	4
$3x + 1$	-2		4		10	
$2x - 5$	-7		-3		1	
y	14		-12		10	

(a) Use your completed table to draw a graph of $y = (3x + 1)(2x - 5)$ with a scale of 2cm for 1 unit on the x - axis and 2cm for 5 units on the y - axis.

(b) Draw on the same axes the line $y = 5$

18. Given that $x + y = 10$ and $xy = 5$; find the values of

(i) $\frac{1}{x} + \frac{1}{y}$

(ii) $y \div \frac{1}{x}$

19. The goals scored by some players in a tournament are summarized in the table below.

Goals	1	2	3	4	5
Number of players	2	A	3	2	1

If the mean number of goals scored is 2.8 .Determine how many players scored goals?

20. (a) Copy and complete the following table for the curve $y = -2x^2 + x + 1$.

x	-3	-2	-1	0	1	2	3
$-2x^2$	-18		-2			-8	
x	-3		-1			2	
1	1		1			1	
y	-20		-2			-5	

(b). Using the values in your completed table, draw the graph of

$$y = -2x^2 + x + 1.$$

(c) Use your graph to solve the equation $6 - x - 2x^2 = 0$.

21. Solve the equation $\frac{3}{4}(2a + 1) = \frac{5}{6}(a + 5)$
22. If $p = \binom{3}{4}$ and $q = \binom{1}{4}$, Find $|p + 2q|$
23. In a class of 56 students, the average mark of 30 boys is 54 while that of girls 48. Find the average mark of the whole class.
24. Given the value $\log_{10} x = 1.477$ and $\log_{10} y = 1.301$. Find the value of:-
(i) $\log_{10} xy$
(ii) $\log_{10} \left(\frac{x}{y}\right)$
25. Find the value of $\log_3 27 - \frac{1}{2} \log_3 \frac{1}{9} + \log_3 81$
26. Simplify $\left(\frac{8}{27}\right)^{\frac{-2}{3}}$
27. Amina bought a Television set (TV) at a discount of 5%. The market price of the TV was shs320, 000. How much did she buy the TV?
28. If $f(x) = 3x - 5$, find the value of $f^{-1}(x)$ and $f^{-1}(11)$
29. Given that $g(y) = 9y^2 - 12y - 4$, Find the value of $g(-2)$
30. If $h(x) = px + 3$ and $h(4) = 23$,
(a) Find the value of;
(i) p
(ii) $h(0)$
(iii) $h(-5)$
(b) determine :
(i) $h^{-1}(x)$
(ii) $h^{-1}(13)$
31. Simplify the following as far as possible.
$$\log_2 4 - \frac{2}{3} \log_3 81 + \log_2 8$$
32. (a) Use logarithm tables to evaluate
$$\frac{\sqrt{33.7} \times 0.429}{76.1}$$

(b) If $\log_{10} x = 0.3979$ and $\log_{10} y = .4771$, find the value of $\log_{10} x^3 y$
33. Evaluate $\frac{68.53}{13.8 \times 0.0742}$

34. Given that $f(x) = x^2 - 1$. Find

(i) $f^{-1}(x)$ and hence

(ii) $f^{-1}(8)$

35. Given that $T = \{2, 5, 6, 8, 9, 10, 12, 13\}$. Illustrate on papygrams the relations:

(i) "Greater than by 3"

(ii) "is a factor of" (4mks)

36. Without using tables or calculator, evaluate. $5.2 \times (3.75^2 - 1.25^2)$. (4mks)

37. A mapping is defined by $f(x) = x^2 - x + 3$. Determine the range of the mapping whose domain is $\{-3, 0, 1, 2\}$ (4mks)

38. A straight line passes through the points $D(-2, 5)$ and $E(2, -3)$. Determine the equation of the line $\overleftrightarrow{DE}$. (4mks)

39. (a) Peter deposited shs 2,500,000 in a bank which offers a compound interest of 15% per annum. How much money did he have in the bank at the end of the two years.

(b) Opio bought a radio at shs 60000. He wanted to sell it at a profit of 20% but found no buyer. When he reduced his new price by 10% he found a buyer. Determine the:

(i) Price at which he sold the radio.

(ii) Percentage profit he made.

40. (a) A mapping is defined by $f(x) = x^2 - x + 3$. Determine the range of the mapping whose domain is $\{-3, 0, 1, 2\}$

(b) Solve for x in the inequality: $\frac{x+3}{4} - \frac{x-2}{3} < 2$ hence show the solutions on a number line.

(a) Given that $f^{-1}(x) = 5x + 7$, find;

(i) $f(x)$

(ii) $f(8)$

(iii) the value of x for which $f(x) = 0$.

41. (a) Find the equation of the line that passes through the origin and point $(-2, 10)$.

(b) The points $A(-2, K)$ and $B(4, 5)$ lie on the same straight line with gradient $\frac{1}{3}$. Find:

- (i) The value of **K**.
(ii) The equation of the line **AB**.
42. (a) Use logarithm tables to evaluate $\sqrt[3]{0.7196}$
(b) Solve the equation: $\log_2 (3x - 5) - 1 = \log_2 x$.
(c) If $\log_{10} x = 0.3010$ and $\log_{10} y = 0.4771$, evaluate $\log_{10} x^3 y^2$
43. The set P and Q are such that $n(P) = n(P^1 \cap Q) = 7$, $n(Q^1) = 8$ and $n(\varepsilon) = 20$.
Represent the given information on a Venn diagram hence find $n(P \cap Q^1)$.
44. P and Q are sets of objects such that $n(\Sigma) = 12$, $n(P \cap Q) = 5$, $n(Q) = 8$ and $n(P \cup Q)^c = 3$
Find;
a) $n(P \cup Q)$ (b) $n(P)$
45. Find the value of P if $23_P = 36_{\text{seven}}$.
46. Given that $(a * b) = \text{HCF of } a \text{ and } b$, evaluate for $(9 * 15) * 24$.
47. Four points A, B, C and D lie on a horizontal level ground. A car moves from point A to B on a bearing of 075° for 240km. from there, it continues to point C in the direction $S 20^\circ E$ for a distance of 210km. From C, the car moves at an average speed of 60km/hr for $2\frac{1}{2}$ hours to point D on a bearing of 220° .
(a) Using a scale of 1cm:30km, draw an accurate diagram to represent the positions A,B,C and D.
(b) Use your diagram above to find;
(i) The shortest distance of D from A
(ii) The bearing of D from A.
48. Given that $p * q = p^3 - q^2$, find the value of $4 * (3 * 5)$.
49. Given that
 $M = \{\text{the first five multiples of } 3\}$ and
 $S = \{\text{the first five square numbers}\}$.
Find:
(a) $M \cap S$ (b) $n(M \cap S)$
50. Given that $a * b = \frac{a+b}{a-b}$, find the value of $(5 * 3) * -2$.
51. Convert 5.272727..... to a fraction in its lowest form.
52. Express 1.6363..... as a fraction in its simplest form.
53. Two sets A and B are such that $n(A) = 8$, $n(B) = 11$, $n(A \cap B) = 5$ and $n(A \cup B)^c = 3$ Find $n(\varepsilon)$ where ε is the universal set.

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