

THEMI HILL SECONDARY SCHOOL

FORM FOUR 2020

100 questions

- From the list of numbers 2, 4, 6, 7, 8, 10, 20, 40, 50, 70, 90 and 92 write down.
  - Factors of 91
  - Odd numbers
  - A number which is prime and also is even.
- The lowest common multiples of 12, 48 and  $m$  is 336, find the value of  $m$  if their greatest common factor is 12.
- Solve for  $m$  if  $(9^{-1})^{2m}(3^m) \div 27^{-1} = 3^{-5m}$ .
- Simplify completely  $\frac{\log 16 + \log 81}{\log 27 + \log 8}$
- Let  $U$  be a universal set and  $C$  and  $D$  be the subsets of  $U$  where  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $C = \{\text{odd numbers}\}$  and  $D = \{\text{prime numbers}\}$   $n(C \cup D)$
- Simba sport club has  $\frac{1}{4}$  probability of winning its next game and  $\frac{1}{6}$  probability of drawing. What is the probability that it won't lose?
- Find the equation of the line passing through the point  $(-3, -2)$  and the mid-point of  $(2, 4)$  and  $(-4, 0)$ .
- Given the vectors  $\underline{a} = 3\mathbf{i} + 2\mathbf{j}$  and  $\underline{b} = 5\mathbf{i} + 3\mathbf{j}$ . Find the vector  $\underline{c} = 2\underline{a} - \underline{b}$ , and then represent it in  $xy$ -plane.
- The areas of two similar polygons are  $27 \text{ cm}^2$  and  $48 \text{ cm}^2$ . If the length of one side of the smaller polygon is 4.5 cm. Find the length of the corresponding side of the larger polygon.
- Find the length of one side of a regular hexagon inscribed in a circle of radius 7 cm.
- The growth of a coconut tree found to be proportional with time. If the height of 36 feet took 9 years, find how many years would be taken by a coconut tree to have 48 feet.
- A pyramid has a square base. If the side of the base decreases by 10% and height increases by 20%, what is the percentage change in the volume?
- If the ratio of sacks of maize, millet and cassava in a certain store is 6:7:3. But there are 42 sacks of millet. Find the total sacks in a store.
- January 1, 2006 Njiku started business with capital in cash 1,200,000/=

- January
- 2 Bought goods for cash 800,000/=
  - 3 purchased shelves for cash 250,000/=
  - 5 sold goods for cash 600,000/=
  - 8 Paid rent for cash 240,000/=
  - 10 Bought goods for cash 400,000/=
  - 13 Paid wages for cash 60,000/=
  - 18 Bought goods for cash 350,000/=
  - 25 Sold goods for cash 300,000/=
  - 27 Paid insurance for cash 100,000/=

Enter and balance the given transactions in cash account.

15. If the tenth term of arithmetic progression is twice the fourth term and the sixth term is 16. Find the sum of the fifth term and sixth term.

16. Find the sum of the first four terms of geometric progression if the sum of the first two terms of a geometric progression is eighteen whereas the sum of the fourth and third terms is one hundred sixty two.

17. If  $\tan A = \frac{r}{\sqrt{s}}$  and  $\cos A = \frac{\sqrt{s}}{a}$ , show that  $a = \sqrt{r^2 + s}$

18. From a certain point A, Amos observes the angle of elevation of the top of a church tower to be  $60^\circ$ . Moving 30m further away to a point B on the same horizontal level as the bottom of the tower C, he observes the angle of elevation to be  $45^\circ$ , find

(i) The distance AC (give your answer in a surd form).

(ii) The height of the tower.

19. Solve for P if  $\frac{1}{p-2} - \frac{1}{p^2-4} = \frac{4}{5}$

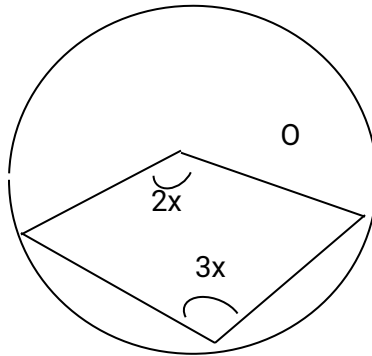
20. A rectangle with dimensions 12m by 16m is increased by xcm and its area also increases to  $285\text{m}^2$ . Find the value of x.

21. The areas of a selection of tobacco plant leaves were found and the results given in a table and estimate mean area

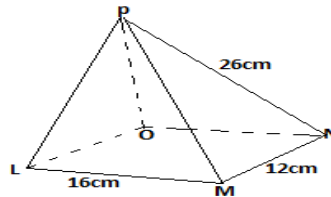
Area ( $\text{cm}^2$ )	2-6	6-10	10-14	14-18	18-22	22-26
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Frequency	32	30	19	11	5	3
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22. Find the value of  $x$ .  $O$  is the centre of the circle.



23. The figure below represents a regular pyramid with rectangular base LMNO and vertex P, each slant edge is 26cm long calculate the volume of the pyramid



24. An airplane flies from Tabora ( $5^{\circ}$  S,  $33^{\circ}$  E) to Tanga ( $5^{\circ}$  S,  $39^{\circ}$  E) at 332km/h along a parallel of latitude. If it leaves Tabora at 3 p.m. Find the arrival time at Tanga airport.

25. Find the image of the point A(1,2) after a reflection in the line  $y = x$

26. Use the concepts of matrix to solve the following 
$$\begin{cases} 4x - 6 = -3y \\ 4 + 5y = -2x \end{cases}$$

27. Find the greatest value of the function  $f(x,y) = 7x + 3y$  subject to the constraints.

$$2x + 3y \leq 12,$$

$$3x + 2y \geq 6,$$

$$x \geq 0,$$

$$y \geq 0.$$

28. Sketch the graph of the function defined by 
$$g(x) = \begin{cases} x - 2 & \text{if } x \leq -1 \\ 1 & \text{if } -1 < x \leq 3 \\ x^2 - 4 & \text{if } x > 3 \end{cases}$$

29. From the set of numbers  $\{1,3,4,5,6,8,10,15,17,21,27\}$ , write down

i. The prime numbers

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ii. The multiple of 3

iii. The factors of 60

30. Four wooden rods with length of 70cm, 119cm, 84cm and 105cm are cut into pieces of the same length. Find the greatest possible length of these pieces if no wood is left over.

31. Without using Mathematical table evaluate  $\frac{(0.0004)^2 \times \sqrt{30000} \times \sqrt{0.0003}}{\sqrt[3]{0.000064}}$ , give the

answer in standard form

32. Evaluate  $\log\left(\frac{75}{100}\right) - 2\log\left(\frac{5}{9}\right) + \log\left(\frac{100}{243}\right)$

33. In a survey at airport at, 55 travelers said that last year had been to Spain, 53 to France and 79 to German. 18 had been to Spain and France, 17 to Spain and German and 25 to France and German while 10 had been to all three countries. Use Venn diagram to find the number of travelers took part in the survey.

34. A bag contains three red balls and two yellow balls. A ball is drawn at random without being replaced and then the second ball is drawn. Find the probability that at most one ball is red.

35. Given that  $u = i + 3j$  and  $v = 2i - j$ , find the magnitude and direction of vector  $w$  given that

$$w = 3u + 2v$$

36. Find the equation of the line through the point (4,3) which is perpendicular to the line

$$4x + y - 10 = 0$$

37. Find the difference between  $x$  and 80% of  $x$ , if  $x = 950$

38. The length of the diagonals of a rhombus are 15cm and 18cm, find its area

39. If  $X$  varies directly as  $Y$  and inversely as  $W$ , and  $X = 4$ ,  $Y = 2$  when  $W = 3$ . Find the value of  $X$

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when Y is 8 and W is 2.

40. Sagan invested a certain amount of money in NMB bank whose interest rate was 10% compounded annually. After three years he got Tsh. 13,310,000/ = . How much did he invest initially?

41. Use the following Trial balance to prepare annual Trading, Profit and Loss account for Mr Magadula Trading Company

Account Name	Dr	Cr
Cash	2,805,000	
Capital		3,574,000
Purchases	3,155,000	
Rent	295,000	
Furniture	401,000	
Shelves	375,000	
Sales		3,912,000
Salary	265,000	
Wages	190,000	
	7,486,000	7,486,000

NB: Closing stock as at 31<sup>st</sup> December 2015 was 250, 000/=

42. In an arithmetic progression the third term is 15 and the sixth term is 30. Find the sum of the first TEN terms of this progression.

43. In geometrical the fourth term is 32 and the sixth term is 128. Find the ninth term.

44. Mussa walks 1km up the hill. If he has climbed a vertical distance of 600m. Find the horizontal distance through which has travelled.

45. Angle A is acute angle and if  $\tan A = 2.4$ , find in simplified form of  $\frac{a}{b}$  the value of

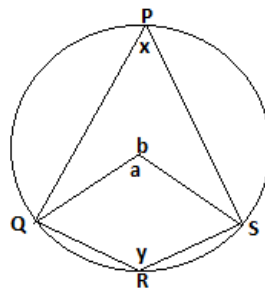
$$\frac{2\cos A + \sin A}{\sin A - \cos A}$$

46. Solve  $x^2 - 3x - 10 = 0$  by using quadratic formula

47. Find M if  $(1 + 3) * M = 18$ , given that  $a * b = a^2 + b$

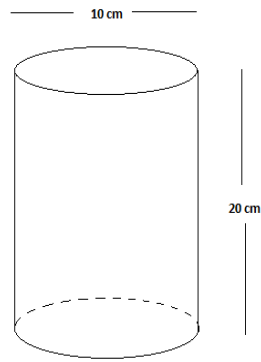
48. The masses of 40 students joined form five 2018 Togolani Secondary school in Tanga were recorded as follows; 60, 64, 63, 67, 66, 68, 59, 58, 59, 60, 64, 66, 65, 60, 73, 70, 63, 69, 70, 60, 66, 70, 74, 69, 63, 69, 59, 65, 64, 65, 73, 61, 62, 64, 61, 61, 62, 63, 68, 73. From these data construct the frequency distribution table with class marks 59, 64, 69, .....

49. In the figure below PQRS is a cyclic quadrilateral inscribed in a circle centered O. Show that the opposite angles of cyclic quadrilateral are supplementary



50. Find the total surface area of the figure below

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51. Consider the following list of towns and cities: Nakuru ( $0^{\circ}$ ,  $36^{\circ}\text{E}$ ), Kammala ( $0^{\circ}$ ,  $33^{\circ}\text{E}$ ), Accra ( $6^{\circ}\text{N}$ ,  $0^{\circ}$ ), London ( $52^{\circ}\text{N}$ ,  $0^{\circ}$ ) and Hull ( $54^{\circ}\text{N}$ ,  $0^{\circ}$ )

(i) Which of these lie on the prime meridian?

(ii) Which of these lie on the Equator?

52. Find the image of the point (3,6) when rotated through  $180^{\circ}$  followed by the reflection in the line  $y + x = 0$

53. Find  $t$  given that  $A = \begin{pmatrix} 6 & 2t \\ t & 0 \end{pmatrix}$  and  $|A| = -50$

54. Solve the following system of simultaneous equations by matrix method  $\begin{cases} 3x + 2y = 1 \\ 5x + 4y = 3 \end{cases}$

55. The manager of the butcher goes to the market to buy cows and goats. He has capital of Tsh 2,000,000/= but he has a space of only 40 animals. The average market price of a cow is Tsh 80,000/= each and for goat is Tsh 20,000/= each. If the profit per cow is Tsh 10,000/= and per goat is Tsh 20,000/= how many cows and goats must he buy to get a maximum profit?

56. Find  $g(5)$  and  $g(6)$  from a function defined by  $g(x) = \begin{cases} x-2 & \text{if } x \leq -1 \\ 1-x & \text{if } -1 < x \leq 3 \\ x^2-4 & \text{if } x > 3 \end{cases}$

57. Express 0.0040293 into

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- (i) Standard notation
- (ii) Three (3) significant digits
- (iii) Four (4) decimal places.

58. Write 0.82 in form of  $\frac{a}{b}$ , where a and b are integers and  $b \neq 0$

59. If  $p * q = \frac{p - q}{q - 1}$ , find the value of  $-2 * 4$ .

60. Rationalize the denominator of  $\frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} - \sqrt{2}}$

61. Make L the subject of the formula, given that  $L = \frac{LQ^2 - 1}{2N}$

62. Factorize  $a^2 - b^2$  hence use the result to solve  $21117^2 - 8883^2$

63. Given the points A and B such that A(2,5) and B(3,7). Find

- a) The equation of the line AB
- b) The y - intercept of the line AB.

64. Simplify the expression  $8y - 2(3 - y) + 10 - 3(y + 1)$

65. If  $x^2 + 8x + q = (x + k)^2$ . Find the values of x, k and q

66. Arrange the order of digits  $\frac{2}{5}$ ,  $\frac{5}{8}$ , 48% and 0.6 in (i) Ascending order (ii) Descending order.

67. Find the product of LCM and GCF of 36, 48 and 54.

68. Solve the simultaneous equation using elimination method  $\begin{cases} 4x + y = 6 \\ 5x + 2y = 9 \end{cases}$

69. If  $2y^2 + ky + 4$  is a perfect square, find the possible values of K.

70. Find the value of y in:-

- (a)  $\log_y 8 = 3$
- (b)  $3 - \log_2 y = \log_2 6$ .

71. Write  $4 \log 3 - \frac{1}{2} \log 81$  as a single logarithmic expression.



72. Find x given  $5+x = 7$

$$X - 1$$

73. A wood consists of three parts x, y, and Z in proportions x:y = 3:5 and y:z = 7:6, Calculate the proportion x:z

74. A businessman has a capital of 400,000/= Tsh. If he increases it by 20% how much will he have?

75. Represent the solution set of the following inequalities on a number line.

(a)  $3x + 4 \geq 25$

(b)  $1 - \frac{x}{3} \geq 6 + \frac{x}{2}$

76. Find the solution set for the following and show the results on the number line.

(a)  $|x - 3| < 6$

(b)  $2|2 - x| = 8$

77. If the sum of two numbers is 358 and one of the number is 2.5. Find the other number.

78. Use Mathematical tables to evaluate the expression below correct to two decimal places.  
17.38 x 246.9

$$256.2 \times 3.22$$

79. Given that  $\log x = 8.0524$ , determine  $\log \sqrt[3]{x}$

80. Solve the following simultaneous equation graphically  $\begin{cases} x + 2y = 4 \\ x - 2y = -8 \end{cases}$

81. If  $ax^2 + bx + c = 0$  where  $a \neq 0$ , show that  $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

82. By using the general formula solve for X, given  $X^2 - 2x - 3 = 0$

83. If  $\log 2 = 0.3010$  and  $\log 3 = 0.4771$ . Find the value of  $\log 576$  without using tables.

84. Find the equation of line which passes through (-2,7) which is parallel to the line  $y + 4x - 5 = 0$

85. Simplify  $9 \times (21-3) \div 9 + 2 - 5$

86. Write 67.03945 correct to

i) Four significant figure

ii) One decimal place

iii) In standard form

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87. Solve for X if  $\left(\frac{1}{3}\right)^{x+1} \times \left(\frac{1}{9}\right)^{2x} = 81$

88. In a class of 35 students, 19 study physics, 18 study History and 3 study neither physics nor History. Find

- i) Students who study both Physics and History
- ii) Students who study physics or History

89. Rationalize the denominator and simplify  $\frac{20}{3-\sqrt{5}} - \frac{50}{\sqrt{5}}$

90. If  $\frac{x}{y} = \frac{2}{3}$ , Find the value of  $\frac{3x + 6y}{y - x}$

91. Find the equation of a line joining the points A (7, 0) and B  $(0, -\frac{7}{3})$

92. A variable "a" varies directly as "b" and inversely as the square root of c. If a = 0.2 when b = 4 and c = 100. Find the value of "a" when b = 16 and c = 64

93. The volume of two tanks is in the ratio of 2:5 if the volume of the second tank is 2500litres. Find the total volume of the two tanks.

94. A damaged table that costs 12,000/= was sold at a loss of 15% find

- i) The loss made
- ii) The selling price

95. If the ratio of sacks of maize, millet and cassava in a certain store is 6:7:3. There are 42 sacks of millet. Find the total sacks in a store

96. Show the solution of the following inequality on the number line  $|4x + 2| \geq 6$

97. In a class, the ratio of boys to girls is 5:3. On a certain day  $\frac{3}{5}$  of the students were present. If 16 students were absent on that day, how many students were in the class? How many girls are there?

98. Find the value of  $\frac{\sin 60^\circ \cos 60^\circ}{\tan 60^\circ}$

99. A right angle triangle has sides 12x, 2x + 1 and 12x + 1 Find the value of X if in cm if 12x + 1 is the hypotenuse side.

100. What should be added to  $x^2 + 8x$  to make the expression a perfect square?

101. Solve the equation  $y^2 - \frac{4}{3}y - 5 = 0$  by completing the square