

FORM 3 TERM 1 2021
MATHEMATICS

SECTION I

1. Simplify $\frac{\sqrt{5}}{\sqrt{5}-2}$ leaving the answer in the form $a+b\sqrt{c}$, where a, b, and c are integers. (2marks)

2. Solve the equation $\log_{10}(6x - 2) - 1 = \log_{10}(x-3)$ (2marks)

3. The table below shows income tax rates in a certain year

Monthly income in Ksh	Tax rates in each shilling %
0 – 10164	10
10165 – 19740	15
19741- 29316	20
29317- 38892	25
38893 – and above	30

In that year, Mawira earned a salary of 41,100 per month. Calculate Mawira's income tax per month given that a monthly tax relief of Ksh 1162 was allowed. (3mks)

4. Determine the inverse, T^{-1} of the matrix $T = \begin{pmatrix} 1 & 2 \\ 1 & -1 \end{pmatrix}$ (1MKS)

Hence find the coordinates to the point at which two lines $X + 2y=7$ and $X-Y=1$
Using matrix method (3MKS)

5. A car park area in a shopping mall measures 54m by 72m is by number of whole number equal squares tiles with the largest possible dimension. Calculate the least possible number of square tiles required. (2MKS)

6) Use logarithm tables to evaluate the following

$$\sqrt[3]{\frac{0.64^2 \times 1.67}{38.44}} \quad (4\text{mks})$$

7) Find the value of X $3^{2x+3} + 3 = 30$ (3MKS)

8) Find the value θ between 0° and 360° satisfying the equation $\sin\theta = -0.8$ (3 MKS)

9) Make x the subject of the equation $\frac{t}{s} = \frac{b}{x-4}$ (3MKS)

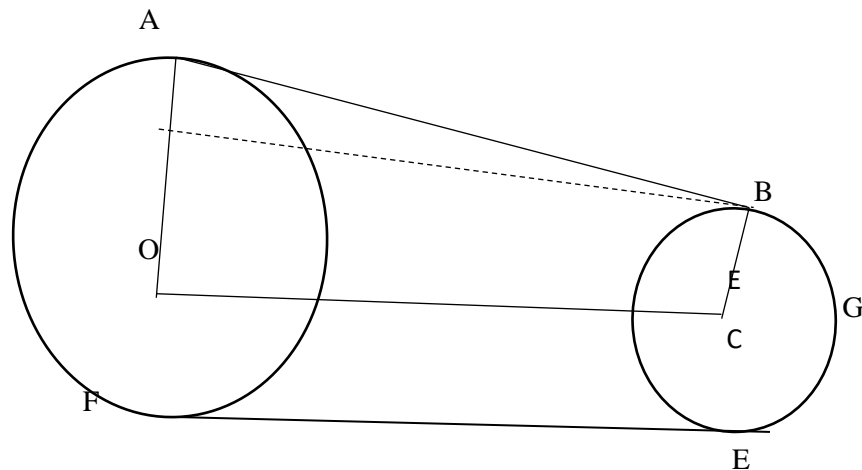
10) The 20th term of an A.P is 60 and the 16th term is 20. Find the first term and the common difference of the sequence. (2MKS)

- b) Find the sum of the first 9 terms of the G.P $8 + 24 + 72 + \dots$ (2MKS)

SECTION B

ANSWER TWO QUESTIONS FROM THIS SECTION

- 11) Wheels have radii of 20cm and 30cm. Their centers are 70cm apart. A belt passes tightly round the wheels as shown below.

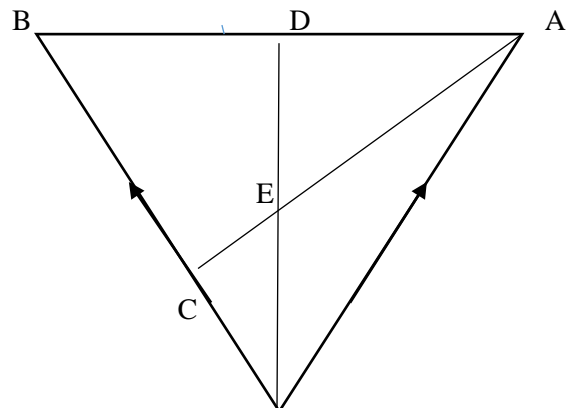


a) Calculate the length AB and FE. (3MKS)

b) Find angles AOC and BCO (3MKS)

c) Calculate the total length of the belt ABGEFH (4MKS)

12).The figure below shows triangle OAB, in which $BD: DA= 1; 2$ and, $OE; ED = 3;2$
C is the midpoint of OB



O

Given that $OA = \tilde{a}$ and $OB = \tilde{b}$ express the following vectors in terms \tilde{a} and \tilde{b}

(i) AB (1 MK)

(ii) OD (1 MK)

(iii) AE (3 MKS)

iv) Show that points A,E and C lie on a straight line. (3MKS)

Hence determine the ratio of CE;EA (2MKS)

13) A Quantity P varies partly as the square of M and partly as N. When $P = 3.8$ $m = 2$ and $n = -3$. When $P = -0.2$, $M=3$ and $n=2$. Find:

(I) The equation that connects P, M and N (3 MKS)

(II) The value of P when $m = 10$ and $n = 4$

(2MKS)

a) Express M in terms of P and N

(2MKS)

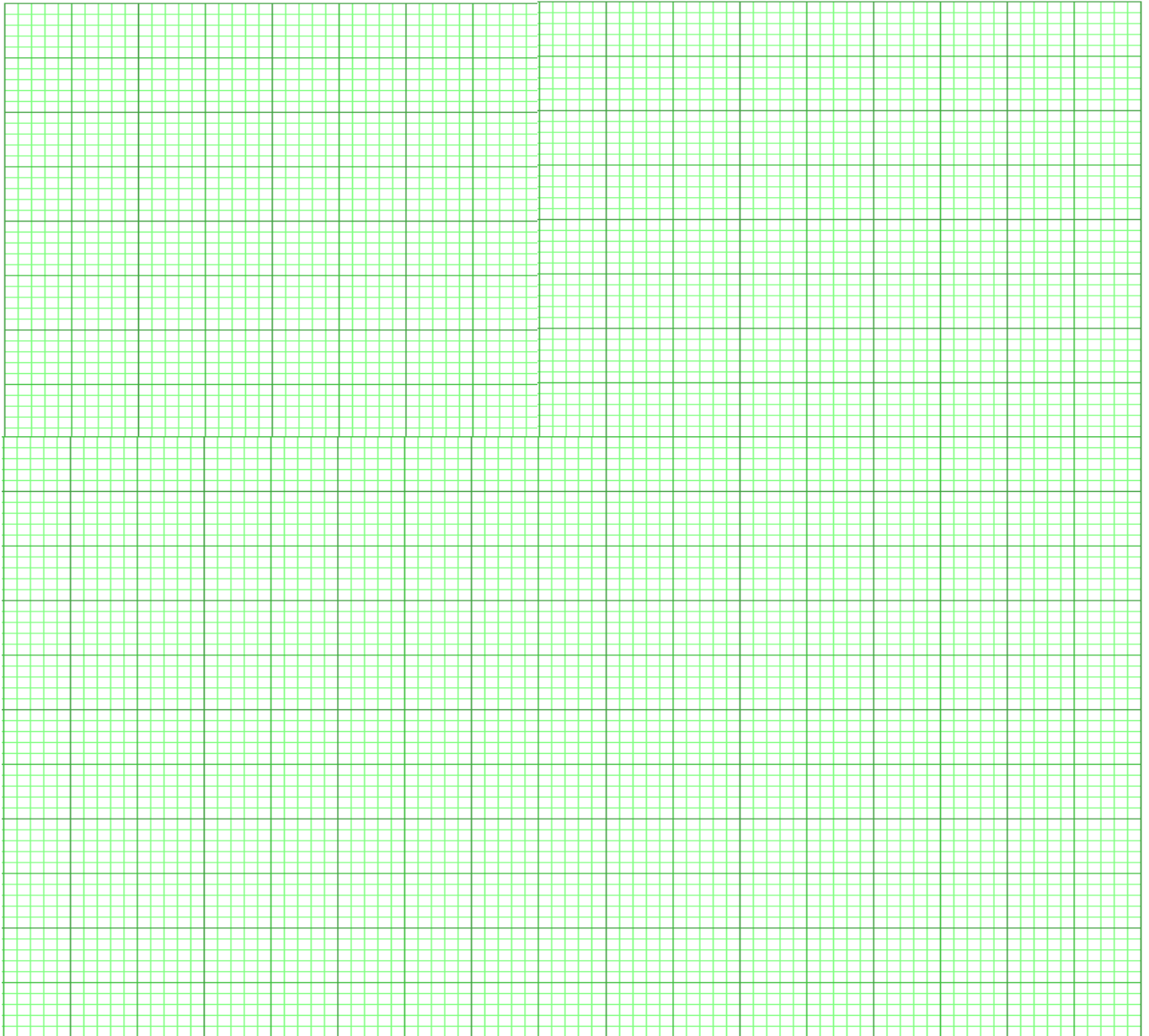
b) If p and n are each increased by 10%, find the percentage increase in m
correct to 2 decimal places

(3MKS)

14) a) complete the table below for the function $2x^2 - 3x - 4$ for $-4 \leq x \leq 2$ (2MKS)

X	-2	-1	0	1	2	3
$2x^2$		2	0	2	8	
$-3x-4$	2		-4			-13
Y			-4			5

b) On the grid below, draw the graph of $y = 2x^2 - 3x - 4 = 0$ for $-2 \leq x \leq$



C) Use your graph to estimate the roots of $Y=2x^2 - 3x - 4=0$

(3mks)

d) Use your graph to solve $= 4x^2 - 7x=12$

(3MKS)