

ANSWER ALL THE QUESTIONS IN THE MATHEMATICS ASSIGNMENT BOOK**WEEK 1 PAPER 1**

1. Without using a calculator evaluate. (3marks)

$$\frac{2\frac{1}{3} - 1\frac{1}{5} \text{ of } 4}{\frac{1}{4} - \left(-\frac{1}{3}\right)^2}$$

2. Simplify: (3 marks)

$$\left[\frac{x^3 - xy^2}{x^4 - y^4}\right]^{-1}$$

3. Solve for x and y in the equation: $4^x(27)^y = 72$ (3 marks)

4. 10 million shillings was shared by three brothers. Salat got $\frac{1}{4}$. Kipgwen got $\frac{1}{2}$. While Sang' got $\frac{1}{5}$. The remainder was donated to a children home. How much was donated to children home (3 marks)

5. Andai recorded data on observation of time spent by a local university's first year bachelor of commerce students in the library as follows:

Time spent in minutes	11-20	21-30	31-40	41-50	51-60
Cumulative frequency	70	170	370	470	500

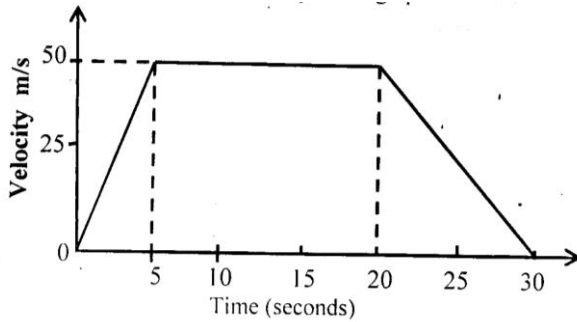
Calculate:

- (a) The mean (4 marks)
- (b) The median (3 marks)
- (c) On the grid provided, draw a frequency polygon from this data (3 marks)
6. (a) Find the equation of a straight line which is perpendicular to $3y - 5x = 5$ and passes through the point of intersection of the lines $2x + y = 5$ and $x - 2y = 0$ (5 marks)

- (b) A straight line $y = \frac{2}{3}x - \frac{2}{3}$ meets the x axis at point T.
- (i) Determine the coordinates of T (2 marks)
- (ii) Determine the acute angle between the line $y = \frac{2}{3}x - \frac{2}{3}$ and x - axis (2 marks)
- (iii) Find the y -intercept of line $y = \frac{2}{3}x - \frac{2}{3}$ (1 mark)
7. Bujumba secondary school intends to buy a certain number of chairs for Ksh. 16200. The supplier agreed to offer a discount of Ksh. 60 per chair which will enable the school to get 3 chairs more. Taking y as the originally intended number of chairs.
- (a) Write an expression in terms of y for:
- (i) Original price per chair (1 mark)
- (ii) Price per chair after discount (1 mark)
- (b) Determine:
- (i) The number of chairs the school originally intended to buy (4 marks)
- (ii) Price per chair after discount (2 marks)
- (iii) The amount of money the school would have saved per chair if it got the intended number of chairs at a discount of 15%. (2 marks)

WEEK 2 PAPER 1

- The line passing through the points P (5, b) and Q (2, 3) is perpendicular to the line $4y + 3x = 1$. Determine the value of b (3 marks)
- The cost of a pair of shoes was Ksh. 800. A dealer raised the price by 10% and later reduced it by 20%. What is the current price of the pair of shoes (2 marks)
- Given that position vector $OT = \begin{pmatrix} 1 \\ -4 \end{pmatrix}$ and the column vector $TN = \begin{pmatrix} 7 \\ 10 \end{pmatrix}$, find the position vector ON (2 marks)
- . The figure below is a velocity - time graph for a car.



Find the total distance travelled by the car (2 marks)

5. Find the integral values of x which satisfy the compound inequality (3 marks)

$$3x - 2 \leq 8 + 5x > 12 + 6x$$

6. . The position vectors of A, B and C are $A = 3i - 2j$, $B = -6i + 4j$ and $c = -9i - 3j$.

(a) State the column vectors

(i) AB (2 marks)

(ii) CB (2 marks)

(b) Find the distance from A to C (2 marks)

(c) Find the coordinates of the midpoint of AC (2 marks)

(d) If C' is the image of C under translation vector $\begin{pmatrix} 1 \\ -3 \end{pmatrix}$ find the coordinates of C' (2 marks)

7. Two friends Jane and Bob live 40 km apart. One day Jane left her house at 9.00 a.m. and cycled towards Bob's house at an average speed of 15 km/h. Bob left his house at 10.30 a.m. on the same day and cycled towards Jane's at an average speed of 25 km/h.

(a) Determine :

(i) The distance from Jane's house to where the two friends met. (4 marks)

(ii) The time they met. (2 marks)

(iii) How far from Jane's house when they met. (2 marks)

- (b) The two friends took 10 minutes at the meeting point and then cycled to Bob's house at an average speed of 12 km/h. Find the time they arrived at Bob's house. (2 marks)

WEEK 3 PAPER 1

1. Evaluate $\frac{-4\{(-4+-15\div 5)+-3-4\div 2\}}{84\div -7+3--5}$ (3 marks)

2. Simplify completely the expression: $\frac{6x^2y^2-20xy+16}{2x^2y^2-8}$ (3 marks)

3. Given that $\sin(x+60)^\circ = \cos(2x)$, find $\tan(x+60)^\circ$ (3 marks)

4. List all the integral values of x that satisfy the inequalities; (3 marks)

$$x - \frac{3}{2} \leq 2x + 1 < 5$$

5. Use squares, square roots and reciprocals tables to evaluate, to 4 significant figures, the expression:

$$\frac{1}{\sqrt{27.56}} + \frac{3}{(0.071)^2}$$
 (3 marks)

6. (a) a straight line L_1 whose equation is $9y - 6x = -6$ meets the x-axis at Z. Determine the coordinates of Z (2 marks)

(b) A second line L_2 is perpendicular to L_1 at Z. Find the equation of L_2 in the form $ax + by = c$, where a, b and c are integers. (3 marks)

(c) a third line L_3 passes through the point (2,5) and is parallel to L_1 . Find:

i) The equation of L_3 in the form $ax + by = c$, where a, b and c are integers. (2 marks)

ii) The coordinate of point R at which L_2 intersects L_3 . (3 marks)

7. Five points, P, Q, R, V and T lie on the same plane. Point Q is 53km on the bearing of 055° of P. Point R lies 162° of Q at a distance of 58km. Given that point T is west of P and 114km from R and V is directly south of P and $S40^\circ E$ from T.

a) Using a scale of 1:1,000,000, show the above information in a scale drawing. (3 marks)

b) From the scale drawing determine:

i) The distance in km of point V from R. (2 marks)

- ii) The bearing of V from Q. (2 marks)
- iii) Calculate the area enclosed by the points PQRVT in square kilometers. (3 marks)

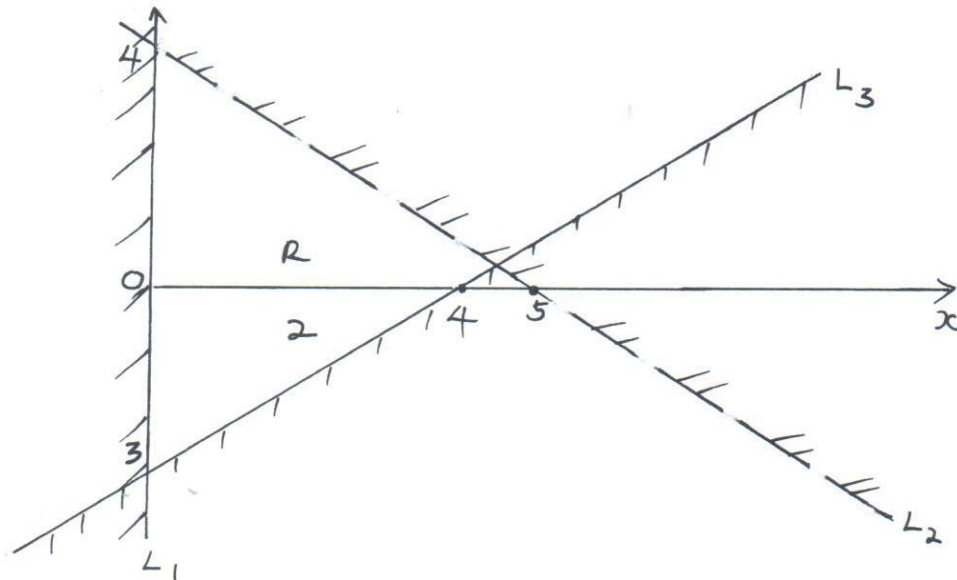
WEEK 4 PAPER 1

1. Wanyama on arrival in Kenya to play for Harambee Stars against Uganda Cranes converted 6000 Euros into Kenyan Shillings. During his stay in Kenya he spent Kshs. 260,000 and converted the remaining amount into US Dollars before travelling back to England. Using the exchange rates below, find how many US Dollars he got? (4 mks)

Currency	Buying (Kshs.)	Selling (Kshs.)
1 US Dollar	96.20	96.90
1 Euro	112.32	112.83

2. Solve for y given that y is acute and $\sin(3y - 50^\circ) - \cos(2y + 10^\circ) = 0$ (3 mks)

3. Find the inequalities that define the region R shown in the figure below. (3 marks)



4. Nyongesa is a sales executive earning a salary of Kshs. 120,000 and a commission of 8% for the sales in excess of Kshs. 1,000,000. If in January he earned a total of Kshs. 480,000 in salaries and commission.

(a) Determine the amount of sales he made in the month of January. (4 mks)

(b) If the total sales in the month of February increased by 18% and in the month of March dropped by 30% respectively;

Calculate:-

(i) Nyongesa's commission in the month of February. (3 mks)

(ii) His total earning in the month of March. (3 mks)

5.. A sector of angle 108° is cut from a circle of radius 20 cm. It is folded to form a cone.

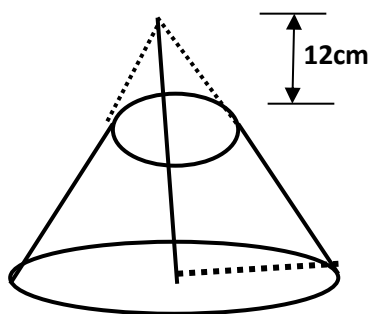
Calculate:

(a) The curved surface area of the cone. (2 mks)

(b) The base radius of the cone. (2 mks)

(c) The vertical height of the cone. (2 mks)

(d) If 12 cm of the cone is chopped off to form a frustum as shown below.



Calculate the volume of the frustum formed. (2 mks)

6. a) Find A^{-1} , the inverse of matrix $A = \begin{pmatrix} 6 & 5 \\ 4 & 7 \end{pmatrix}$ (2 mks)

b) Ibanda sells white and brown loaves of bread in his kiosk. On a certain day he sold 6 white loaves of bread and 5 brown ones for a total of Kshs. 520. The next day he sold 4 white loaves and 7 brown ones for a total of Kshs. 530.

i. Form a matrix equation to represent the above information. (1 mk)

ii Use matrix method to find the price of a white loaf of bread and that of a brown loaf of bread. (3 mks)

c) A school canteen bought 240 white loaves of bread and 100 brown loaves of bread. A discount of 10% was allowed on each white loaf whereas a discount of 13% was allowed on each brown loaf of bread. Calculate the percentage discount on the cost of all the loaves of bread bought. (4 mks)

7. A village Q is 7 km from village P on a bearing of 045° . Village R is 5 km from village Q on a bearing of 120° and village S is 4 km from village R on a bearing of 270° .

a) Taking a scale of 1 m to represent 1 Km, locate the three villages. (3 mks)

b) Use the scale drawing to find the:

i. Distance and bearing of the village R from village P. (2 mks)

ii. Distance and bearing of village P from village S. (2 mks)

iii. Area of the polygon PQRS to the nearest 4 significant figures. (3 mks)

WEEK 5 (PAPER 2)

SECTION 1: (50 MARKS) ANSWER ALL QUESTIONS

1. Use logarithms to evaluate to 4 significant figures (3 marks)

$$\frac{(0.5241)^2 \times 83.59}{\sqrt[3]{0.23 + 0.126}}$$

2. The height of a cone is exactly 12cm. Calculate the percentage error in the volume if the radius is 7cm correct to the nearest centimeter. (3 marks)

3. Make h the subject of the formula (3 marks)

$$V = \sqrt[3]{\frac{ax^2h}{b-h}}$$

4. Z is directly proportional to x^2 and inversely proportional to y. If x is increased by 20% and y is decreased by 20%. Find the percentage change in Z. (3 marks)

5. Given that $\vec{OA} = 3\vec{i} + 2\vec{j} - 4\vec{k}$ and $\vec{OB} = 4\vec{i} + 5\vec{j} - 2\vec{k}$ and a point P divides line AB externally in the ratio 3:2, determine the magnitude of \vec{OP} to 2 decimal places (3 marks)

6. Given that $2\cos(2x - 30^\circ) = -\frac{6}{5}$ find x where $180^\circ \leq x \leq 360^\circ$ (3 marks)

7. Irene buys a printer on hire purchase. She pays a deposit of sh.4000 and 12 monthly installments of sh.1500 each. Calculate the cash price if a compound interest of 5% per month is charged on the amount borrowed. (3 marks)

8. Find the value of x in the equation

$$\log(15 - 5x) - \log(3x - 2) - 2 = 0 \quad (3 \text{ marks})$$

9. Rationalize the denominator and simplify (3 marks)

$$\frac{4}{\sqrt{5} + \sqrt{2}} - \frac{3}{\sqrt{5} - \sqrt{2}}$$

10. Given that $\mathbf{A} = \begin{bmatrix} 1 & 0 & 1 \\ 3 & 0 & \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 4 & 2 \\ 9 & 6 \end{bmatrix}$

Find $\mathbf{A}^{-1}\mathbf{B}$ (3 marks)

11. Solve the equation $2x^2 + 3x = 5$ by completing the square method. (3 marks)

12. The number of birds in a sanctuary was originally 1.2million. Due to a mysterious diseases this number halved itself after every one week. Determine the number of birds remaining in the sanctuary at the end of the 5th week. (3 marks)

13. Simplify the expression $\frac{3x^2 - 4xy + y^2}{9x^2 - y^2}$ (3 marks)

14. Construct triangle PQR with PQ = 5.8 cm, QR = 3.4 cm and PR = 4.1 cm. Construct a circle passing through P, Q and R. Measure its radius (4 marks)

15. The cost of an article is sh. 1,200. Find the rate of inflation if the cost of the article after 5 years is sh. 1,932.60. (3 marks)

16. The product of the third and fourth terms of an arithmetic sequence is 3000. Find the first term if the common difference is 10. (3 marks)

WEEK 6

SECTION II: (50 MARKS) ANSWER ALL THE QUESTIONS

Answer any five questions from this section in the spaces provided after each.

17. (a) Complete the table below for the function $y = 2x^2 + 4x - 3$ (2 marks)

X	-4	-3	-2	-1	0	1	2
$2x^2$	32		8	2	0	2	
$4x-3$			-11		-3		
Y			-3			3	13

(b) Draw the graph of the function $y = 2x^2 + 4x - 3$ on the grid provided. Use the scale: 2cm rep 1 unit on the x-axis and 1cm rep 2 units on the y-axis. (3 marks)

(c) Use your graph to estimate the roots of the equation $2x^2 + 4x - 3 = 0$ (1 mark)

(d) Use your graph to obtain the roots of the equation $2x^2 + x - 5 = 0$ to 1 decimal place. (3 marks)

(e) Draw the line of symmetry to pass through the turning point of this curve. (1 mark)

18. The table below shows how income tax was charged on income earned in a certain year.

Taxable income per year(Kenyan shillings)	Rate
1-72,600	10%
72,601- 145,200	15%
145,201 -217,800	20%
217,801 - 290,400	25%

Mr. Mwangula is an employee of a certain company and earns a salary of ksh.15,200 per month. He is housed by the company and pays a nominal rent of Ksh. 1050 per month. He is married and is entitled to a family relief of ksh. 450 per month.

- i. Calculate his taxable income in Ksh p.a (2 marks)
- ii. Calculate his gross tax per month. (4 marks)
- iii. Calculate his net tax per month (2 marks)
- iv. Calculate his net salary per month (2 marks)

19. The first term of a **G.P** is 1 while the first term of an **AP** is 4. The third term of the **G.P** is the first term of the **AP**. The ratio of the common difference to the common ratio of the progression is 3:2 the (Common ratio is greater than 0). Find;

- (a) The common ratio of the **G.P** and common difference of the **A.P** (4mks)
- (b) The fifth term of the **A.P** (2mks)
- (c) The 6th term of the **G.P** (2mks)
- (d) The sum of the first four terms of the **G.P**. (2mks)

20. (a) Complete the table below for the functions $y = 3 \sin(2x - 30)$ and $y = \cos(x + 60)$ in the domain $-180^\circ \leq x \leq 180^\circ$ (2 marks)

x°	-180 ⁰	-150 ⁰	-120 ⁰	-90 ⁰	-60 ⁰	-30 ⁰	0 ⁰	30 ⁰	60 ⁰	90 ⁰	120 ⁰	150 ⁰	180 ⁰
$y = 3\sin(2x - 30)$	-1.5			1.5	-1.5			1.5	3			-3	
$y = \cos(x + 60)$	-0.5			0.87	1			0	-0.5			-0.87	

(b) On the same axes draw the graphs of $y = 3 \sin (2x - 30)$ and $y = \cos (x+60)$

Use the scale: 1cm rep 30⁰ on the x-axis and 1cm rep 1 unit on the y- axis. (5 marks)

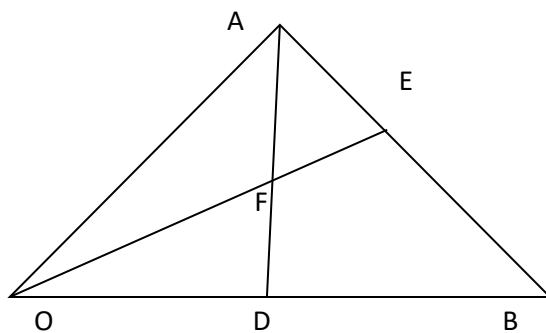
(c) Use your graphs to solve:

(I) $3 \sin (2x - 30)^\circ = 0$ (1 mark)

(II) $\cos (x + 60)^\circ = 0$ (1 mark)

(III) $3 \sin (2x - 30)^\circ - \cos (x + 60)^\circ = 0$ (1 mark)

21. In the figure below, E is the midpoint of AB, OD:DB=2:3 and f is the point of intersection of OE and AD.



Given $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$

a) Express in terms of \mathbf{a} and \mathbf{b}

i. \mathbf{AD} (1 mark)

ii. \mathbf{OE} (2 marks)

b) Given that $\mathbf{AF} = s\mathbf{AD}$ and $\mathbf{OF} = t\mathbf{OE}$ find the values of s and t (5 marks)

c) Show that E, F and O are collinear. (2 marks)

22. (a) A quantity P varies directly as the cube of Q and inversely as the square root of R. When $P = 189, Q = 6$ and $R = 16$. (i) Determine the value of P when $Q = 8$ and $R = 25$. (3 marks)

(ii) Find the percentage change in Q when P is increased by 15% and R is decreased in the ratio 4:5. (3 marks)

(b) The charge C shillings per person for a seminar in a hotel is partly fixed and partly varies inversely as the total number of persons attending the seminar. When 100 people attend, the charge is Ksh 2 036 per person while when 80 people attend, the charge is Ksh 2 045 per person. Calculate the charge per person when 200 people attend the seminar. (4 marks)

23. A football match is such that a win garners three points a draw garners one point and a match lost earns no point. The probability of team winning is 40% lose is 45% and a draw 15% if the team plays two games:

a. draw a probability tree diagram to represent all the possible outcomes. 2marks

b. the probability that:

i. they earn six points. (2 marks)

ii. they win at least one match. (2 marks)

iii. they will have at most two points. (2 marks)

iv. they will garner more than one points. (2 marks)

24. The table below shows monthly income tax rates.

Monthly taxable pay K£	Rate of tax sh per K£
1-342	2
343-684	3
685-1026	4
1027-1368	5
1369-1710	6
Over 1710	7

A civil servant earns a monthly salary of sh 20 000 and is provided with a house at a normal rent of sh 700 per month.

a) calculate the civil servant taxable pay in K£ (4mks)

b) Calculate the total tax (4mks)

c) If the employee is entitled to a tax relief of sh 600 per month. What is the net tax paid? (2mks)