456/1
MATHEMATICS
PAPER 1
November 2023
2 hours

WAKISSHA JOINT EXAMINATIONS

End of Year Assessment

SENIOR THREE

MATHEMATICS

Paper 1

2 hours

INSTRUCTIONS

- *Attempt all items in this paper.*
- *All items carry equal scores*

1. Okello and another new comer Okot of the same age. They need to know their ages to put in class register. The product of their ages is 144 years. One day during mathematics lesson Okello borrows a calculator from Okot and on the screen he finds a number 720 which made him wonder which numbers he could have entered to get the outcome as that figure. On the same day since they had not moved with packed food, they decided to visit the school canteen. Okello bought 5 sweets with 2 chapat's and was charged ugx 2500. Okot bought 4 sweets with one chapat and was charged Ugx 1400. Since the students were many and the canteen attendant was too busy they could not ask the prices of each item.

Task

a) How old do you think are the two friends?

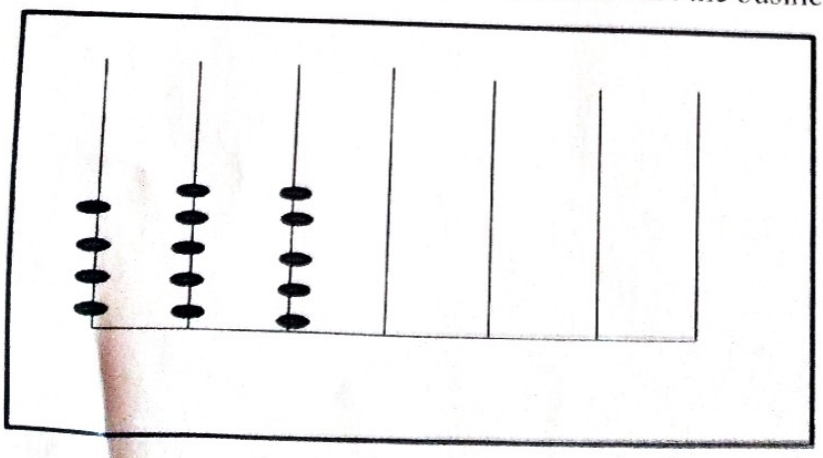
b) Help Okello figure out the possible values that Okot could have typed in the calculator to get the number on the screen.

c) Help the two friends to find out the prices of each items, sweet and chapat.

2. A worker wants to save money to start his own business. He is able to save Ugx 100,000 every month from his salary of Ugx 600,000. However each time money accumulates on his account, he gets a challenge and he uses the money. He, approaches a friend for advice and he is given these two options:

Open up a smart plan with his bank with the following terms:	Get an insurance policy with the following terms:
i) He is given additional 5% saving interest on total amount saved in the agreed time.	i) He is given an additional 5% saving interest on each Ugshs 1,200,000 saved every year.
ii) Here you choose how many years you want to save.	ii) Here the minimum years are 5years not less.

The worker was a man who was good at using an abacus to make his calculations. And as he calculated the amount he needs to start the business he came up with;



Base 10 Abacus

His other expenses include; House rent which is a quarter of his monthly salary. Home glossaries of Ugx 100,000. And transport to work which is one and half of the amount he spends on his groceries. The balance is what he keeps for other unexpected circumstances.

Task

a) How long will it take him to make money he needs?

b) Which option of saving should he take and why?

c) Which money goes to unexpected circumstances every month?
(Show the working on how you reached the conclusion on each part)

3. A friend to your guardian wants to bring his child to the same school you attend. He calls your guardian and requests her to direct him to your school. There are two routes you can use from home to school;
Route A. A straight direct murram roads from home to school
Route B: From home, drive in the direction of 135 degrees for 55 km and then makes a bearing of 180 degrees turn and drive more 40 km you will find Kalagi trading centre. From Kalagi you will further drive in the Western direction until you reach the school. The home is vertically located above the school premises.
The friend requests your guardian to send him a drawing instead summarizing his direction but she assigns you to draw.

Task

a) Assist her to make the drawing showing the road map to school.

b) If after the drawing a friend rather decides to take the Southern direction from home. Through what distance will he drive to reach school?

c) If he starts driving at 12:30 pm and arrives at school at 2:30 pm through route B non-stop. What shall be his average speed?

d) Which option of the two routes should he take and why?

4. Four members of a certain sacco namely; Aboth, Balikoowa, Dumba and Ekotu bought items as given below:

A both bought one bag of posho, 5 bags of millet, 2 bags of sorghum and 2 bags of rice.
Balikoowa bought 5 bags of posho, 3 bags of millet and 4 bags of rice. Dumba bought 4 bags of posho and 8 bags of rice.
Ekotu bought 3 bags of rice 4 bags of sorghum 3 bags of millet and 2 bags of posho.

The cost per bag of the items bought was; Rice at Ugx 200,000, sorgum at Ugx 60,000, millet at Ugx 75,000, posho at Ugx 100,000.

Task

a) Assist the sacco members to summarise the above information in matrix form for the
   i) items purchased
   ii) cost expensed

b) What do you think is the appropriate order of matrix multiplication for computing total expenses?

c) Using your knowledge of matrix multiplication help the members to know how each shall spend on their purchases.

d) If the members of the sacco sold all their items at Ugx 7, 150,000 and agreed to share this money amongst Aboth, Balikowa, Dumba, Ekotu in the ratio 2:3½: 5:2½ respectively. Help the members to determine how much each should take at the end of the business.

e) Of the four members, who got maximum profits?

END

Basis	Competency	Evidence/Skill	Score	Distribution of Score
• Organization of data • Computation of expenses • Representing data graphically	• Ability to understand and use matrices • Learners are able to identify appropriate graphs • Learners should plot, interpret and use graphs to solve problems • Learner understands use of ratios and proportions	(data matrix, see table below)	1 mk	B1 for data matrix 4x4
		c Cost matrix (100	1 mk	B1 for cost matrix 4x1/1x4
		b) 4x4 by 4x1 c)	1 mk	B1 for both orders
		$\begin{pmatrix} 1 & 5 & 2 & 2 \\ 5 & 3 & 0 & 4 \\ 4 & 0 & 0 & 8 \\ 2 & 3 & 4 & 1 \end{pmatrix} \begin{pmatrix} 100\,000 \\ 75\,000 \\ 60\,000 \\ 200\,000 \end{pmatrix}$ **Aboth** spent 100,000 + 375,000 + **Balikoowa** **Dumba** **Ekotu** $\begin{pmatrix} 1 & 5 & 2 & 2 \\ 5 & 3 & 0 & 4 \\ 4 & 0 & 0 & 8 \\ 2 & 3 & 4 & 1 \end{pmatrix}$ 000 75000 60000 200000) order matrices 120,000 + 400,000 = Ugs 995,000 1,000 + 225,000 + 800,000 = Ugs 1,525,000 30 + 1,600,000 = Ugs 2,000,000 spent 200,000 + 240,000 + 1,265,000	8mks	M1 for expression A1 for ans M1 for expression A1 for ans M1 for expression A1 for ans M1 for expression A1 for ans
		(d) $2 + 3\frac{1}{2} + 5 + 2$ $\frac{1}{2} = 13$ **Aboth** $\frac{2}{13}$ x 7,150,000 = Ug 1,100,000 **Balikoowa** got $\frac{3.5}{13}$ x 7,150,000 = Ugs 1,925,000 **Dumba** got $\frac{5}{13}$ x 7,150,000 = Ugs 2,750,000 **Ekotu** got $\frac{2.5}{13}$ x 7,150,000 = Ugs 1,375,000	9 mks	B1 for sum = 13 M1 for expression A1 for ans M1 for expression A1 for ans M1 for expression A1 for ans M1 for expression A1 for ans
		e) Profits made by Abot 995,000 = Ugs 105,000 1,100,000 – Balikoowa 1,925,000 – 1,525,000 = Ugs 400,000 Dumba 2,750,000 – 2,000,000 = Ugs 750,000 Ekotu 1,375,000 – 1,265,000 = Ugs 110,000 *Dumba got maximum profits*	5 mks	B1 for Aboth's profit B1 for Balikoowa's profit B1 for Dumba's profit B1 for Ekotu's profit B1 for Dumba
		Total	23 mks	

Data matrix (Evidence/Skill, part a):

	P	M	S	R
Ab	1	5	2	2
B	5	3	0	4
F	4	0	0	8
E	2	1	4	1

WAKISSHA JOINT EXAMINATIONS
SCORE GUIDE
End of year Assessment
Senior Three
November 2023
MATHS

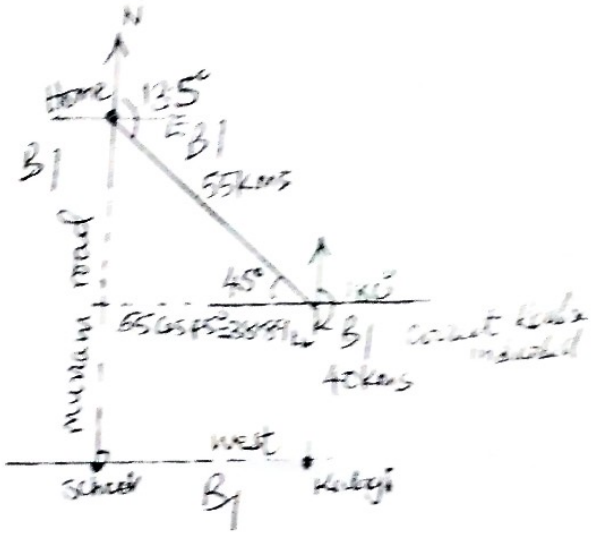
COMPETENCY BASED SCORING GRID

Item 1:

Basis	Competency	Evidence/Skill	Score	Distribution of Score
a) Ability to work with integers b) Formation of algebraic equations c) Ability to apply algebra to solve simultaneous equations	• Learner carries out calculations with positive and negative integers. • Find the prime factorization of numbers.	**a)** Let "a" be the age of boys $a \times a = 144$ $a^2 = 12^2$, $\therefore a = 12$.	3 Marks	B_1 Stating/implied $a \times a = 144$ M_1 for $a^2 = 12^2$ A_1 for $age = 12$ years
		b) Identifying **all** factors of 720. {1, 2,3, 4, 5, 6, 8, 9,80, 90, 12,144, 180,240,360, 720}	4 Marks	B_4 if all factors are identified. B_3 if ¾ of the factors are identified. B_2 if ½ identified. B_1 if ¼ identified.
		The possible numbers include (1, 720),(2, 360), (3,240), (4, 180),(5, 144),(6, 120), (8, 90), (9,80).	8 Marks	B_1 for each pair of factors stated $\times 8 = 8$ marks.
		c) Let x, y be the prices of each sweet and chapat respectively. Okello purchased $5x + 2y = 2500$. Okot purchased $4x + y = 1400$. From Okot's; $y = 1400 - 4x$ $5x + 2(1400 - 4x) = 2500$ $5x - 8x = 2500 - 2800$ $\rightarrow x = 100$ $y = 1400 - 4(100)$ $y = 1000$ $\therefore$ each sweet costs Ugx100 and each chapat costs Ugx 1000.	10 Marks	B_2 for forming each equation. $\times 2 = 4$ marks. B_1 for making y the subject. M_1 Simplification. A_1 for $x = 100$. B_1 for correct substitution. M_1 Simplification. A_1 for $y = 1000$.
		Total Marks	**25**	

Item 2:

Basis	Competency	Evidence/Skill	Score	Distribution of Score
▪ Decision making in business. ▪ Learner uses both options: Simple interest and compound interest.	• Learner uses decimal place values to develop understanding of numbers. • Learners carry out calculations with positive and negative integers. • Learner understands and applies Business Mathematics when solving problems.	a) Given Salary 600,000, Savings 100,000. Balance is 500,000. Amount needed = 10,000 + 100,000 + 100,000 = Ugx 210,000.	1 mk	B_1 for balance seen or implied
		Rent = ¼ x 600,000 = Ugx 150,000 Glossaries = Ugx100,000 Transport = $\frac{3}{2} \times 100{,}000$ = Ug 150,000 Ugx **400,000**	2 mks	M_1 for expression A_1 for 210,000
		Un expected = 500,000 – 400,000 = Ugx **100,000**	5 mks	M_1 for computing rent, A1 for 150,000 M_1 for calculating transport.
		Option 1, Amount = Principal + Interest $210{,}000 = 100{,}000n + \frac{5}{100} \times 100{,}000n$ $210{,}000 = 105{,}000n$ n = 2 years.	2 mks	M_1 for addition, A_1 for 400,000 M1 for subtraction, A1 for 100,000.
			5 mks	M_1 for expression, M_1 for equating, M_2 for simplification, A_1 for n = 2.
		Option 2, Interest in 5years = $\frac{5}{100} \times 12{,}000{,}000 \times 5$ = Ugx 300,000	3 mks	M1 for stating, M1 for simplification and A1 for 300,000. M1 for addition and A1 for 800,000.
		Amount in 5years = $(5 \times 100{,}000 + 300{,}000)$ = Ugx 800,000.	2 mks	M1 for expression, M1 for simplification, A1 for value y=1.3125
		5 years = 800,000 y years = 210,000, → $y = \frac{(210{,}000 \times 5)}{800{,}000}$	3 mks	B1 for conclusion.
		y = 1.3125 years		B1 for unexpected.
		b) **Conclusion:** Option 1 is better because interest in agreed time.	1 mk	
		c) **Unexpected circumstances** = Ugx 100,000	1 mk	
		Total	**25 mks**	

Basis	Competency	Evidence/Skill	Score	Distribution of Score
• Ability to represent relative positions on a sketch diagram. • Ability to manipulate algebra	• Learner uses compass points, bearings and scale drawings. • Learner understands and uses the three basic trigonometric functions.	 Distance Kalagi to School $55\cos 45^0 = 38.89km$ (2d.p) Distance on tarmac is (55 + 40 + 38.89) = 133.89 Av. Speed = $\frac{Total\ distance}{Total\ time} = \frac{133.89}{2}$ $= 67km/hr$ Distance on marram road = 38.89 + 40 = 78.89km Time taken = $\frac{78.89}{30} = 2.63hrs$ Preference: Use tarmac road Reason: Movement on tarmac takes less time and low consumption of fuel.	4 mks 4 mks 3 mks 2 mks 3 mks 5 mks 1 mk 2 mks	B- for each relative route correctly drawn × 4 = 4mks B- for each bearing drawn correctly 135°, 180° and Western direction and B1 for complete sketch. B- for identifying, M1 for simplification and A1 for the answer. M- for addition, A1 for 133.89 B- for expression, M1 for simplification and A1 for 2.63hrs M1 for addition, A1 for 78.89, M1 for expression, M1 for simplification and A- for 2.63hrs. B- seen/implied B- for time B- for stating consumption
		Total	**24**	

Item 4:

Basis	Competency	Evidence/Skill	Score	Distribution of Score
▪ Organization of data. ▪ Computation of expenses. ▪ Representing data graphically.	• Ability to understand and use matrices. • Learners are able to identify appropriate graphs. • Leaners should plot, interpret and use graphs to solve problems. • Learner understands use of ratios and proportions.			

	P	M	S	R
Ab	1	5	2	2
B	5	3	0	4
F	4	0	0	8
E	2	3	4	3

ii. Cost matrix (100

b) 4x4 by 4x1

c)

$$\begin{pmatrix} 1 & 5 & 2 & 2 \\ 5 & 3 & 0 & 4 \\ 4 & 0 & 0 & 8 \\ 2 & 3 & 4 & 3 \end{pmatrix} \begin{pmatrix} 100\,000 \\ 75000 \\ 60000 \\ 200000 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 5 & 2 & 2 \\ 5 & 3 & 0 & 4 \\ 4 & 0 & 0 & 8 \\ 2 & 3 & 4 & 3 \end{pmatrix}$$

000 75000 60000 200000) order matrices

Aboth spent 100,000+375,000+ 120,000 +400,000 = Ugx 995,000

Balikoowa ,000+225,000+800,000 = Ugx 1,525,000

Dumba 00+1,600,000 = Ugx 2,000,000 spent 200,000+240,000

Ekotu x 1,265,000

d) $2 + 3\frac{1}{2} + 5 + 2$ $\frac{1}{2}$ = 13

Aboth $\frac{2}{13}$ × 7,150, 000 = Ug 1,100,000

Balikoowa got $\frac{3.5}{13}$ × 7,150,000 = Ugx 1,925,000

Dumba got $\frac{5}{13}$ × 7 ,150,000 = Ugx 2,750,000

Ekotu got $\frac{2.5}{13}$ × 7, 50,000 = Ugx 1,375,000

e) Profits made by: Abot 995,000 = Ugx 105,000

1,100,000 – Balikoowa 1,925,000 – 1,525,000 = Ugx 400,000

Dumba 2,750,000 – 2,000,000 = Ugx 750,000

Ekotu 1,375,000 – 1,265,000 = Ugx 110,000

Dumba got maximum profits

	1 mk	B1 for item matrix 4x4
	1 mk	B1 for cost matrix 4x1/1x4
	1 mk	B1 for both orders
	8mks	M1 for expression, A1 for ans. M1 for expression, A1 for ans. M1 for expression, A1 for ans. M1 for expression, A1 for ans.
	9 mks	B1 for sum = 13 M1 for expression, A1 for ans. M1 for expression, A1 for ans. M1 for expression, A1 for ans. M1 for expression, A1 for ans.
	5 mks	B1 for Aboth's profit B1 for Balikoowa's profit B1 for Dumba's profit B1 for Ekotu's profit B1 for Dumba
Total	25 mks	