

456/1  
MATHEMATICS  
PAPER 1  
July/August 2023  
2½ hours



## WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

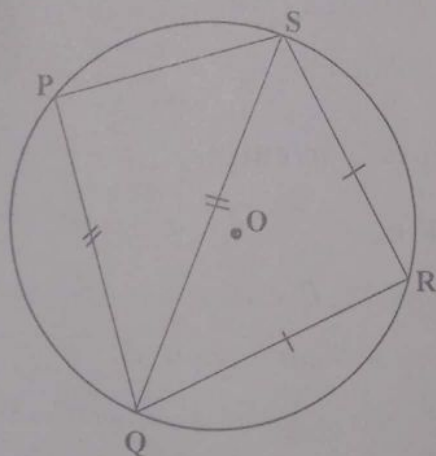
### INSTRUCTIONS TO CANDIDATES:

- Answer *all* questions in section A and any *five* questions from section B.
- Any additional question(s) answered will not be marked.
- All necessary calculations *must* be done in the same answer booklet/sheets provided, with the rest of the answers. Therefore no paper should be given for rough work.
- Graph paper is provided.
- Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

## SECTION A (40 marks)

*Answer all questions in this section.*

1. Given that  $x \Delta y = x^2 - 6y^2$ , evaluate  $(3 \Delta 6) \Delta 4$ . (4 marks)
2. The bearing of point A from point B is  $210^\circ$ . Find the bearing of point B from point A. (4 marks)
3. Given that matrix  $P = \begin{pmatrix} 3 & 0 \\ 5 & 1 \end{pmatrix}$ . Show that  $P^2 - 4P + 3I = 0$  where  $I$  is the identity matrix of order 2 by 2. (4 marks)
4. Factorise completely  $12p^2 - 27q^2$ . (4 marks)
5. A school bus carries 78 passengers when full. The bus has a total of 30 seats. Some of the seats are for 3 passengers and others are for 2 passengers. Determine the number of seats for three passengers and for two passengers. (4 marks)
6. Given that  $\tan x = 0.5774$ . Find the two possible values of  $x$  for which  $\tan x = -0.5774$ . (4 marks)
7. In the figure below  $PQ = QS$  and  $RQ = RS$ , angle  $PQS = 36^\circ$ , where  $O$  is the centre. (4 marks)



Find angle SQR.

(4 marks)

8. Solve the inequality  $\frac{1}{4}(2x + 3) \leq 4 - \frac{1}{4}(3 - x)$ , hence show your answer on the number line. (4 marks)
9. Make  $L$  the subject of the expression  $T = 2\pi \sqrt{\frac{L^2 + M}{MH}}$ . (4 marks)
10. A number is chosen at random from the integers 1 to 10. Find the probability that the number chosen is either a factor of 10 or a prime number. (4 marks)

# SECTION B (60 marks)

Answer any five questions from this section. All questions carry equal marks.

11. The table shows marks scored by 46 students in a mathematics test.

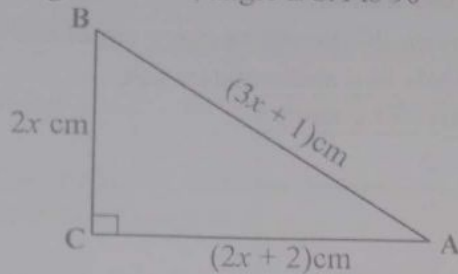
Marks	Cummulative frequency
29.5 – 34.5	2
34.5 – 39.5	7
39.5 – 44.5	17
44.5 – 49.5	32
49.5 – 54.5	40
54.5 – 59.5	44
59.5 – 64.5	46

- (a) Calculate the mean mark, using the working mean of 47 marks. (8 marks)
- (b) Draw a cumulative frequency curve and use it to estimate the number of students who scored above 47 marks. (4 marks)
12. (a) Draw a graph of  $y = x^2 - 2x - 3$  for  $-2 \leq x \leq 4$ .  
Use a scale of 2 cm to represent 1 unit on both axes. (6 marks)
- (b) Use your graph in (a) above to solve equations:-  
(i)  $x^2 - 2x - 3 = 0$ . (2 marks)  
(ii)  $x^2 - 3x = 0$ . (4 marks)
13. (a) Given that  $\begin{pmatrix} 3 & 2 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 3 & p \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 11 & q \\ 3 & 3 \end{pmatrix}$  Find the values of p and q. (3 marks)
- (b) A painter bought 40 tins of Red paint, 25 tins of Yellow paint and 40 tins of Orange paint. In Kikuubo market, the price of a tin of Red, Yellow and Orange paint is Shs. 20,000/=, Shs. 15,000/= and Shs. 25,000/= respectively. In Nakasero market, the price of a tin of Red, Yellow and Orange paint is Shs. 21,000/=, Shs. 14,000/= and Shs. 26,000/= respectively. By writing the matrices, for the items bought as row matrix and the cost of items bought as column matrix. Use matrix multiplication to find;  
(i) the cost of the paints in each market. (6 marks)  
(ii) where is it cheaper to buy the paints from and by how much? (3 marks)
14. A transformation matrix  $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$  maps the vertices of a quadrilateral ABCD on to  $A'(13,8)$   $B'(21,12)$   $C'(33,20)$  and  $D'(25,16)$
- (a) Find the coordinates of ABCD. (5 marks)
- (b) The image  $A'B'C'D'$  is rotated through a negative quarter turn about the origin to form  $A''B''C''D''$ . Write down the coordinates of  $A''B''C''D''$  (4marks)
- (c) Find a single transformation matrix that would map quadrilateral  $A''B''C''D''$  back to ABCD. (3marks)

Turn Over  
3



15. (a) In the figure below, angle  $BCA$  is  $90^\circ$



Find the value of  $x$  and hence determine the height  $BC$ .

(5 marks)

- (b) The angle of elevation of the top of the cliff from Tom's home is  $30^\circ$ . Tom moved from his home towards the cliff, after covering a distance of 400 m, the angle of elevation of the top of the cliff at that point is  $47^\circ$ . Determine the height of the cliff.

(7 marks)

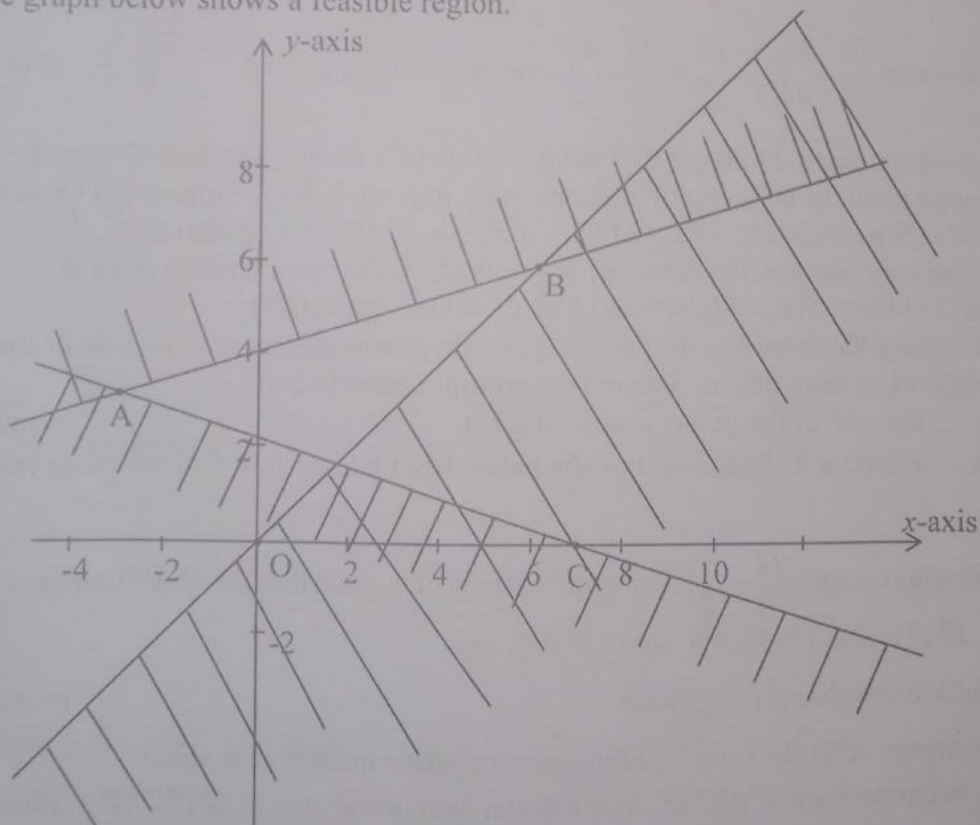
16. (a) Using a pair of compasses, a ruler and a pencil only, construct a triangle  $PQR$  where  $\overline{QR} = 7.2$  cm, angle  $PQR = 75^\circ$  and  $\overline{PR} = 8.4$  cm

- (b) Draw a circle to circumscribe the triangle  $PQR$ . Measure the radius of a circle and the length  $\overline{PQ}$ .

- (c) Find the area of the circle formed, through  $PQR$ . (Use  $\pi = 3.143$ ). Correct your answer to one decimal place.

(12 marks)

17. The graph below shows a feasible region.



Use the graph above to:

- (a) form inequalities representing the feasible region.  
(b) find the maximum value of  $5x + 3y$  from the feasible region.

(9 marks)

(3 marks)

END