456/1

MATHEMATICS

Paper 1

JULY/AUG 2022

2 ½ hours

ASSHU MBARARA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

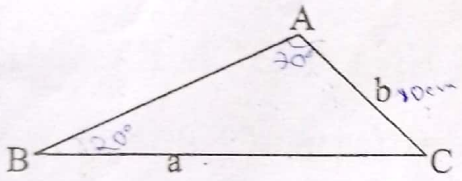
- Answer ALL questions in section A and any FIVE questions from section B.
- Any additional question(s) answered will NOT be marked
- All necessary calculations must be done in the answer booklet(s) provided. Therefore, no paper should be given for rough work.
- Graph paper is provided.
- Silent, non-programmable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

SECTION A (40 MARKS)

Answer ALL questions in this section.

1. The sum of three consecutive even numbers is 72. If the first number is x, find the three numbers. *(4marks)*

2. Solve the following pairs of simultaneous equations
   $3x + y = 10$
   $5x - 2y - 2 = 0$ *(4marks)*

3. 

In an ΔABC, A = 70^0, B = 20^0 and b = 10cm. Find the value of a correct to one decimal place.

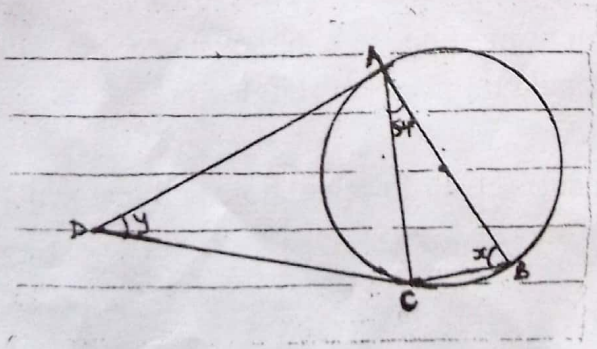
4. The table below shows the distribution of ages of COVID-19 patients in a hospital.

Age of patients (years)	11 – 19	20 – 28	29 – 37	38 – 46	47 – 55
No of patients	7	16	17	20	10

   Draw a histogram to represent the above data. *(4marks)*

5. Determine the value of y in the equation $2^{3y+2} = \left(\frac{1}{16}\right)^{-y}$ *(4marks)*

6. Given that $\begin{pmatrix} 2 & 4 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 24 \\ 6 \end{pmatrix}$. Find the values of a and b *(4marks)*

7. 

In the diagram above AB is the diameter of the circle and DA and DC are tangents to the circle at A and C respectively. Given that angle CAB = 54^0, find the values of x and y *(4marks)*

8. Factorize completely; $5x^2 - 20$. Hence solve $5x^2 - 20 = 0$ *(4marks)*

9. The table below shows the age of pupils in a certain class.

Age (years)	11	12	8
No of pupils	n	10	n

If the mean age of the pupils is 10, find the value of n *(4marks)*

10. A rectangle whose area is $16cm^2$ is given a transformation represented by the matrix $M = \begin{pmatrix} 3 & 6 \\ 2 & 5 \end{pmatrix}$. State the ratio of image area to object area.

(4marks)

SECTION B: (60marks)

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

11. Using a pair of compasses and ruler only, construct a triangle PQR in which PQ = 6cm, QR = 7cm and $<PQR = 75^0$. Measure PR. Construct an inscribed circle in ΔPQR. Measure and record the radius of the circle. Hence calculate the area of the circle. (take $\pi = 3.142$) *(12marks)*

12. (a) Find the inverse of $A = \begin{pmatrix} 4 & -1 \\ 2 & 3 \end{pmatrix}$ *(4marks)*

(b) A mother bought 2eggs and 3 tomatoes at a total cost of shs1175. The cost of 4 tomatoes is sh 100 more than that of one egg.

(i) If x is the cost of an egg and y is the cost of a tomato, write down this information as a pair of simultaneous equations. *(02marks)*

(ii) Using matrix method, determine the cost of one egg and the cost of one tomato. *(6marks)*

13. (a) copy and complete the table below for $y = \sin(\frac{1}{2}x + 30^0)$; $0^0 \leq x \leq 360^0$

X^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0	210^0	240^0	270^0	300^0	330^0	360^0
$Y = \sin(\frac{1}{2}x + 30^0)$	0.5		0.866		1.0			0.707		0.259	0		-0.5

(b) Using a scale of 1cm for 30^0 on the x – axis and 2cm for 1unit on the y – axis, draw the graph of $y = \sin(\frac{1}{2}x + 30^0)$ for $0^0 \leq x \leq 360^0$. ***(4marks)***

(c) Using your graph, solve the equation $\sin(\frac{1}{2}x + 30^0) = 0.6$ ***(2marks)***

14. A triangle ABC where A, B and C are the points (2, 3), (6, 3) and (4, 6) respectively is given a transformation represented by the matrix $m = \begin{pmatrix} 0 & -3 \\ -1 & 2 \end{pmatrix}$ followed by the matrix $N = \begin{pmatrix} 2 & 3 \\ 1 & 0 \end{pmatrix}$ to give the final image A″B″C″.

(a) Find the image points of ;

(i) A′B′ and C′, the image under M

(ii) A″B″ and C″ ***(6marks)***

(b) Describe the single matrix transformation that is represented by the combined matrix transformation M followed by N. ***(2marks)***

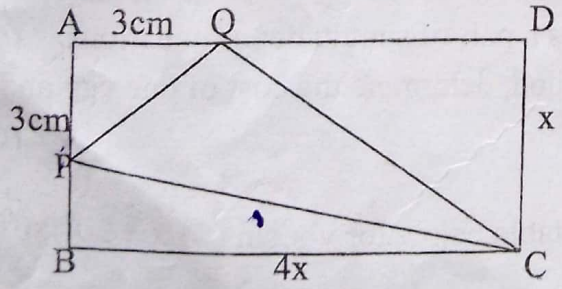
(c) Obtain a single matrix that would map A′B′C′ back on to ABC ***(4marks)***

15. A bag contains 6 white (W), 4 black (B) and 3 red (R) balls.

(a) If two balls are picked at random with replacement, find the probability that both balls are of the same colour. ***(9marks)***

(b) How many Red balls must be added to the bag so that the probability of drawing a red ball is ½ ? ***(3marks)***

16. In the diagram below ABCD is a rectangle in which BC = 4xcm and CD = xcm. P and Q are points onAB and AD respectively, such that AP = AQ = 3cm.



(a) Find the sum of the areas of triangles BCP and CDQ in terms of x

(b) Given that the area of triangle PQC is $40.5cm^2$, find the value of x

(c) Express the area of triangle PCQ as a ratio of the area of the rectangle ABCD.

17. A dealer has to transport 400tonnes of maize flour in at most 6hours. He has at his disposal a pickup and a truck. A pickup can carry 20 tonnes a trip and takes ½ hour per return trip. The truck can carry 30 tonnes and takes 40minutes per return trip. If the pick up makes x trips and the truck y trips:

(a) Write down three inequalities to describe the given conditions *(3marks)*

(b) Represent the inequalities on a graph paper by shading the un wanted regions (Use the scale of 1cm to represent 1 unit on both axes. *(6marks)*

(c) Find from your graph the number of pickup trips and truck trips which are full to capacity that are required to transport the maize flour at a minimum cost. *(3marks)*

END