## 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 210^0.
   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 $P^2 - 4P + 3\mathbf{I} = 0$ where $\mathbf{I}$ 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 = 36^0, where O is the centre. (4 marks)
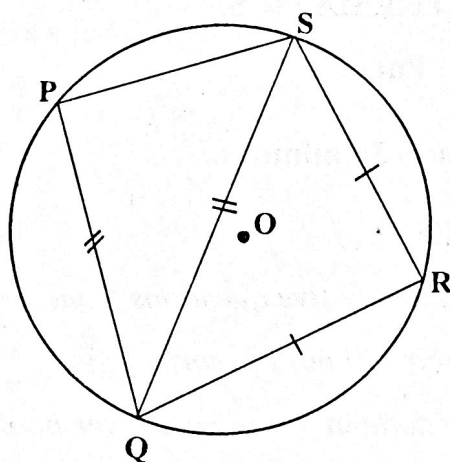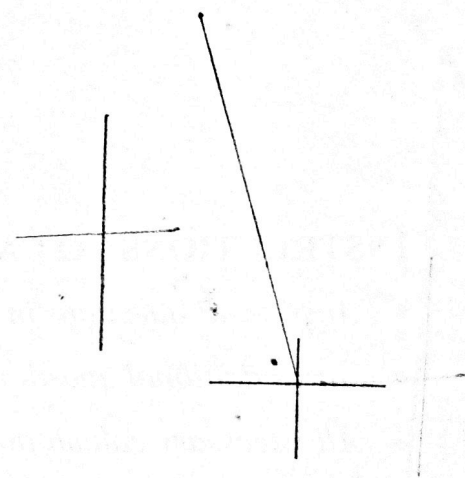
   Find angle SQR. (4 marks)

8. Solve the inequality
   $\frac{1}{4}(2x + 3) \le 4 - \frac{1}{4}(3 - x)$, hence show your answer on the number line. (4 marks)

9. Make L the subject of the expression $T = 2\pi \sqrt{\dfrac{L^2 + M}{MH}}$ (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) Caculate 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 $-2 \le x \le 4$.
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)

15. (a) In the figure below, angle BCA is 90^0

B, 2x cm, (3x + 1)cm, C, (2x + 2)cm, A
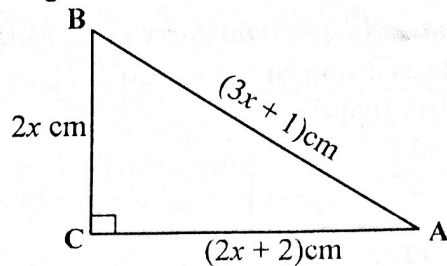
Find the value of x and hence determine the height BC. (5 marks)

(b) The angle of elevation of the top of the cliff from Tom's home is 30^0. 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 47^0. Determine the height of the cliff. (7 marks)
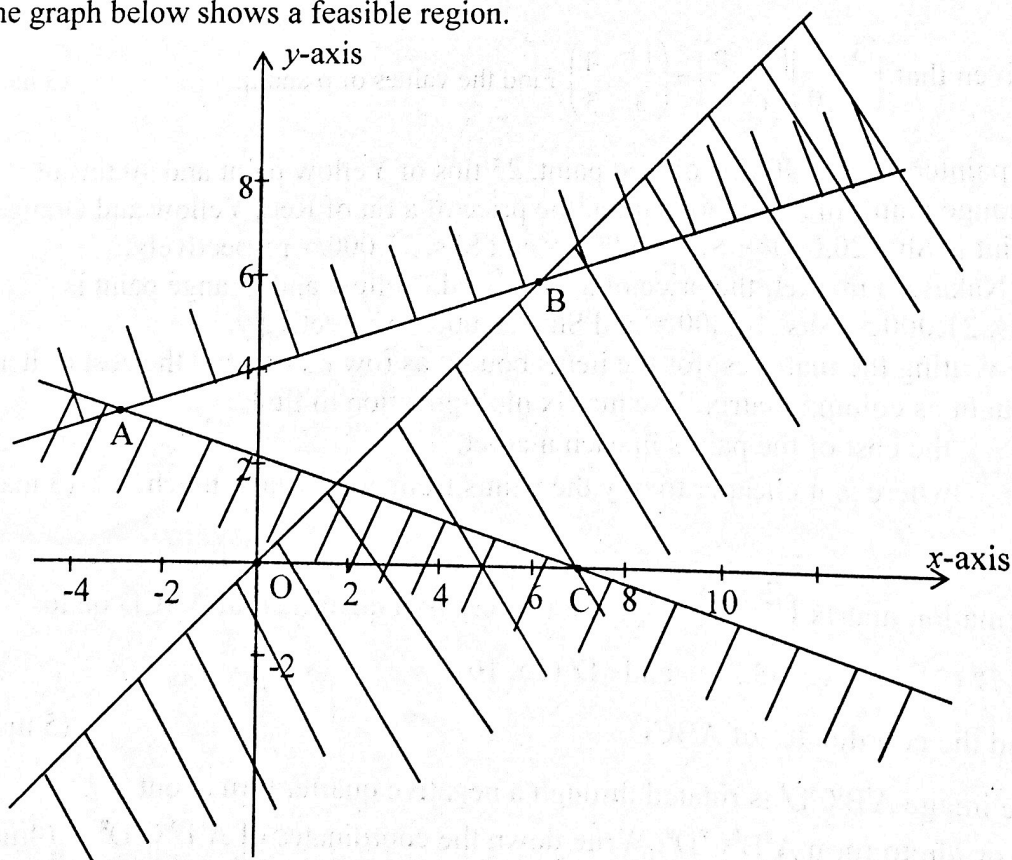
16. (a) Using a pair of compasses, a ruler and a pencil only, construct a triangle PQR where $\overline{QR} = 7.2$ cm, angle PQR = 75^0 and $\overline{PR} = 8.4$ cm

(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 months)

17. The graph below shows a feasible region.

Use the graph above to;
(a) form inequalities representing the feasible region. (9 marks)
(b) find the maximum value of $5x + 3y$ from the feasible region. (3 marks)

END

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