S.4 MATHEMATICS ASSIGNMENT (1)
PAPER 1

INSTRUCTIONS

➥ Answer **all** questions in section **A** and **B**.

SECTION A

1. Given that $c * b = c^2b - cb^2$. Find the value of $(3 * 1) * 3$.

(4 marks)

2. Make **t** the subject of the formula.

$$Y = \frac{x(2r-t)}{3t}$$

(4 marks)

3. Factorize the expression completely;

$6y^2 - 11y - 6 - (2y - 3)^2$

(4 marks)

4. Given that Cos θ = $\frac{-3}{5}$ where θ is an obtuse angle; find the value of tan θ − sin θ.

(4 marks)

5. A bag contains 14 balls of which 10 are red and 4 are green. Two balls are picked at random one at a time without replacement. Find the probability of picking balls of different colours.

(4 marks)

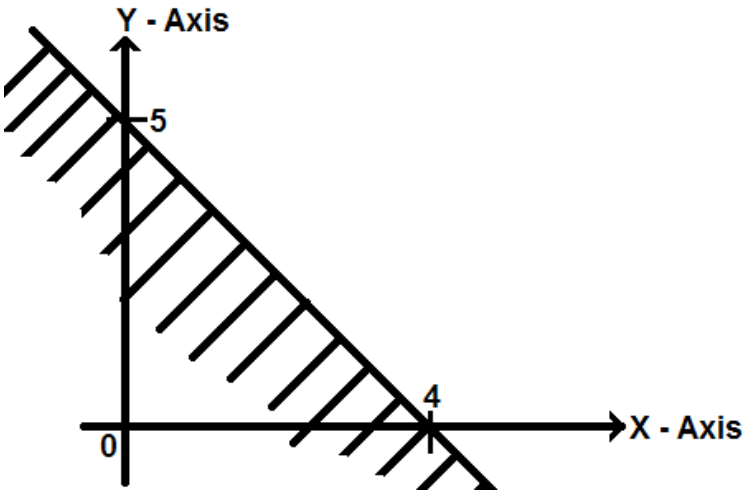
6. Solve the inequality $\frac{x-1}{3} + \frac{x}{4} > \frac{2x}{3}$. Show your result on a number line.

(4 marks)

7. Given that $A = \begin{pmatrix} -4 & 3 \\ 0 & -2 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 \\ 3 & -2 \end{pmatrix}$, $C = \begin{pmatrix} -1 & 6 \\ 6 & 0 \end{pmatrix}$. Find the matrix D^{-1} where D = (AB + C)

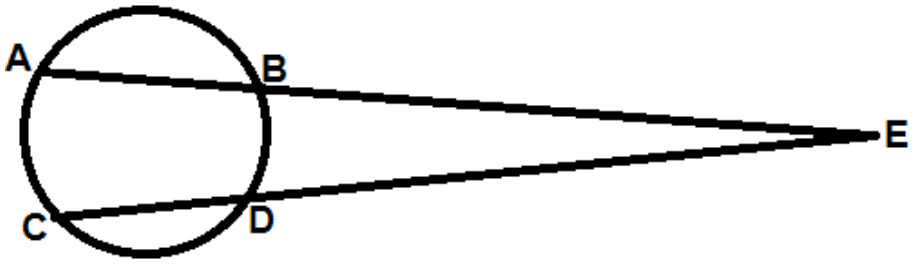
(4 marks)

8. Determine the inequality that defines the shaded region below.



(4 marks)

9. Given that $M = \begin{pmatrix} 3a & 2b \\ 6 & 5 \end{pmatrix}$, find the ratio a:b for which M is a singular matrix. (4 marks)

10. 

Given that AB = 2cm, BE = 6cm and CD = 3cm, find the value of DE. (4 marks)

SECTION B

11. a) Copy and complete the table below for the graph of $y = 5 + 3x - 2x^2$. (4 marks)

X	−3	−2	−1	0	1	2	3	4
$-2x^2$	−18		−2	0	−2			−32
5 + 3x	−4		2	5		11	14	
Y	−22			5		3		−15

b) Use the table in (a) above to draw the graph of $Y = 5 + 3x - 2x^2$ for $-3 \leq x \leq 4$. (3 marks)

c) Use your graph to solve;

i) $5 + 3x - 2x^2 = 0$

ii) $x^2 - x - 2 = 0$ (5 marks)

12. The table shows the height of seedlings in millimeters in a nursery bed.

Height (cm)	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69
Cumulative frequency	5	12	27	39	47	50

a) Draw an ogive and use it to estimate the interquartile range of the heights of the seedlings. (6 marks)

b) Calculate the;

i) mean

ii) modal height (6 marks)

13. a) Given the matrices A = (−3, −2), $B = \begin{bmatrix} 1 & 4 \\ 2 & -1 \end{bmatrix}$ and $C = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$. Find ABC. (4 marks)

b) In a grocery, items are priced as follows;

sugar Shs 3000 per kg,

bread Shs 3500 per loaf

Milk Shs 1500 per litre and

Blue band Shs 5000 per tin

Okello bought 4kgs of sugar, 2 loaves of bread and 3 litres of milk while;

Opio bought 6kg of sugar, 3 loaves of bread, 2 litres of milk and a tin of blue band from the grocery.

i) Write down a 2 x 4 matrix for the items bought and a 4 x 1 matrix for the cost of the items.

(3 marks)

ii) By matrix multiplication, determine the amount spent by each man. Hence state more and by how much. (5 marks)

14. Triangle XYZ with vertices X(−1,8), Y(−2,9) and Z(2,11) is given a transformation of a positive quarter turn to form X'Y'Z'.
X'Y'Z' is then reflected along the line x + y = 0 to form X"Y"Z".

a) Write the matrices for:

i) Positive quarter turn (2 marks)

ii) Reflection along x + y = 0 (2 marks)

b) Determine the co−ordinates of;

i) X'Y'Z' (4 marks)

ii) X'Y'Z' (4 marks)

c) Describe a single matrix which maps XYZ onto X"Y"Z" (2 marks)

15. Using a ruler, pencil and pair of compasses only;

a) Construct a triangle KLM in which KL = 9.6cm KM = 10.4cm and angle KLM = 60^0.

b) Measure angle KML.

c) Construct mediators of KM and LM.

d) Draw a circumscribing circle to triangle KLM.

e) Measure the radius of the circle and calculate its area.

Correct your answer to one decimal place. (Take $\pi = 3.14$)

(12 marks)

16. a) Given that $\tan x = \frac{-15}{8}$ and that x lies between 180^0 and 360^0.

Calculate without using tables or calculators the value of 4Cos X – sin.

b) Given that $5\cos\propto = 4$ and $\propto$ is an acute angle.

Find $5\sin\propto + 4\tan\propto$.

c) Moses observes a bird on top of a tree 300m away. If the tree is 120m high, calculate the angle of elevation of the bird.

d) In a triangle ABC, angle BAC = 150^0, AB = 5cm and AC = 4cm.

Calculate the area of the triangle ABC.

(12 marks)

17. A factory has two textiles Nylon (N), shirts and cotton (C) shirts, that carry out X printings and Y printings respectively over a given period of time. The production of each printing is as shown below.

	Nylon shirts (N)	Cotton shirts (C)
Small size	180	270
Medium size	100	250
Large size	200	100

The production at the end of the period must be such that not more than 2700 small size, not less than 1500 medium size and not less than 1400 large size are produced.

a) Write down 5 inequalities in X and Y that satisfy the given conditions above.

(5 marks)

b) Draw the graph on the same axes showing regions that satisfy the conditions.

(5 marks)

c) Estimate from your graphs the values of X and Y which give the maximum number of printings.

(2 marks)

END