456/1
MATHEMATICS
PAPER 1
July / August 2009
2 hours 30 minutes

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

*Answer **all** the questions in Section A and **any five** questions from section B.*

*All necessary calculations **MUST** be done on the same page as the rest of the answer.*

Silent non-programmable scientific calculators may be used.

Mathematical tables with a list of formulae and squared paper are provided.

No paper should be given for rough work.

*State the degree of accuracy at the end of each answer attempted using a calculator or tables; and indicate **cal** for calculator, **Tab** for mathematical tables.*

SECTION A (40 MARKS)

*Attempt **all** questions in this section.*

1. Find the values of x in the equation $64^{-1} = x^6$.

2. Give that $a * b = \frac{(a^2 - b^2)}{27}$

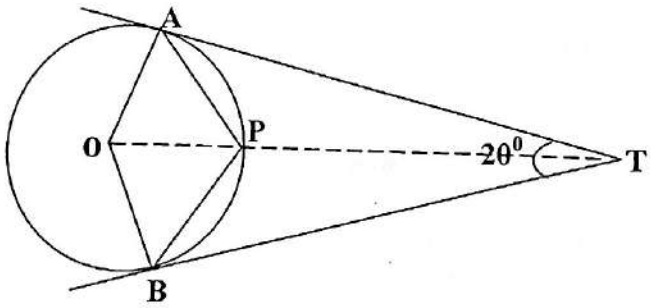
   Evaluate 14 * 13

3. Make **t** the subject in the formular $P = \frac{n}{2m}\sqrt{\frac{F}{k-t}}$

4. In a class, there are 48 boys. If the ratio of the number of girls to the total number of pupils in the class is 3:7. Find the number of girls in the class.

5. Jane invested 80,000/= at 15% simple interest per annum. If after **t** years, her account accumulated to 128,000. Find the value of **t**.

6. In the figure below TA and TB are tangents to the circle of centre O. Given that $<ATB = 20^0$, find angles AOT and PAT.



7. Given that 17 Sin? = 15, where 90^0 ? ? ?180^0.
   Find the value of 34cos? - 8tan? .

8. The matrix $T = \begin{pmatrix} 1 & a \\ b & -4 \end{pmatrix}$ maps the point P (3, - 2) onto P^1 (-1, 17). Find the values of a and b.

9. A piece of land measures 48m by 32.6m. Find its area in cm^2 on a map whose scale is 1:150.

10. Solve for x in the equation.

$$\frac{2x - 5}{3} - \frac{3x - 1}{4} = \frac{3}{2}$$

SECTION B (60 MARKS)

Attempt 5 questions

11. Using a ruler and a pair of compasses only, construct a quadrilateral ABCD in which $\overline{BD} = 9cm, \overline{AD} = 7.3cm$, $\overline{BC} = \overline{CD} = 5.8cm$ and angle $BAD = 67.5^0$.

    (a) Measure $\overline{AB}$

    (b) Bisect angle BCD and let the bisector meet $\overline{BD}$ at M. Construct a circle passing through the points A, M and D.

    (c) Measure the distance from the centre of the circle O to the vertex C. Find the circumference of the Circle. $(\pi = \frac{22}{7})$

12. A triangle with coordinates A (2,3), B(6,3) and C(4,6) is given a transformation represented by matrices M $\begin{pmatrix} 0 & 3 \\ -1 & 2 \end{pmatrix}$ and N $\begin{pmatrix} 2 & 3 \\ 1 & 0 \end{pmatrix}$ to

    form A′B′C′ and A″B″C″ respectively.

    (a) Find the coordinates of A,′ B,′C′ and A,″B,″C″.

    (b) Find a single matrix that maps ABC onto A″B″C″. Hence describe it.

    (c) Obtain a single matrix that would map A″B″C″ back onto ABC.

13. Below are marks scored by S.4 students of a certain school in an end of term 1 2009 physics exam.

19	20	31	72	40	39	35	32
45	21	13	51	77	15	19	64
10	50	62	40	19	20	27	37
20	53	39	15	42	56	31	12
12	38	31	26	39	63	44	22
58	78	64	18	36	49	54	35
40	38	70	16	29	39	20	21

    (a) (i) Form a frequency distribution table consisting of classes of equal width, starting with 10-19 as the first class.

    (ii) Using 44.5 as your assumed mean calculate the mean mark of students.

(b) Draw a histogram to represent the marks of the students and use it to estimate the modal mark.

14. Copy and complete the table below.

x	-4	-3	-2	-1	0	1	2	3	4
x^2-2									
$-x^2+6$									

(b) Plot on the same axes the graphs of $y = x^2 - 2$ and $y = 6 - x^2$.
(Use the scale 1cm: 1 unit on both axes)

(c) Use your graph to solve the equation $x^2 - 4 = 0$. (12 marks)

15. In a certain country, tax is levied on income per month as shown below.

Taxable Income per month	**Tax Rate (%)**
0 - 50,000	10
50 ,001 - 100,000	15
100,001 - 150,000	20
150,001 - 200,000	30
200,001 - 250,000	35
250,001 - 300,000	40
300,001 - 350,000	45
350,001 - Above	55

An employee in the same country earns a gross monthly income of 766,000/=. The allowances accrued to the employee include:
Housing shs. 10,000 per month
Marriage shs. 919,200 per year
Medical shs. 50,000 per month
Transport shs. 120,000 per year
Insurance shs. 72,000 per year

The employee is married with 5 children, 2 above 10 years, but below 18, one child is below ten years while the other 2 are above 18 years. The rate per child is as follows:
Below 10 years shs. 3000 per child
Between 10 and 18 years shs. 4000 per child
Above 18 years shs. 5,000 per child

(a) Calculate

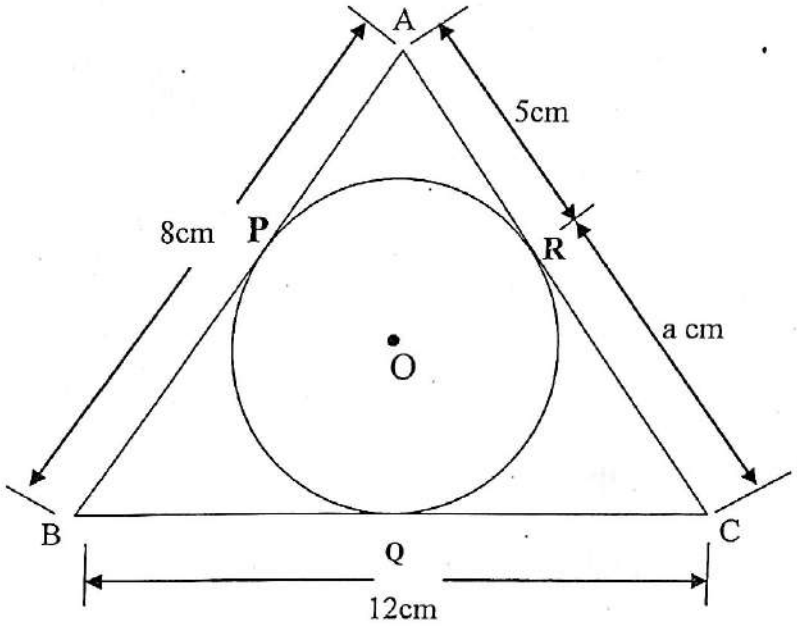
(i) The employee's taxable income.

(ii) The income tax the employee pays.

(b) Express the employee's income tax as a percentage of the gross monthly income (12marks)

16. In the figure below, AB, BC and AC are tangents to the Circle, Centre O. Given that RC = **a** cm and AR = 5cm. Find.

(i) the value of a.
(ii) the radius of the circle.
(iii) the length OC.
(iv) the size of angle PBQ.



(12 marks)

17. A manufacturer of Jam in Kawempe has 720kg of straw berry syrup and 800kg of Mango syrup for making two types of jam, grade A and grade B. Each type is made by mixing straw berry and mango syrup as follows:-

Grade A: 60% strawberry and 40% Mango.
Grade B: 30% strawberry and 70% Mango.
The jam is sold in 400gram jars. The selling prices are as follows:
Grade A: shs. 1000 per jar.
Grade B: shs. 750 per jar.

(i) Form inequalities to represent the given information.
(ii) Draw the inequalities on a squared paper.
(iii) From your graph determine the number of jars of each grade the manufacturer should produce to maximize his profit. (12 marks)

END

456/1
MATHEMATICS
Paper 1
July/August 2012
$2^1/_2$ 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.**
- All necessary calculations **must** be done on the same answer booklet provided. Therefore, no paper should be given for rough work.
- Mathematical tables and squared papers may be provided.
- Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- State the degree of accuracy at the end of each question attempted using calculator or mathematical table and indicate **Cal** for calculator or **Tab** for mathematical tables.

SECTION A (40 MARKS)

*Attempt **all** questions in this section.*

1. Given that;

$$x \Delta y = x^2 - 6y^2$$

Evaluate $(8\Delta - 3) \Delta 4$.

(04Marks)

2. A box contains n red balls and (n- 8) blue ones.
The probability of drawing a red ball is $\frac{3}{4}$. Find the number of balls in the box.

(04Marks)

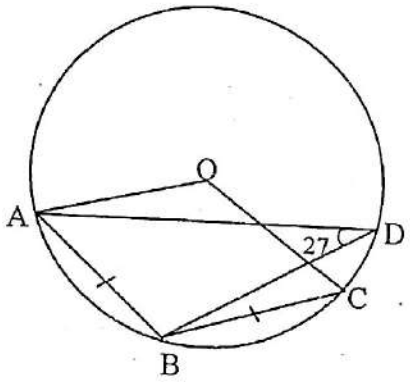
3. Find the inverse of the matrix $\begin{pmatrix} -1 & 2 \\ -4 & 3 \end{pmatrix}$

(04Marks)

4. The point A(-4, 1) is mapped onto $A^1(5,4)$ after an enlargement centre P With scale factor -2. Using vectors, determine the coordinates of P.

(04Marks)

5.



In the figure given, O is the centre of the circle, $\overline{AB} = \overline{BC}$ and angle ADB = 27^0. Calculate;
(i) the obtuse angle AOC
(ii) Angle ABC

(04Marks)

6. State the equation $\frac{t+2}{3} - \frac{8-t}{2} = \frac{t}{6}$

(04Marks)

7. Use factorisation method to solve the equation $x^2 - 6x - 91 = 0$

(04Marks)

8. Make X the subject of the formula $y = \frac{2X}{3} + \frac{P}{30}$

(04Marks)

9. In the recent competitions in cross country, the time taken by 8 students were recorded as below in minutes;
16.4, 20.5, 16.3, 18.7, 15.5, 14.5, 25.3 and 24.2.
(a) Calculate the median time.

(b) Calculate the time taken by the ninth student if the mean for all the 9 students was 18.8 minutes. (04Marks)

10. Given that $17\sin\theta = 15$, for $180^0 \geq \theta \geq 90^0$.
Find the value of $34\cos\theta - 8\tan\theta$ without using tables or calculators. (04Marks)

SECTION B: (60Marks)

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

11.

Marks	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Number of students	1	2	4	5	6	9	5	1	5	2

The table above shows the marks obtained in a mathematics examinations.

(a) (i) Draw a histogram to represent this data.
(ii) Estimate the mode from the histogram. (05marks)

(b) Using an assumed mean of 52, calculate the mean mark. (07marks)

12. In a game, a player throws two fair dice, each with faces numbered 1 to 6. When the two dice show different numbers, the player scores the sum of the two numbers. When the two dice show the same numbers, the player scores twice the sum of the two numbers. Calculate the probabilities that a player

(a) Scores 6 in one throw of the two dices. (03Marks)
(b) Scores a multiple of 4 in one throw of the two dice. (03Marks)
(c) Scores 3 in each of two successive throws of the two dices. (06Marks)

13. (a) Solve the following simultaneous equations using matrix method.

$2X - y = -4$
$X + 5y = 9$

(06Marks)

(b) Given that $(x \quad 1-x)\begin{pmatrix} 2 & 18 \\ 2 & 6 \end{pmatrix} = 4\,(1-x \quad y)$,
find the values of x and y. (06Marks)

14. (a) Two positive integers differ by 4 and the sum of their squares is 136. Form an equation and solve it to find the number. (06Marks)

(b) A man is now four times as old as his son. Eight years ago, the Product of their ages was 220 years. Find the son's present age. (06Marks)

15. (a) Using a ruler and a pair of compasses only construct triangle XYZ in Which $\angle X = 60^0$, $\angle y = 90^0$ and $\overline{XY} = 5cm$.

(b) On the same diagram, construct the circumcircle of triangle XYZ, and the locus of a point P on the same side of XY as Z, such that the area of triangle XYP equals half the area of triangle XYZ.

(c) Mark a point Q such that $\angle XQY = 30^0$ and the area of triangle XYQ is half the area of triangle XYZ. If M is a point such that $\angle XMY = 30^0$, find the largest possible area of triangle XMY.

16. ABC is a triangle whose vertices are A (2,2), B (6,4) and C (2,6). ABC is enlarged using a scale factor of -1.5 about the origin to form $A^1B^1C^1$. $A^1B^1C^1$ is then rotated through 90^0 about the origin to form A"B"C".

(i) Write down the matrices for enlargement and rotation. (02Marks)

(ii) Use your matrices above to determine the coordinates of A'B'C' and A"B"C". (06Marks)

(iii) Find a single matrix which maps A"B"C" back onto ABC. (04Marks)

17. Kumi Hotel has 7 roasters of 200kg oven capacity and 6 roasters of 400kg oven capacity. The 200kg oven capacity roaster can be used 5times a day. The 400kg oven capacity roaster can be used only 2 times a day. Each roaster must be operated by only one chef. On a given Saturday the Hotel is contracted to roast 9000kg of meat for guests at a wedding ceremony. On that day, only 11 chefs were available.
The 200kg oven capacity roasters each needs Shs. 12,000 per day to run and the 400kg oven capacity roasters each needs Shs. 20,000 per day to run. If x and y represent the number of 200kgs oven capacity roasters and 400kg oven capacity roasters to be used respectively by the Hotel:

a) Write down six inequalities representing the above information. (05Marks)

b) Plot on the same axes graphs for the inequalities, shading out the unwanted region. (05Marks)

c) Use your graph to find the number of each type of roaster the Hotel should use so as to minimize costs. (02Marks)

END

456/1
MATHEMATICS
Paper 1
July/August 2011
$2^1/_2$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

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- All necessary calculations **must** be done on the same answer booklet provided. Therefore, no paper should be given for rough work.
- Mathematical tables and squared papers are provided.
- Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- State the degree of accuracy at the end of each question attempted using calculator or mathematical table and indicate **Cal** for calculator or **Tab** for mathematical tables.

Turn Over

SECTION A (40 MARKS)

Attempt all questions in this section.

1. Simplify $\dfrac{5^{2x+1} \times 3125}{5^{2(x+3)}}$ (4 Marks)

2. Joyce is seven years younger than her husband and is five years older than her brother. The sum of the ages of her husband and brother is 58.
Determine the age of Joyce's brother. (4 Marks)

3. Given that $3t5_{eight} = 245_{ten}$. Find the value of t. (4marks)

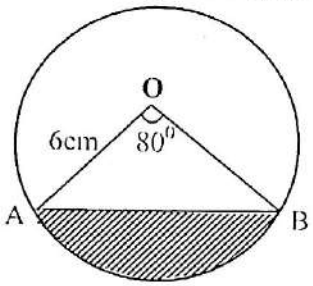
4. Given that Sin $\theta = \dfrac{-\sqrt{3}}{2}$ for $180^0 \leq \theta \leq 270^0$, without the use of tables or calculators, determine (i) Cos θ

(ii) tan θ (4 Marks)

5. The coordinates of points A and B are A (5,4) and B (-3, b). Find the possible values of b such that $|AB| = \sqrt{65}$ units

(4 Marks)

6. In the figure below, O is the centre of the circle of radius 6cm. $\angle AOB = 80^0$.
Calculate the area of the minor segment cut off by a chord AB (4marks)



7. Given that $2^x - 3 = 0$. Without using tables or calculators, determine the value of 8^{x+3}

(4 Marks)

8. Given that $\begin{pmatrix} 3 & a \\ b & -12 \end{pmatrix} \begin{pmatrix} 7 \\ -6 \end{pmatrix} = \begin{pmatrix} -3 \\ 51 \end{pmatrix}$. Find the values of a and b.

(4 Marks)

9. Make r the subject of the formula

$$A = P\left(1 + \frac{r}{100}\right)^n$$ (4 Marks)

10. Express $\dfrac{\sqrt{2}-1}{\sqrt{2}+1}$ in the form $a + b\sqrt{c}$ where a, b and c are rational numbers. (4 Marks)

SECTION B (60 Marks)

Attempt any five questions from this section.

11. The heights of 50 seedlings were measured and recorded as below:-

5.4	4.7	7.0	6.1	3.4	5.2	3.2	4.5	5.9	6.8
6.7	5.8	8.5	6.5	8.2	5.4	4.2	6.5	4.1	7.5
7.1	5.2	5.4	6.9	5.7	8.1	6.4	6.1	7.2	6.2
3.7	5.1	5.6	5.0	7.0	7.9	5.4	7.1	3.5	7.2
8.3	6.5	5.7	6.0	5.1	8.7	5.3	4.6	6.9	6.7

(a) Construct a frequency distribution table with class intervals of equal class width starting with 3.0 – 3.9, 4.0 – 4.9,...

(b) (i) State the modal class
(ii) Calculate the mean of the seedlings

(c) Draw a cumulative frequency curve and use it to estimate the median height of the seedlings.

12. In this question use ruler and compasses only.

a) Construct a triangle PQR in which $\overline{PQ}$ = 11.5cm, < PQR = 60^0 and $\overline{QR}$ = 8.4cm.

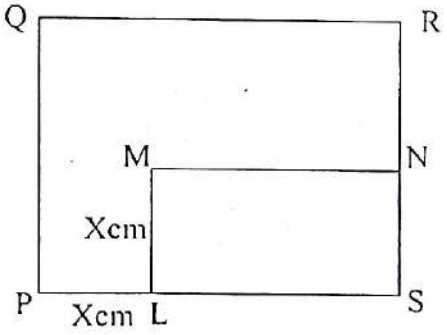
b) Construct the bisectors of the angles PRQ and QPR, let them intersect at points S.

c) From S, draw a perpendicular to PQ meeting PQ at T.

d) Draw a circle with centre S and radius equal to ST.

e) Measure the length of ST correct to the nearest millimeter and state how far is the point S from PR and QR.

13. PQRS is a square of sides 10cm and MNSL is a rectangle. If ML = PL = Xcm,
a) Show that the area of the rectangle MNSL is given by $(10X - X^2)cm^2$.



b) Given that $y = 10X - X^2$, copy and complete the following table.

X	0	1	2	3	4	5	6	7	8	9	10
y		9			24				16		

c) Draw the graph of $y = 10X - X^2$ for $0 \leq X \leq 10$.
Using a scale of 1cm: 1unit on the X – axis and 2cm: 5units on y-axis.

d) Use you graph to solve the following equations
(i) $10X - X^2 = 0$ (ii) $10X - X^2 = 9$

e) Write down the equation of the line of symmetry of the curve.

14. Given that $T = \begin{pmatrix} 3 & -1 \\ 7 & 2 \end{pmatrix}$ and $M = \begin{pmatrix} 5 & 4 \\ 1 & 3 \end{pmatrix}$ are two transformations.

i) Find a single matrix for the combined transformation (a) MT (b) TM

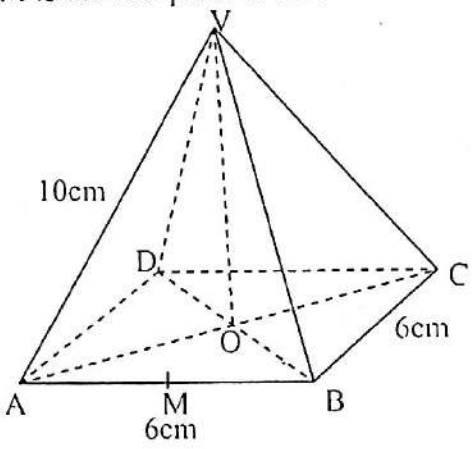
ii) Find the image of I (1,0) and J (0,1) under the combined transformation
(a) MT (b) TM.

iii) If $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is the matrix representing a certain transformation K, find the image of I (1, 0) and J (0, 1) under K.

15. a) A bag contains 4 red and 67 blue marbles. Two marbles are picked at random from the bag. What is the probability that they are both of the same colour, given that;
(i) the first marble is put back? (ii) the first marble is not put back?

b) A 3-digit number is formed out of 2,3,4.
Find the;
(i) Possible numbers to be formed
(ii) Probability that numbers formed are even.
(iii) Probability that the numbers formed are greater than 340.

16. The figure below shows a right pyramid on a square base A B C D of 6cm. The Slant height $\overline{VA}$ = 10cm and M is the mid-point of $\overline{AB}$.



Calculate the;
i) the height $\overline{VO}$
ii) the angle between the line $\overline{VA}$ and the plane ABCD.
iii) the angle between the plane VAB and plane ABCD.
iv) Volume of the pyramid.

17. A shopkeeper stores two types of cleaning fluid, type A and type B. Type A comes in packets of 6Kg at Sh. 150 each. Type B comes in packets of 12Kg costing Sh. 100 each. The greatest weight the shopkeeper can transport in his van is 1800kg and he does not wish to spend less than Sh. 22,500. He decides that he will require more than 90 packets of type A.

(i) Write down three inequalities, other than $X \geq O$ and $Y \geq O$ (where X and Y are the numbers of type A and B respectively) which satisfy these conditions.

(ii) Use a scale of 1cm to represent 10 packets on each axis, draw the graph and indicate clearly, by shading out the unwanted region, the area where (X, Y) must lie.

(iii) Given that the profit on type A is Sh. 20 per packet and on type B Sh. 30per packet, use your graph to establish the number of packets of A and B which must be sold for maximum profit.

(iv) Calculate the maximum profit.

END

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MATHEMATICS
Paper1
July/August 2013
$2\frac{1}{2}$hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

INSTRUCTIONS TO CANDIDATES:

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- Any additional question(s) answered will not be marked.
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SECTION A (40 MARKS)

*Attempt **all** questions in this section.*

1. Given that a*b=$\sqrt{ab}$ -2.

   Find the value of 7*(27*3). (04 marks)

2. A translation **T** maps the point A ($\bar{2}$,3) onto A^1 ($\bar{6}$,10).
   Find ;
   i) The translation vector **T**. (04 marks)
   ii) The image of B (10, 8) under the same translation. (04 marks)

3. If 1- $\left(\frac{1}{2}\right)^y = \frac{31}{32}$. Find the value of y.

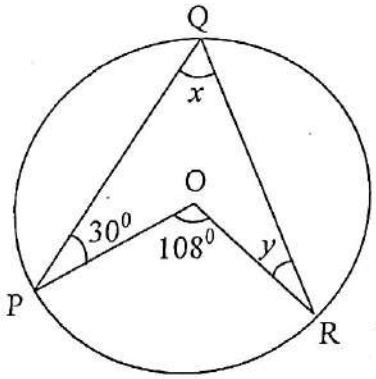
4. The gradient of the line joining the points R(2, 2p) and S (4,1) is $\frac{-3}{2}$.
   Find the value of p. (04 marks)

5. The legs of a pair of dividers are 9cm long each. They are opened so that the points are 6cm apart.
   Find the angle between the legs. (04 marks)

6. Solve the inequality $2(3x-1) \leq 4x + 6$ and show your solution on a number line. (04 marks)

7. A lake of area 480Km^2 is represented by an area of 120cm^2 on a map.
   Find the length of a road which is represented by 15cm on the map.
   (Give your answer in km). (04 marks)

8. (a) Factorise the quadratic function $2x^2 + x - 1$.
   (b) Hence solve the equation $2x^2 + x - 1 = 0$ (04 marks)

9. 

   In the figure above O is the centre of the circle.
   Angle POR and OPQ are 108° and 30° respectively.
   Find the values of x and y. (04 marks)

10. Given the value $log_{10}x = \bar{1}.477$ and $log_{10}y = 1.301$.
    Find the value of;-
    i) $log_{10}(x\,y)$.
    ii) $log_{10}\left(\frac{x}{y}\right)$. (04 marks)

SECTION B: (60Marks)

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

11. The table below shows marks scored by S.3 students in a mathematics test in a certain school.

Score	fx
41 – 48	222.5
49 – 56	787.5
57 – 64	1452
65 – 72	753.5
73 – 80	918
81 – 88	253.5

a) State the model class

b) Calculate;

i) The mean score

ii) The median score of the information. (12marks)

12. a) Using a ruler and a pair of compasses only, construct a triangle ABC where AB = 8.2cm, angle CAB = 105° and angle ABC = 30°.

b) D is a point such that angle DAB is half angle CAB and angle ABD is twice angle ABC. Using construction find the position of D.

c) Construct an inscribing circle to the triangle ABD.

d) Determine :

i) BC

ii) radius of the circle

iii) angle DAB. (12marks)

13. a) A rectangle has its length doubling its width. If the area of the rectangle is $72m^2$,
Find the;

i) width

ii) length

iii) length of the diagonal.

b) Moses picks apples for four consecutive days from his garden. Each day, he picks twice the number of the previous day. If the total number of apples picked for the four days was 1200, find the number of apples picked on the second day. (12 marks)

14. Joan goes shopping and buys 3 writing pads, 5 exercise books and 6 ball pens. Her brother Joel buys 3 writing pads, 8 exercise books and 4 ball pens.
In Kampala writing pads cost shs. 800, exercise books cost shs.400 and ball pens cost shs. 200 each.
In Mubende, writing pads cost shs. 700, exercise books cost shs. 600 and ball pens cost shs. 150 each.

a) Write down the;

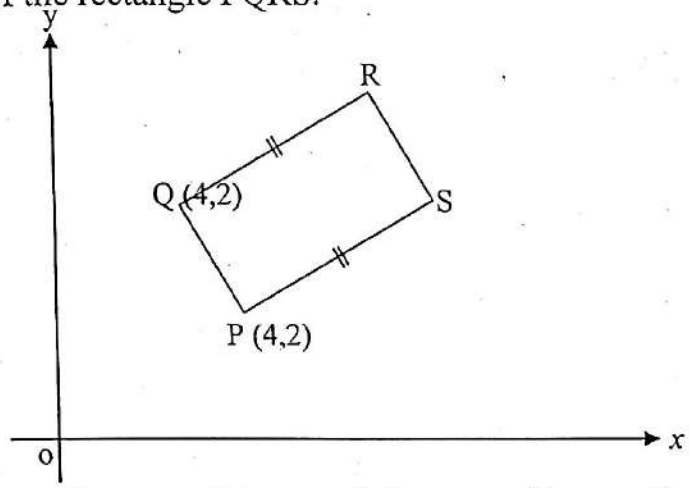
i) item matrix as a 2 X 3

ii) cost matrix as 3 X 2

b) Use matrix multiplication to find how much Joan and Joel would spend in Kampala and Mubende. (07 marks)

c) Show that the det(A • B) = det(A) • det (B)given that $\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 2 & 3 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 2 & 1 \\ 1 & 0 \end{pmatrix}$ (05 marks)

15. In the figure PQRS is a rectangle and P and Q are the points (4, 2) and (2,8) respectively. Given the equation of the line PR is $y = x - 2$
Find the;
i) gradient of QR.
ii) coordinates of R.
iii) coordinates of S.
iv) area of the rectangle PQRS.



(12marks)

16. a) On a graph paper, plot a parallelogram with coordinates A (2,1) B(6,1) C(8,4) and D(4,4).
b) Determine the area of the parallelogram.
c) ABCD is transformed using the matrix $\mathbf{T} = \begin{pmatrix} 4 & 0 \\ -2 & 1 \end{pmatrix}$ to form A′B′C′D′.
Find the area of A′B′C′D′.
d) Find the matrix which maps A′B′C′D′ back onto ABCD. (12 marks)

17. A tailor has Shs.180,000 to spend on materials for making shirts and trousers in a week.
The material for a shirt cost him shs.12,000 and for a pair of trousers shs.15,000, the time taken to make a shirt is $2\frac{1}{2}$hours and a pair of trousers 5hours but he works at most 40 hours per week. He needs to make at least as many shirts as pairs of trousers.
He makes a profit of Shs. 2000 on each shirt and Shs. 5000 on each pair of trousers.
If x and y represents shirts and pair of trousers respectively,
a) Write down all the inequalities for the above information.
b) Plot a graph of the inequalities, shading out the unwanted regions.
c) How many of each should he make in a week to maximize his profit?
(12 marks)

END

456/1
MATHEMATICS
Paper 1
July/August 2014
$2^1/_2$hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

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 on the same answer booklet provided. Therefore, no paper should be given for rough work.
- Mathematical tables and squared papers may be provided.
- Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- State the degree of accuracy at the end of each question attempted using calculator or mathematical table and indicate **Cal** for calculator or **Tab** for mathematical tables.

SECTION A (40 MARKS)

Attempt all questions in this section.

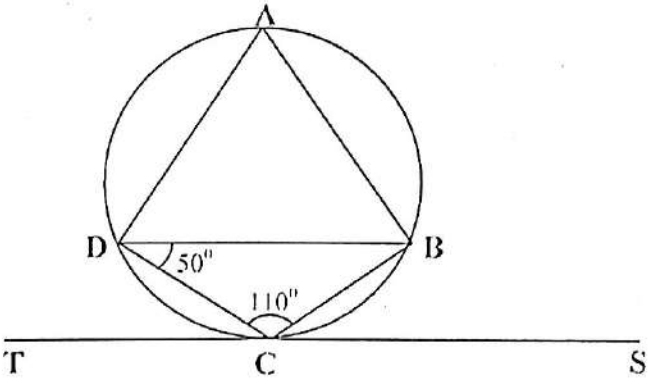
1. Express $0.4\overline{18}$ as a fraction in its simplest form. (4 marks)

2. Find the equation of a line perpendicular to $2x + 5y = 6$ and passing through (-3,-2). (4 marks)

3. The average mark of 32 boys in a class of 62 students in is 54. Whereas the average mark of girls is 50. Find the average mark of the whole class. (4 marks)

4. Simplify $\frac{8^n \times 2^{n-1}}{16^{2n} \times 4^{(1-2n)}}$ (4 marks)

5. A rectangle has a perimeter of 36m and an area of $80m^2$. What is the length of the longer side of the rectangle? (4 marks)

6. 

TCS is a tangent to the circle at C. $\angle DCB = 110^0$, $\angle CDB = 50^0$

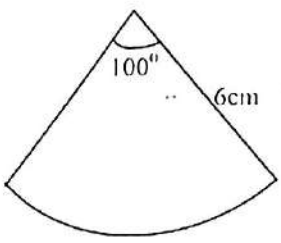
Find the angles (i) $\angle DAB$

(ii) $\angle BCS$ (4 marks)

7. Find the point of intersection of the lines $x + y = 6$ and $4x - 4 = y$. (4 marks)

8. On a map whose scale is 1:400,000 a swamp is represented by $5cm^2$. Find its actual area in km^2 (4 marks)

9. Simplify $\frac{2x^2+x-6}{x+2}$ (4 marks)

10. 

The figure shows a centre of a circle whose radius is 6cm, and angle at the centre is 100^0.

The sector is folded to form a cone. Determine the radius of the circular end of that cone. (4 marks)

SECTION B (60MARKS)

Answer any *five* questions this section.

11. Below are marks scored in a maths test.

64	58	54	59	83	65	62	46
43	70	50	35	64	62	50	53
55	54	32	59	48	54	35	48
71	74	55	70	40	58	64	40
75	45	40	55	55	45	48	72

(a) Form a frequency distribution table with equal class intervals of 6 starting with 30 as the lower class limit of the first class. (5 marks)

(b) State:
(i) Median class
(ii) Modal frequency (1 mark)

(c) Calculate:
(i) Mean (2 marks)
(ii) Mode (2 marks)
(iii) Median (2 marks)

12. Using a ruler and a pair of compasses only, construct a quadrilateral ABCD in which AB = AC = 6cm, AD = 5cm, $A\hat{B}C = 45^0$ and $D\hat{A}B = 120^0$.
a) Construct a circle that passes through the points A, B and C of the quadrilateral.
b) Measure the distance between the centre of the circle and vertex D.
c) Calculate the area of the circle formed.

(12 marks)

13. KY Construction Company wants to contract four houses A, B, C and D on each of the three different sites; Muyenga, Ntinda and Kololo. For each of the houses the company needs to use a number of doors of the type P, Q and R as described below.

House	Door P	Door Q	Door R
A	2	6	5
B	3	8	9
C	3	9	10
D	4	7	10

The cost in shillings of each type of door at each site is given as follows

Door	Muyenga	Ntinda	Kololo
P	300,000	350,000	200,000
Q	250,000	300,000	400,000
R	200,000	350,000	350,000

(a) Construct
(i) a 4 x 3 matrix for the doors. (1 mark)
(ii) a 3 x 3 matrix for the cost. (1 mark)

Turn Over

(b) Use matrix multiplication and determine the cost of all the doors at:
(i) Muyenga
(ii) Ntinda
(iii) Kololo

(9 marks)

(c) Which of the three sites is costly to the company to construct houses?

(1 mark)

14. (a) Draw the graph of $y = 6 + 3x - 2x^2$ for $-2 \leq x \leq 3$, taking 2cm as one unit on the x – axis and 1cm as one unit on the y – axis.
(b) Use your graph to obtain solutions for the equations.
(i) $6 + 3x - 2x^2 = 0$
(ii) $2 + 3x - 2x^2 = 0$

(12 marks)

15. Triangle ABC is transformed using matrix $T = \begin{pmatrix} -2 & 3 \\ 1 & 2 \end{pmatrix}$ to triangle A^IB^IC with coordinates A^I (-4, 2), B^I (7,7), C^I (-2,8). Triangle $A^IB^IC^I$ is then transformed using matrix $R = \begin{pmatrix} -1 & 1 \\ 2 & 3 \end{pmatrix}$ to form $A^{II}B^{II}C^{II}$. Determine;
(a) Coordinates of
(i) ABC (5 marks)
(ii) $A^{II}B^{II}C^{II}$ (3 marks)
(b) A single matrix that maps ABC onto $A^{II}B^{II}C^{II}$ (2 marks)
(c) Ratio of area of triangle ABC to area of triangle $A^{II}B^{II}C^{II}$ (2 marks)

16. Three towns A, B and C are such that B is 400km on a bearing of 100^0 from A while C is 800km on a bearing of 170^0 from A.
(a) Using a scale of 1 cm: 50km, represent the positions of ABC on a diagram. (5 marks)
(b) Determine; (i) The distance BC in km. (2 marks)
(ii) The bearing of B from C (1 mark)
(c) A plane flying at 200km/hr moves from A to B to C and then directly to A, how long does it take? (4 marks)

17. A farmer has x goats and y cows. The food cost for each goat is shs. 800 per day and for each cow is 1600 per day. A total of shs.14,400 is available for animal food, and there is space for almost 14 animals.
In addition there must be at least 9 goats and at least 3 cows.
(a) Write inequalities representing the information above. (4 marks)
(b) Use your inequalities to express the information graphically. (6 marks)
(c) Determine the number of each animal that the farmer should keep to give him minimal cost. (2 marks)

END

456/1
MATHEMATICS
Paper 1
July/August 2015
$2^1/_2$hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

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 on the same answer booklet 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.
- State the degree of accuracy at the end of each question attempted using calculator or mathematical table and indicate **Cal** for calculator or **Tab** for mathematical tables.

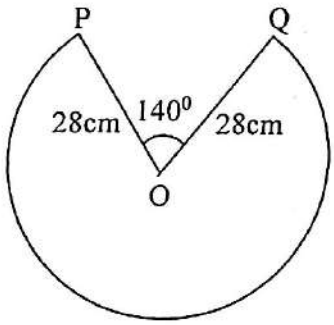
SECTION A

1. Simplify the expression $\frac{2x^2-5xy-3y^2}{(x-3y)}$ (4 marks)

2. Solve the equation. $(54\times0.5)^x=\frac{1}{9}$ (4 marks)

3. The line $y = 2x + 3$ is translated using the column vector $\begin{pmatrix}3\\-2\end{pmatrix}$ to form its image. Find the equation of the image line. (4 marks)

4. The figure below shows a net of a cone where $\angle POQ = 140^0$, $OP = OQ = 28cm$. Calculate the radius of the cone formed. (4 marks)



5. (i) Find $\sin 210^0$, hence
   (ii) Solve the equation $\tan\Theta = \sin 210^0$ in the range $0 \leq \Theta \leq 360^0$. (4 marks)

6. In a geography test, the total mark scored by 6 students was 420. If the mean mark for the first 5 students was 68. Find the mark scored by the sixth student. (4 marks)

7. Given the matrix $T = \begin{pmatrix}2x & 3\\ x & x\end{pmatrix}$. Find the values of x for which det. T = 2. (4 marks)

8. Solve the equation $(x-2)^2 + 2x(x-2) = 0$ (4 marks)

9. Solve the inequality $\frac{x+7}{5}-\frac{x+3}{6}\leq 1$ and show your solution on a number line. (4 marks)

10. The opposite angles of a cyclic quadrilateral are such that one of them is thrice the other. Find the values of each of the angles. (4 marks)

11. The table below shows masses of 35 newly born babies in a hospital.

Mass	x	f	d (x-A)	fd
2.0 – 2.4	2.2	5	-1.5	-7.5
2.5 – 2.9				-4.5
3.0 – 3.4		8		
3.5 – 3.9		9		
4.0 – 4.4				
4.5 – 4.9				
5.0 – 5.4		2		3.0
		$\Sigma f =$		$\Sigma fd =$

(a) Copy and complete the table.
(b) Using assumed mean of 3.7, determine the mean.
(c) Calculate the median.
(d) Draw a histogram for this data and use it to estimate the mode. (12 marks)

12. (a) Given $y = 3x^2 - 5x - 7$. Copy and complete the table below for values of x in the range $-3 \leq x \leq 4$.

x	-3	-2	-1	0	1	2	3	4
y	35	-	-	-7	-	-	-	-

(b) Using the table in (a) above, draw a graph of $y = 3x^2 - 5x - 7$ for $-3 \leq x \leq 4$.

(c) Use your graph above to solve the following equations:-
(i) $3x^2 - 5x - 7 = 0$
(ii) $x^2 - 2x - 1 = 0$

(12 Marks)

13. A stubborn bull is tethered on a rope in a triangular field of grass which is surrounded by maize, cassava and beans. Given that the field measures 11m by 9.5m by 8.2m.
(a) Using 1cm to represent 1m, make an accurate drawing of the field.
(b) Determine the maximum length of the rope on which it can be tethered without eating the surrounding crops.
(c) Find the maximum area of the grass it can eat, hence the area of the grass not eaten by the stubborn bull. (12 marks)

14. Triangle ABC with vertices A (3,1), B (7,1) and C (3,4) is mapped on $A^IB^IC^I$ by the transformation matrix $\begin{pmatrix} 3 & 2 \\ 1 & 1 \end{pmatrix}$. Then $A^IB^IC^I$ is mapped onto $A^{II}B^{II}C^{II}$ by the transformation matrix $\begin{pmatrix} -1 & 1 \\ 0 & 2 \end{pmatrix}$ Find :-

(a) Find the coordinates of:-
   (i) A^I, B^I and C^I
   (ii) A^{II}, B^{II} and C^{II}

(b) Find a single matrix that would map A^{II} B^{II} C^{II} back onto ABC.

(c) Find the area of $A^{II}B^{II}C^{II}$. (12 marks)

15. (a) Find the values of x and y from the matrix equation.

$$\begin{pmatrix} y & 4 & 2 \\ 3 & 1 & x \end{pmatrix} \cdot \begin{pmatrix} 3 \\ -4 \\ x \end{pmatrix} = \begin{pmatrix} 4 \\ x+17 \end{pmatrix}$$

(b) Use matrices to solve the simultaneous equations.

$$x + 2y = -5$$
$$3x = 13 + y.$$

(c) Given the matrices $P = \begin{pmatrix} 4 & -2 \\ 5 & 3 \end{pmatrix}$ and $Q = \begin{pmatrix} 5 & 0 & 2 \\ -1 & 4 & 5 \end{pmatrix}$

State the order of matrix (P.Q) (12 marks)

16. (a) A straight road runs uphill 400m inclined at 13^0 to the horizontal. Calculate the height of the hill.

(b) The hill is shown on a map of scale 1:100,000. Calculate the length in cm of the line on the map representing the road.

(c) If a number x is doubled, the result is twenty four less than it's square. Write the information as an equation in terms of x and hence find the possible values of x.

(12 marks)

17. Mr. Kato is going to bake chocolate cakes and yellow cakes to sell. He wants at least two chocolate cakes. Besides, he wants more yellow cakes than chocolate cakes. Due to limited time and facilities, he cannot bake more than ten cakes. The chocolate cakes are to be sold for Shs. 1500 each and the yellow cakes for Shs. 1000 each. To make profit, more than Shs. 8000 must be realized from the sales. (suppose he bakes x chocolate cakes and y yellow cakes).

(a) Write down **four** inequalities to represent this information. (4 marks)

(b) (i) On the same axes, plot the graphs of the inequalities and shade the unwanted regions. (4 marks)

   (ii) List all the possible numbers of chocolate cakes and yellow cakes Mr. Kato can bake. (2 marks)

(c) How many cakes of each type should Mr. Kato bake in order to make the maximum profits? (2 marks)

END

456/1
MATHEMATICS
Paper 1
July/August 2017
2 1/2 hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

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)

Attempt all questions in this section.

1. Find x, if $15.75^2 - 12.25^2 = 7x$ *(04 marks)*

2. Given that $a * b = a^2 - 3b$, find the value of $3 * (2 * 1)$. *(04 marks)*

3. Solve the equation; $x - 2 = \frac{5}{x+2}$ *(04 marks)*

4. Musoke and Kato are to share Shs. 45,000 in the ratio $x : 2x - 3$ respectively. If Musoke got Shs.18,000, find x. *(04 marks)*

5. The table below shows the marks obtained in mathematics questions marked out of 10.

Marks	Cumulative frequency
5	2
9	5
3	12
2	13
4	16
8	20

Find the mean and the mode. *(04 marks)*

6. A bag contains 8 black marbles and a number of white marbles. The probability of drawing one of the black marbles is $\frac{1}{6}$. How many white marbles are there in the bag. *(04 marks)*

7. Solve the inequality: $\frac{x+2}{9} \leq x + 2$, and show the solution on a number line. *(04 marks)*

8. If $\underset{\sim}{p} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ and $\underset{\sim}{q} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$, Find $\left|\underset{\sim}{p} + 2\underset{\sim}{q}\right|$ *(04 marks)*

9. Make p the subject of the formula: $q = \frac{p - 3}{2p + 1}$ *(04 marks)*

10. Given matrix $M = \begin{pmatrix} 3 & -2 \\ 4 & 1 \end{pmatrix}$, find M^{-1} *(04 marks)*

SECTION B (60 MARKS)

Attempt any five questions from this section

11. The table below shows the distribution of marks obtained by 40 candidates in a mathematics paper.

Marks	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
No. of candidates	2	3	10	12	8	3	2

(a) State the:-
(i) class width
(ii) modal class *(06 marks)*

(b) Calculate the:-
(i) mean mark
(ii) modal mark *(04 marks)*

(c) If those who passed the paper make $\frac{4}{7}$, how many candidates sat the paper? *(02 marks)*

12. (a) Draw the graph of the curve $y = x^2 - x - 6$ for $-3 \leq x \leq 4$. *(06 marks)*
(b) Use your graph in (a) above to solve the equations.
(i) $x^2 - x - 6 = 0$
(ii) $x^2 - x - 2 = 0$ *(05 marks)*
(c) State the line of symmetry for the curve $y = x^2 - x - 6$ *(01 mark)*

13. The square $ABCD$ with coordinates A (2,0), B (6,0), C (6,4) and D (2,4) is reflected in the line $x + y = 0$, to form $A'B'C'D'$.
$A'B'C'D'$ is then rotated through $+90^\circ$ about the origin to give $A''B''C''D''$.

(a) Write down the matrices for the:-
(i) reflection
(ii) rotation *(02 marks)*

(b) Use your matrices to determine the coordinates of:
(i) $A'B'C'D'$
(ii) $A''B''C''D''$ *(04 marks)*

(c) Show $ABCD$ and its images on the same graph. *(03 marks)*

(d) Find the single matrix of transformation which maps $ABCD$ on to $A''B''C''D''$ and describe it fully. *(03 marks)*

14. (a) Hamida is standing 12 metres from an electric pole. She finds that the angle of elevation of the top of the pole from her eye is 39°.
What is the height of the electric pole if she is 1.5 metres tall? *(06 marks)*

(b) A surveyor measures the angle of elevation of the top of a radio mast from ground level and finds that it is 47°. He moves 20 metres towards the radio mast and finds that the angle of elevation is now 62°.
Find the height of the radio mast. *(06 marks)*

SECTION A (40 MARKS)

Attempt **all** questions in this section.

1. Find x, if $15.75^2 - 12.25^2 = 7x$ *(04 marks)*

2. Given that $a * b = a^2 - 3b$, find the value of $3 * (2 * 1)$. *(04 marks)*

3. Solve the equation; $x - 2 = \dfrac{5}{x+2}$ *(04 marks)*

4. Musoke and Kato are to share Shs. 45,000 in the ratio $x : 2x - 3$ respectively. If Musoke got Shs.18,000, find x. *(04 marks)*

5. The table below shows the marks obtained in mathematics questions marked out of 10.

Marks	Cumulative frequency
5	2
9	5
3	12
2	13
4	16
8	20

Find the mean and the mode. *(04 marks)*

6. A bag contains 8 black marbles and a number of white marbles. The probability of drawing one of the black marbles is $\frac{1}{6}$. How many white marbles are there in the bag. *(04 marks)*

7. Solve the inequality: $\dfrac{x+2}{9} \leq x + 2$, and show the solution on a number line. *(04 marks)*

8. If $\underset{\sim}{p} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ and $\underset{\sim}{q} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$, Find $\left|\underset{\sim}{p} + 2\underset{\sim}{q}\right|$ *(04 marks)*

9. Make p the subject of the formula: $q = \dfrac{p - 3}{2p + 1}$ *(04 marks)*

10. Given matrix $M = \begin{pmatrix} 3 & -2 \\ 4 & 1 \end{pmatrix}$, find M^{-1} *(04 marks)*

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

(a) Construct a quadrilateral ABCD such that $\overline{AB} = 5cm$, $\angle ABC = 135°$, $\overline{BC} = 7.4cm$, $\angle DAB = 60°$ and $\overline{AD} = 9.0cm$. *(06 marks)*

(b) From point D construct a perpendicular line to meet line AB at point E. *(02marks)*

(c) Circumscribe triangle AED. *(02 marks)*

(d) Measure the length $\overline{DE}$ and the radius of the circle. *(02 marks)*

16. Ssalongo bought the following items for his twins at the beginning of the two terms; term 1 and term 2.
For term 1, he bought the following for Kato; 18 exercise book, 12 pens, 4Kg of sugar and 3 pencils.
For Wasswa, he bought 15 exercise books, 14 pens, 6Kg of sugar and 4 pencils.
For term 2, he bought the following for Kato; 11 exercise books, 13 pens, 5Kg of sugar and 6 pencils.
For Wasswa he bought 17 exercise books, 14 pens, 3Kg of sugar and 2 pencils.
An exercise book costs 2,300/=, a pen costs 500/=, a Kg of sugar costs 4,200/= and a pencils costs 200/=.
Given that the prices of these items did not change in term 2.

(a) Write down:-
(i) a 2×4 matrix representing items bought in term I.
(ii) a 2×4 matrix representing items bought in term II.
(iii) a 4×1 matrix representing the costs of the items. *(03 marks)*

(b) Write down a single matrix representing the total number of each of the items bought in both terms for each child. *(03 marks)*

(c) Using matrix multiplication, calculate the total amount of money spent on each child in both terms. *(06 marks)*

17. A farmer has x goats and y cows. The food cost for each goat is 800/= and for each cow is 1,600/= per day.
Only 14.400/= is available for animal food. There is no room for more than 14 animals. There must be at least 9 goats and at least 3 cows.

(a) Write down all the inequalities that represent the above information. *(04 marks)*

(b) Represent the inequalities on a graph by shading the unwanted regions. *(04 marks)*

(c) From your graph, find the number of goats and cows that must be kept so that the food cost is to be minimum. *(04 marks)*

-END-

456/1
MATHEMATICS
PAPER 1
July/August 2018
2½ hours

WAKISSHA 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 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*

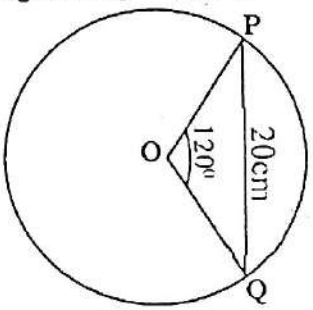
1. Given that $p * q = 3p + q^2 - pq$, find the value of;
   (i) $3 * 5$
   (ii) $(3 * 5) * -1$
   (04 marks)

2. Jane bought 3 pencils and 4 books at a total cost of shs. 4,900. Tom bought 5 pencils and 6 books at a total cost of shs.7500. Determine the price of each pen and each book if they bought from the same shop. *(04 marks)*

3. Line $y + x = 2$ is reflected in the y-axis. Find the equation of the image of this line after this transformation. *(04 marks)*

4. Factorise the quadratic function $4x^2 - 11x - 3$ and hence solve the quadratic equation $4x^2 - 11x - 3 = 0$ *(04 marks)*

5. In the diagram below, a chord of length $20cm$ is drawn to a circle of *centre* O where angle $POQ = 120^0$.



   Determine the:
   (i) shortest distance between the chord and the centre.
   (ii) area of triangle POQ. *(04 marks)*

6. Solve the inequality: $1\frac{5}{6} - \frac{1}{2}(x - 4) \leq \frac{1}{3}$ and show your solution on a number line. *(04 marks)*

7. In a class of 50 students, there are 30 boys and the rest are girls. Given that the mean mark for the whole class in a test was 64marks and that for the boys was 60 marks. Find the mean mark for the girls. *(04 marks)*

8. Using matrix method, solve the simultaneous equations:
   $7x = 31 - 10y;$
   $10 - 2x = 4y$ *(04 marks)*

9. Two dice are tossed together and each pair of numbers that appear upper most is recorded.
   (i) Construct a table for the products of all possible outcomes.
   (ii) Find the probability that the product of that pair is greater than 29. *(04 marks)*

10. A regular polygon has 18 sides. Find the size of each exterior angle and hence determine the angle sum of interior angles of this polygon. *(04 marks)*

SECTION B (60 marks)

Attempt any five *questions from this section.*

1. (a) Draw a graph of $y = (2x - 1)(x + 3)\ for - 4 \leq x \leq 2$: Use a scale of 2cm for 1 unit on the $x - axis$ and 1 cm for 1 unit on the $y - axis$. *(7 marks)*

(b) Use your graph to solve the equations;

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

(ii) $2x^2 + 4x - 4 = 0$ *(3 marks)*

2. The following are marks of 35 students scored from a mathematics examination from a certain school.

30	60	70	80	90	69	53
72	40	92	51	61	82	71
51	73	59	88	60	74	76
79	38	67	55	99	48	66
65	68	79	67	73	66	83

(a) Construct a frequency distribution table starting with $30 - 39, 40 - 49$ etc. *(05 marks)*

(b) Calculate the mode. *(03 marks)*

(c) Draw a cumulative frequency curve and use it to estimate the median mark. *(04 marks)*

13. (a) Using a ruler pencil and a pair of compasses only, construct a triangle ABC such that $AB = 7.1cm$, angle $ABC = 105^0$, and angle $BAC = 45^0$.

Measure the length AC.

(b) Construct a perpendicular onto AC from B to meet it at D.
Circumscribe triangle BCD and measure the;

(i) length BD.

(ii) radius of the circle. *(12 marks)*

14. The points $A(-2, 1), B(-2,4), C(1,4)\ and\ D(1,1)$ are vertices of a square $ABCD$.
The images of $A, B, C\ and\ D$ under a reflection in the line $x - y = 0$ are $A^{I}, B^{I}, C^{I}\ and\ D^{I}$.
$A^{I}, B^{I}, C^{I}\ and\ D^{I}$ are then mapped onto points $A^{II}, B^{II}, C^{II}\ and\ D^{II}$ respectively under an enlargement with scale factor 2 and a centre of enlargement the origin (0,0).

(a) Write down the matrices for the reflection and enlargement. *(02 marks)*

(b) Find the coordinates of the points;

(i) $A^{I}, B^{I}, C^{I}\ and\ D^{I}$ *(03 marks)*

(ii) $A^{II}, B^{II}, C^{II}\ and\ D^{II}$ *(03 marks)*

(c) Determine the matrix of a single transformation that would map $ABCD$ onto $A^{II}\ B^{II}\ C^{II} D^{II}$ *(02 marks)*

(d) Show the square $ABCD$ and its images on the same axes. *(02 marks)*

15. (a) Given that $\begin{pmatrix} -1 & 3 \\ -1 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 8 \end{pmatrix}$, find the values of x and y. *(04 marks)*

(b) A school bought sports wears of different sizes for different colours.
The order of sizes were: small, medium and large.
The colours were yellow, blue, green and red.

Yellow	20 small	40 medium	30 large
Blue	50 medium	10 small	20 large
Green	40 large	35 medium	5 small
Red	32 medium	35 large	8 small

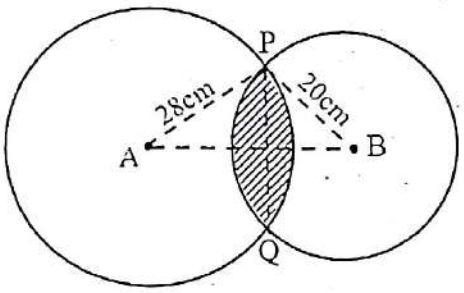
If the cost was Shs. 9.000. Shs 10,000 and Shs. 12,000 for small, medium and large sizes respectively, write down a;

(i) 4 X 3 matrix for the purchases. *(02 marks)*

(ii) 4 X 1 matrix for the cost. *(01 mark)*

(iii) Use matrix multiplications to determine the amount spent on buying sportswear for each colour. *(05 mark)*

16. Given that A *and* B are centres of the circles, lines PA and PB are tangents to the circles respectively.
PQ = 30cm while AB is a perpendicular bisector of PQ;



Find the area of the shaded part which is common to the two circles.
(*Take* $\pi = 3.142$) *(12 marks)*

17. Kiira municipal council plans to construct a parking yard for x - minibuses and y - lorries.
Minibuses are allowed $10m^2$ of space and lorries $20m^2$ of space and there is only $500m^2$ space available.
Not more than 40 vehicles are allowed at a time. There are always both types of vehicles and at most 15 lorries are allowed at a time.

(a) (i) Write down five inequalities to represent the above information. *(03 marks)*

(ii) Represent the above inequalities in (a) (i) above on the same axes. *(05 marks)*

(b) If the parking charges for the minibus is Shs. 50,000 and that for a lorry is Shs. 60,000 per day. Find how many vehicles for each type should be parked on the yard in order to maximise profits. *(04 marks)*

END