ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS
PAPER 2

4004/2
2 hours 30 minutes

JUNE 2025 SESSION

Additional materials:
Mathematical Instruments
Mathematical Tables
Non programmable Electronic Calculator
Answer booklet

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces provided on the answer booklet.
Answer **all questions** in Section A and **any four questions** from Section B.
If you use more than one booklet, fasten them together.
All working must be clearly shown on the same sheet as the rest of the answer.
Omission of essential working will result in loss of marks.
If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given correct to three significant figures. Answers in degrees should be given correct to one decimal place.
Mathematical tables and Non programmable electronic calculators may be used to evaluate explicit numerical expressions.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

This question paper consists of 10 printed pages.

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SECTION A [52 marks]

Answer **all** questions in this section

1 **(a)** Estimate $\frac{1,98 + 8,75 \times 6,05}{6,89}$ by first rounding off the given numbers to the nearest whole numbers. [3]

(b) The side of a cube is 8,7 cm given correct to the nearest millimetre. Find the least possible volume of the cube correct to 2 decimal places. [3]

(c) Simplify $2\frac{1}{2} \div 3\frac{3}{4} + 1\frac{1}{5}$. [3]

2 **(a)** In a group of 160 form one learners at a sports academy, all learners play at least one of the ball games volleyball, netball or tennis.

40 learners play netball only.

25 play tennis only.

28 play Volleyball only.

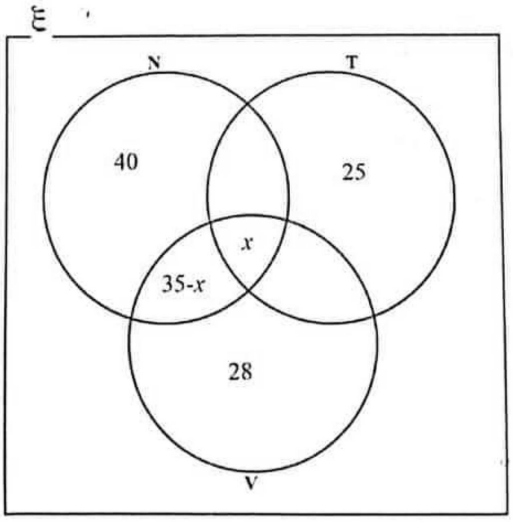
50 play netball and tennis.

35 play netball and Volleyball.

30 play tennis and volleyball.

x play all the three games.

(i)



The diagram above is an incomplete Venn diagram of the information. Copy and complete the Venn diagram by inserting the number of learners in each part of the sets in terms of x. [3]

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(ii) Find the value of x, [3]

(b) The universal set, ξ, has subsets A and B such that:

$\xi = \{x : 1 \leq x < 10, x \in \mathbb{Z}\}$

A is a set of odd numbers

B is a set of factors of 10

(i) List all elements of set A. [2]

(ii) Find $n(A^1 \cap B)$. [2]

3 **(a)** A rectangular vegetable garden has a length of 50,7m and a width of 30,5 m. Inside the garden there is a circular reservoir of radius 1,4 m. The remaining space is for growing vegetables.

In this question take π to be $\frac{22}{7}$.

(i) Calculate the area covered by the reservoir. [2]

(ii) It costs \$ 38 507 to spray the space for growing vegetables.
Find the cost per square metre of spraying the space for growing vegetables.

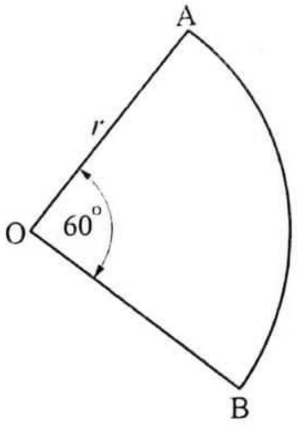
Give the answer to the nearest dollar. [3]

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(b)



The diagram shows a sector AOB of a circle centre O and radius r cm.
The arc AB subtends an angle of $60°$ at the centre of the circle.
In this question take π to be $\frac{22}{7}$.

(i) The length of arc AB = 11cm.
Calculate the radius of the circle, [3]

(ii) Hence or otherwise calculate the area of the sector. [2]

4 **(a)** The cost, C, for a birthday party at a lodge is partly constant and partly varies with the number, n, of people attending. If there are 5 people attending the cost is $ 700, and it costs $ 1340 for 13 people attending.

(i) Express the cost, C, in terms of n and constants h and k, [1]

(ii) Find the value of h and the value of k, [4]

(iii) Calculate the cost if 25 people attend. [2]

(b) P varies directly as Q. $P = 12$ when $Q = 5$.

(i) Find the formula connecting P and Q. [3]

(ii) Calculate the value of Q when $P = 42$. [2]

5 **Answer the whole of this question on a sheet of plain paper.**
Use ruler and compasses only for all constructions and show clearly all construction lines and arcs.
All constructions should be done on a single diagram.

(a) Construct triangle ABC such that $AB = 10cm$, $A\hat{B}C = 45°$ and $B\hat{A}C = 60°$. [5]

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(b) Construct the locus of points that are,

(i) $4,5\ cm$ from B, [1]

(ii) $1,5cm$ from AB on the same side of AB as C. [2]

(c) Point P lies inside the triangle and is such that $BP \leq 4,5$ and P $\geq$ 1,5 cm from AB.

Shade clearly the region in which P lies. [2]

(d) Measure and write down the length of AC. [1]

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SECTION B [48 Marks]

Answer **any four** questions from this section.

Each question carries 12 marks

6 **(a)** Solve the equation [3]

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

(b) It is given that $M = \frac{N}{N+P}$. [2]

(i) Find the value of M when $N = 60$ and $P = 45$.
Give the answer as a fraction in its lowest terms.

(ii) Make N the subject of the formula. [3]

(c) Solve the equation [4]

$$\log_3 (x-2)^2 = 2$$

7 A group of 100 form 2 learners was asked to give ages in years of their grandfathers. The information is shown in the table below.

Age (x) in years	$50 \leq x < 55$	$55 \leq x < 60$	$60 \leq x < 65$	$65 \leq x < 70$	$70 \leq x < 75$	$75 \leq x < 80$
Frequency	6	10	22	32	20	10

(a) Calculate an estimate of the mean age. [3]

(b) The same information is represented in a cumulative frequency table.

Age (x) in years	$x<50$	$x<55$	$x<60$	$x<65$	$x<70$	$x<75$	$x<80$
Cumulative frequency	0	6	16	38	p	90	100

Find the value of p. [1]

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(c) **Answer this part of the question on a sheet of graph paper.**

Using a scale of 2cm to represent 5 years on the age-axis and 2cm to represent 20 learners on the cumulative frequency-axis, draw a cumulative frequency curve for the data, given. [4]

(d) Use the graph to estimate the,

(i) median, [1]

(ii) interquartile range. [3]

8 Mr Ndou wants to plant peas and beans in his 5-hectare field. Peas need 4 bags of fertilizer per hectare and beans need 2 bags of fertilizer per hectare. He has 16 bags of fertilizer. He needs to plant at least 1.5 hectares of beans and at least 1 hectare of peas.

(a) Taking x to be the area where beans are planted and y to be the area where peas are planted, write down 4 inequalities that satisfy the above conditions. [4]

(b) **Answer this part of the question on a sheet of graph paper.**

The point (x,y) represent x hectares of beans and y hectares of peas. Using a scale of 2 cm to 1 unit on both axes for $0 \leq x \leq 8$, $0 \leq y \leq 5$, draw a graph and indicate clearly by shading **the unwanted region,** the region in which (x, y) must lie. [6]

(c) The estimated profit is \$30 000 per hectare for beans and \$40 000 per hectare for peas.

Calculate the maximum possible profit he can get. [2]

9 **Answer the whole of this question on a sheet of graph paper.**

Using a scale of 2 cm to 1 unit on both axes for $0 \leq x \leq 7$ and $-4 \leq y \leq 4$ draw the x and the y axis.

A quadrilateral ABCD has vertices at A(3;2), B(4;2), C(4;3) and D(3;4).

(a) Draw and label clearly quadrilateral ABCD. [1]

(b) Draw quadrilateral $A_1B_1C_1D_1$ the image of the quadrilateral ABCD under a translation, with a translation vector $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$. [2]

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(c) (i) Draw quadrilateral $A_2B_2C_2D_2$ with vertices at
$A_2\left(1\frac{1}{2};1\right)$, $B_2(2;1)$, $C_2\left(2;1\frac{1}{2}\right)$ and $D_2\left(1\frac{1}{2};2\right)$. [1]

(ii) Describe fully the single transformation that maps quadrilateral ABCD on $A_2B_2C_2D_2$. [3]

(d) Draw the image of quadrilateral ABCD under a 90° clockwise rotation about centre (1, 1) and label it $A_3B_3C_3D_3$. [3]

(e) Write down a matrix representing a stretch parallel to the x-axis with a stretch factor of 3. [2]

10 (a) Matrix $A = \begin{pmatrix} -3 & 4 \\ -2 & 1 \end{pmatrix}$, matrix $B = \begin{pmatrix} 4 & -1 \\ 2 & 5 \end{pmatrix}$ and matrix $C = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$.

Evaluate,

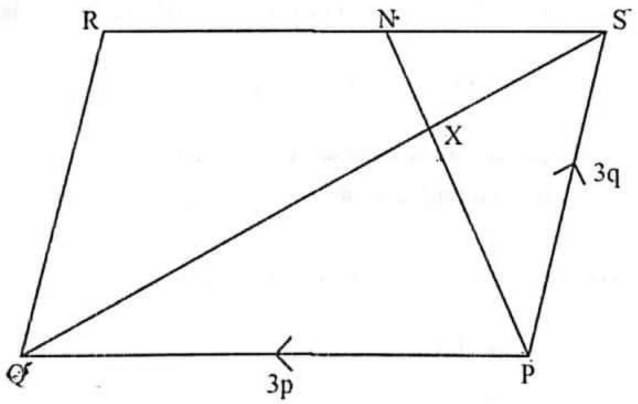
(i) $3A - B$, [3]

(ii) BC. [2]

(b) Find the inverse of matrix A. [3]

(c) Hence or otherwise solve the simultaneous equations:
$-3x + 4y = 11$
$-2x + y = 4$ [4]

11



PQRS is a parallelogram, $\vec{PQ} = 3p$ and $\vec{PS} = 3q$.
The point X on QS is such that $QS = 3XS$.

(a) Express in terms of p and/or q,

(i) $\vec{RS}$, [1]

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(ii) $\vec{SQ}$, [1]

(iii) $\vec{XQ}$. [2]

(iv) $\vec{XP}$. [2]

(b) PX produced meets SR at N so that $NP = hXP$.

Express $\vec{NP}$ in terms of p, q and h, [1]

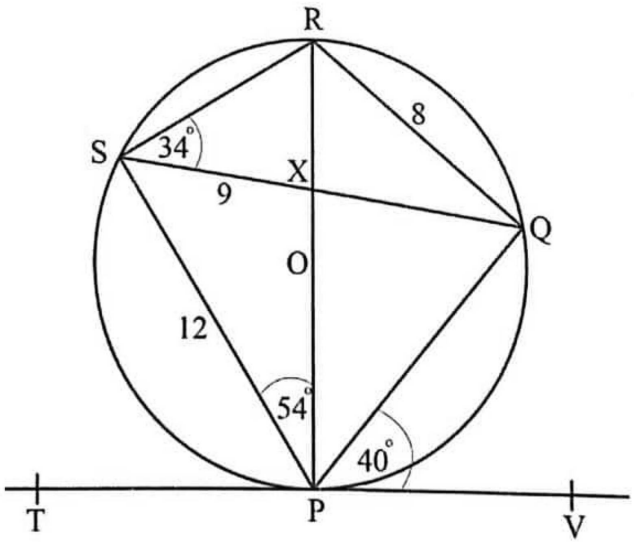
(c) (i) $NS = kRS$.

Express $\vec{NP}$ in terms of p, q and k. [1]

(ii) Using the answers in **(b)** and **(c)(i)**, find the values of the constants h and k. [3]

(d) Write down the ratio $\frac{NS}{RS}$. [1]

12



In the diagram points P, Q, R and S are on the circumference of circle centre O.

PR and QS intersect at X.

TPV is a tangent to the circle at P.

$Q\hat{P}V = 40°$, $Q\hat{S}R = 34°$ and $R\hat{P}S = 54°$.

PS = 12 cm, QR = 8 cm and SX = 9 cm.

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(a) Find,

(i) $Q\hat{P}R$, [1]

(ii) $P\hat{R}Q$, [1]

(iii) $R\hat{Q}S$, [1]

(iv) $P\hat{Q}S$, [2]

(v) $P\hat{X}Q$. [2]

(b) **(i)** Name correctly the triangle which is similar to triangle PXS, [1]

(ii) Calculate the length of RX, [2]

(iii) Find the ratio of the area of triangle QRX : Area of triangle PSX. [2]

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