ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS 4004/2

PAPER 2

JUNE 2023 SESSION 2 hours 30 minutes

Additional materials:
Mathematical Instruments
Mathematical Tables
Non programmable Electronic Calculator
Plain Paper (1 sheet)
Graph Paper (4 sheets)
Answer Paper

Time 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces provided on the answer paper/answer booklet.
Answer **all questions** in Section A and **any four questions** from Section B.
Write your answers on the separate answer paper provided.
If you use more than one sheet of paper, fasten the sheets 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 and 2 blank pages.

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SECTION A [52 MARKS]

Answer **all** questions in this section.

1 (a) Simplify $0,92 - 0,33 + 0,24$, giving the answer in standard form. [2]

(b) Amos sold a radio for \$66,00 and made a profit of 10%.
Find the cost price of the radio. [2]

(c) Share \$286,00 in the ratio $1 : 1\frac{1}{2} : 4$. [3]

(d) Remove brackets and simplify $(d + 3)(6d - 1)$. [2]

2 (a) Given that $T = g + \sqrt{n^3 - m}$,

(i) Find T when $g = -4$, $n = 3$ and $m = -9$, [2]

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

(b) Find the rate of interest per year when \$144,00 earns \$22, 68 simple interest in $3\frac{1}{2}$ years. [2]

(c) Express $\frac{2 - x}{x^2 - 4} - \frac{1 + x}{x + 2}$ as a single fraction in its simplest form. [3]

3 (a) Solve the following equations,

(i) $\frac{3}{5}(f - 1) = \frac{1}{5}f$ [2]

(ii) $\left(2\frac{2}{3} - p\right)^2 = 1\frac{7}{9}$ [3]

(b) Factorise completely,

(i) $10m^2 - tr - 2mt + 5mr$, [2]

(ii) $p^3 - 16p$. [2]

(c) A carpenter's wage depends on the number of hours she works.
She is paid at a rate of \$3,65 per hour.
Calculate her wage for working a 38 hour week. [2]

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

(a) Construct,

(i) a quadrilateral ABCD in which $A\hat{B}C = 135°$, $B\hat{A}D = 60°$, $BC = 6,6\ cm$, $AB = 4,8\ cm$ *and* $AD = 8,9\ cm$, [5]

(ii) the locus of points equidistant from AB and BC, [2]

(iii) the locus of points that are 3 cm from AB on the same side of AB as DC, [2]

(b) Mark and label a point P, that is equidistant from AB and BC and 3 cm from AB. [1]

(c) Measure and write down the length of PC. [1]

5 **(a)** Simplify

(i) $25,8 - 13 + 15,25$ [2]

(ii)

days	hrs	mins
3	15	40
+ 2	8	40

[2]

(b) Tafadzwa borrows \$600 from his brother Tendai at the beginning of the year. He invests the money and agrees that at the end of the year he will repay Tendai and give him $\frac{2}{5}$ of any profit he will make. If the \$600 increases to \$1250, calculate how much he should give Tendai at the end of year. [2]

(c) **(i)** Express 676 as a product of its prime factors in index notation. [1]

(ii) Hence or otherwise find the square root of 676. [1]



(d) Given that $f(x) = 3x + 5$, find

(i) $f(3)$. [1]

(ii) the value of x for which $f(x) = 83$. [2]

SECTION B [48 MARKS]

Answer any four questions from this section.

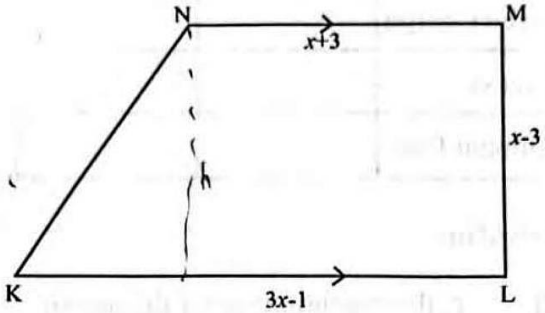
Each question carries 12 marks.

6 (a) The cost C, of printing a newspaper is partly constant and partly varies as n, the number of printed newspapers.

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

(ii) If the cost of printing 500 newspapers is \$320 and the cost of printing 1 000 newspapers is \$540, find the cost of printing 750 newspapers. [5]

(b)



In the diagram $KLMN$ is a trapezium in which KL is parallel to NM. $K\hat{L}M = 90°$, $KL = (3x - 1)$cm, $NM = (x + 3)$cm and $LM = (x - 3)$cm.

(i) Find in terms of x an expression for the area of the trapezium. [1]

(ii) Given that the area of the trapezium is $15cm^2$, form an equation in x and show that it reduces to $2x^2 - 5x - 18 = 0$. [2]

(iii) Solve the equation $2x^2 - 5x - 18 = 0$. [2]

(iv) Find the length of LM. [1]

(a) The following is an extract of an incomplete water bill for a family.

The family is allowed to use 11 kilolitres (KL) of water per month at a certain rate.

If the family uses more than 11 kilolitres of water the rate increases to $2,50 per kilolitre.

Description	Previous reading	Present reading	Consumption	Rate	Amount
	(Kl)	Kl	Kl	$/Kl	$
Water	762	776	*c*		
Permitted Consumption			11	*r*	17,05
Fixed Charge					7.30
Excess			*s*	2,50	*t*
Amount Due					*w*

Calculate

(i) *c*, the consumption for the month, [1]

(ii) *r*, the rate of permitted consumption, [2]

(iii) *s*, the excess amount of water, [1]

(iv) *t*, the amount paid for excess, [2]

(v) *w*, the total amount due that month. [2]

(b) N varies inversely as the square root of M.

(i) Find a formula connecting N, M and a constant *k*. [1]

(ii) Given that $N = 17$ when $M = 20, 25$, find the value of M when $N = 34$. [3]

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

Use a scale of 2cm to 2 units on both axes for $-8 \leq x \leq 8$ and $-4 \leq y \leq 18$.

a) Triangle A has vertices at $(-6; 2)$, $(-2; 2)$ *and* $(-5; 6)$.

Draw and label triangle A. [1]

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(b) Triangle B is the image of triangle A under a clockwise rotation of 90 ° about the point (2; 2).

Draw and label triangle B. [3]

(c) **(i)** Triangle C is the image of triangle A and has vertices at

$(-6; 14)$, $(-5; 16)$ *and* $(-2; 6)$.

Draw and label triangle C. [1]

(ii) Describe fully a single transformation which maps triangle A onto triangle C. [3]

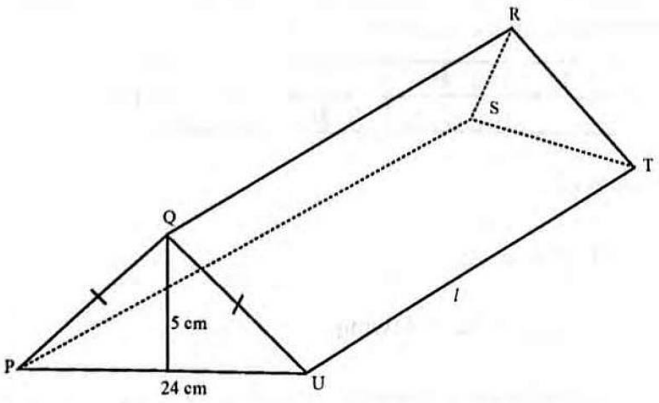
(d) **(i)** Triangle D is the image of triangle A and has vertices at

$(-2; 2)$, $(-2; -2)$ *and* $(2; -1)$.

Draw and label triangle D. [1]

(ii) Describe fully the single transformation that maps triangle A onto triangle D. [3]

9



The diagram above shows a solid triangular prism PQRSTU.

$PU = 24\ cm$, $QP = QU$ and TU, the length of the prism is l cm.

The perpendicular from Q to PU is 5 cm.

(a) Calculate,

(i) QU, [2]

(ii) the area of triangular face PQU. [2]

(b) The volume of the prism is 1728 cm^3.

Find the length l, of the prism. [2]

(c) The material used to make the prism has a density of 4 g/cm^3 and costs $1, 93/kg.
Calculate the,

(i) mass of the prism in kilogrammes, [2]

(ii) cost of material used to make the prism. [2]

(d) Find the length of a similar triangular solid prism of volume 512 cm^3. [2]

(a) A class has 16 boys and 10 girls.
Two learners are to be chosen one after the other to represent the school in a competition.
Calculate the probability that the learners chosen are both of the same sex. [3]

(b) Answer the whole of this question on a sheet of graph paper.
Use a scale of 2cm to 1 unit for the $x - axis$ in the range $-5 \leq x \leq 5$
and 2cm to 5 units on the $y - axis$ for the range $-10 \leq y \leq 35$.
The table below is for the function $y = 2x^2 - x - 6$.

x	−4	−3	−2	−1	0	1	2	3	4
y	30	15	p	−3	−6	−5	0	q	22

Find the values of p *and* q. [2]

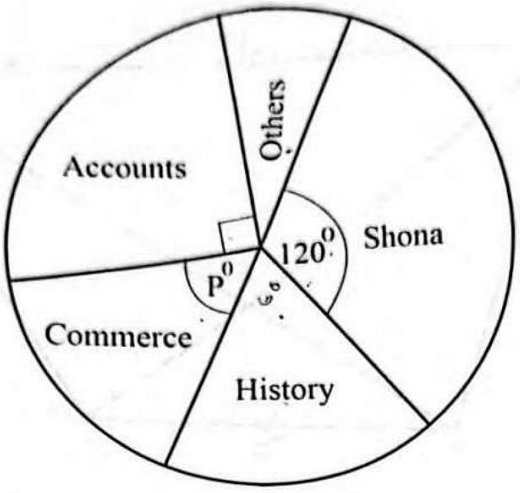
(c) Draw the graph of $y = 2x^2 - x - 6$. [4]

(d) Use the graph to answer the following :

(i) State the minimum value of $y = 2x^2 - x - 6$. [1]

(ii) Find the gradient of the curve at the point where $x = -3$. [2]

11 **(a)**



The pie chart above shows the choices made by 192 learners on their preferred favourite subject.

Find the

(i) number of learners who said they preferred Shona, [2]

(ii) number of learners who said they preferred Accounts. [2]

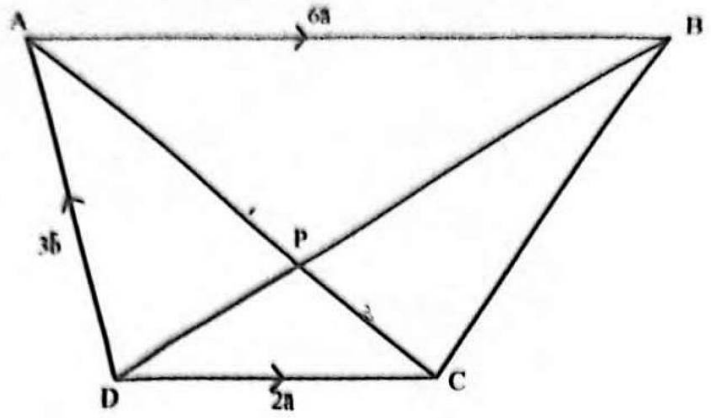
(b) 40 learners said they preferred Commerce.

Find the value of p. [2]

(c) 32 learners said they preferred History.

Find the size of angle that represents other subjects. [2]

(d)



The diagram shows a trapezium ABCD.
AB is parallel to DC.
$\vec{AB} = 6a$, $\vec{DC} = 2a$ and $\vec{DA} = 3b$
AC and BD intersect at P such that AP:PC= 3:1.
Express in terms of a and /or b,

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

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

(iii) $\vec{DP}$, [1]

(iv) $\vec{PA}$. [1]

12 (a) Given that $A = \begin{pmatrix} -2 & 3 \\ 1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$,

evaluate AB. [2]

(b) If $f(x) = 3x^2 - 5x - 1$, solve the equation $f(x) = -3$. [4]

(c) The interior angles of a hexagon are $82°, 94°, 109°, x°, 2x°$ *and* $3x°$
Find the value of $x°$. [3]

(d) Solve the inequality $5 - x > 3x + 2$. [3]

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