ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Ordinary Level

MATHEMATICS **4008/2**

PAPER 2

Wednesday **9 JUNE 1999** Morning 2 hours 30 minutes

Additional materials:
Answer paper
Geometrical instruments
Graph paper (3 sheets)
Mathematical tables
Plain paper (1 sheet)

IE 2 hours 30 minutes

TRUCTIONS TO CANDIDATES

te your name, Centre number and candidate number in the spaces provided on the answer pa
wer booklet.

wer all questions in Section A and any three questions from Section B.

te your answers on the separate answer paper provided.

u use more than one sheet of paper, fasten the sheets together.

tronic calculators must not be used.

orking must be clearly shown. It should be done on the same sheet as the rest of the answer.
ssion of essential working will result in loss of marks.

degree of accuracy is not specified in the question and if the answer is not exact, the answer st
ven to three significant figures. Answers in degrees should be given to one decimal place.

RMATION FOR CANDIDATES

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

ematical tables may be used to evaluate explicit numerical expressions.

This question paper consists of 11 printed pages and 1 blank page.

Section A [64 marks]

Answer all the questions in this section.

1 (a) Evaluate $2\frac{1}{2} - \frac{3}{5} \div \frac{2}{3}$.

(b) Tendai is paid \$12,40 an hour for a basic week of 40 hours. He is paid \$18,60 overtime. Calculate his pay for a week in which he works for 48 hours.

(c) There are 1500 pupils at Pundo Secondary School. One third of the pupils are girls

(i) Find the number of boys.

(ii) Given that $\frac{1}{8}$ of the boys are studying Agriculture, express the number of bo Agriculture as a percentage of the total number of pupils at the school.

(d) Calculate the simple interest earned on \$1200 invested at a rate of 15% per 6 months.

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2 (a) (i) Factorise completely $ax + x - 3a - 3$.

(ii) Factorise $2x^2 - 7x + 3$.

(iii) Write down the L.C.M. of

$ax + x - 3a - 3$ and $2x^2 - 7x + 3$.

(b) Given that $2p = \sqrt[3]{6q + 5}$,

(i) find the value of p when $q = 20$,

(ii) express q in terms of p.

(c) Simplify $\frac{2}{x-1} - \frac{8}{x+5}$.

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e table below shows the number of pupils from each form who went on a trip to Great Zimbabwe.

Form	Number of pupils
1	25
2	16
3	75
4	64

) Using a 1 cm-wide bar to represent each form and a vertical scale of 2 cm to represent 10 pupils, draw a labelled bar chart for the given data. [3]

) For these pupils, find

(i) the modal form,

(ii) the mean number per form.

[3]

) If two pupils are chosen at random from those who went on the trip, find the probability that they were both in Form 3. [2]

l) Given that the total number of pupils at the school was 1080, find, as a single fraction in its lowest terms, the probability that a pupil chosen at random from the whole school, went on the trip and was in either Form 2 or Form 4. [2]

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i) Find the value of r for which the matrix $\begin{pmatrix} r & 24 \\ -4 & 3 \end{pmatrix}$ is singular. [2]

i) Given that $\begin{pmatrix} 3 & 2 \\ 1 & -1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 16 \\ 7 \end{pmatrix}$,

calculate the values of x and y. [3]

:) W, X, Y and Z are four points with coordinates $(-2, 3)$, $(4, 6)$, $(8, 1)$ and $(1, -2)$ respectively.

(i) Find $\overrightarrow{XY}$ as a column vector.

(ii) Find $|\overrightarrow{XY}|$.

(iii) Calculate the gradient of WX.

(iv) Find the equation of the line parallel to WX which passes through Z.

[6]

Answer the whole of this question on a sheet of plain paper.
Use ruler and compasses only for all constructions and show clearly all the construction

(a) (i) Construct a quadrilateral $ABCD$ in which $AB = 9{,}0$ cm, $D\hat{A}B = 90°$, $AD = 7{,}5$ cm and $BC = 6{,}3$ cm.

(ii) Measure and write down the size of $B\hat{C}D$.

(b) On the same diagram construct

(i) the locus of points that are 5,0 cm from B,

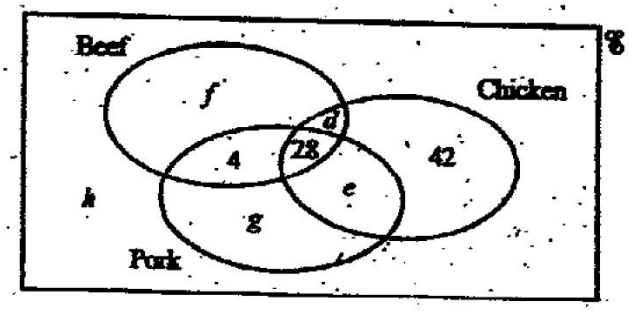
(ii) the locus of points that are equidistant from DA and DC.

(c) Mark and label points X and Y which are 5,0 cm from B and equidista and DC.

In a survey, 200 people were asked which of three meats – beef, chicken or pork – they liked. The results are displayed in the table below.

Type of Meat	Number of people
Beef	80
Chicken	120
Pork	50
Beef and Chicken	60
Chicken and Pork	46
Pork and Beef	32
All three	28
None of the three	h

me of this information is shown in the incomplete Venn diagram below.



) Write down the values of

(i) d,

(ii) e,

(iii) f,

(iv) g,

(v) h.

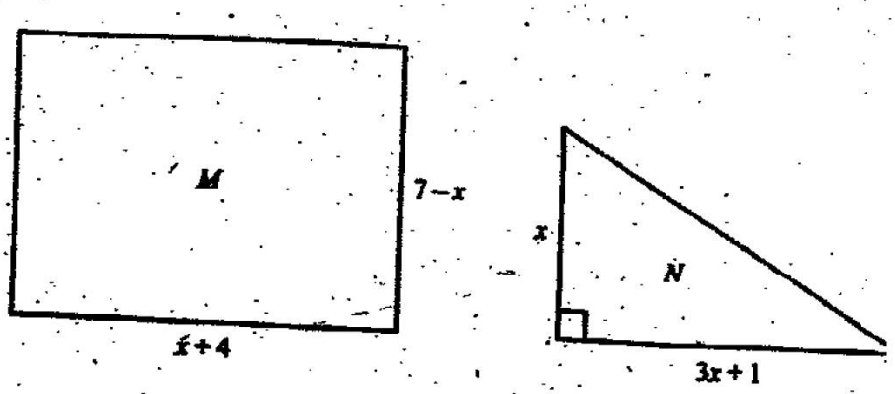
) How many people liked exactly two types of meat?

Calculate the number of people who did not like any of the meats as a fraction of the to number surveyed. Give your answer as a fraction in its lowest terms.

Section B [36 marks]

Answer three questions in this section.

7



The diagram shows a rectangle and a right-angled triangle. The lengths of the sides o *M* are $(x+4)$ cm and $(7-x)$ cm. The lengths of two of the sides of the triangle *N* $(3x+1)$ cm as shown.

(a) Write down an expression, in terms of x, for the area of

(i) rectangle *M*,

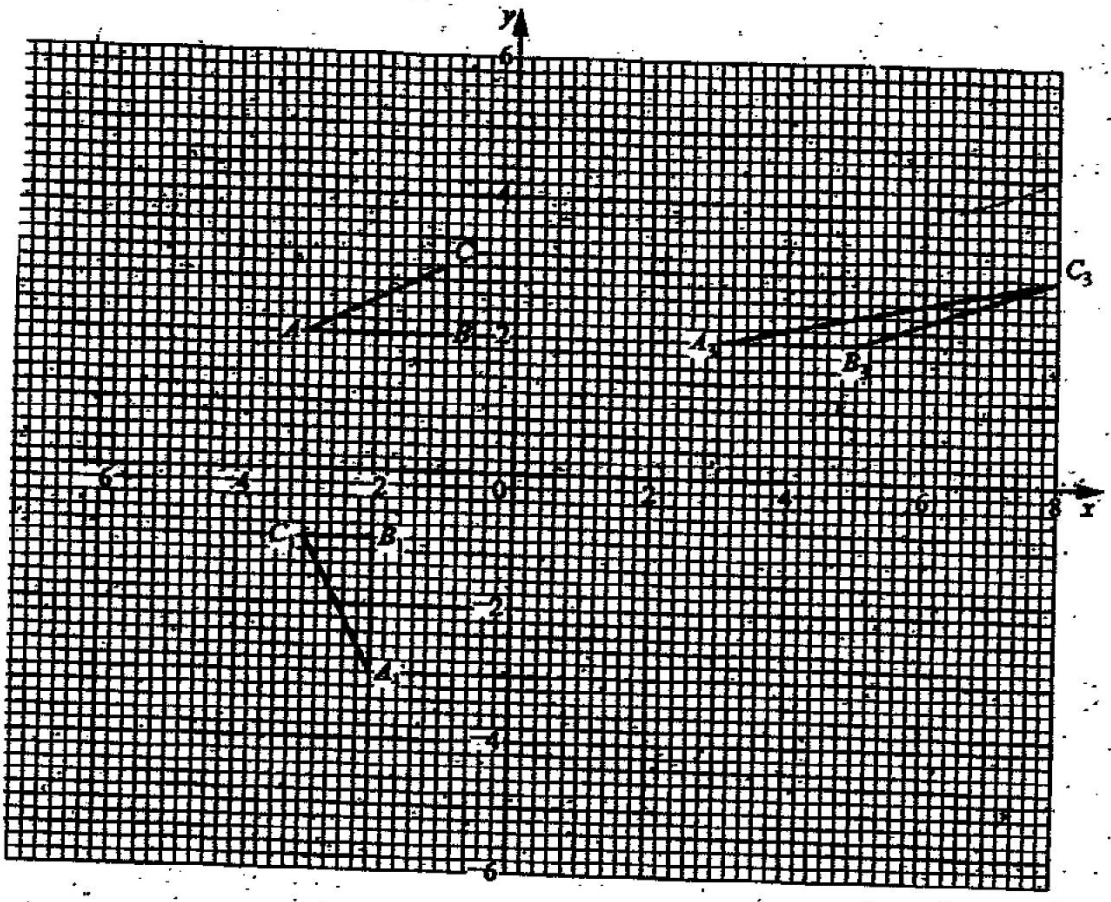
(ii) triangle *N*.

(b) Given that the area of rectangle *M* is twice the area of triangle *N*, form an equ show that it reduces to

$$2x^2 - x - 14 = 0.$$

(c) Solve the equation in (b), giving your answers correct to 3 significant figures.

(d) Write down the dimensions of rectangle *M* correct to the nearest millimetre.



$\triangle ABC$ has vertices $A(-3, 2)$, $B(-1, 2)$ and $C(-1, 3)$.
$\triangle A_1B_1C_1$ has vertices $A_1(-2, -3)$, $B_1(-2, -1)$ and $C_1(-3, -1)$.

(i) Describe fully the single transformation that maps $\triangle ABC$ onto $\triangle A_1B_1C_1$. [2]

(ii) Write down the matrix that represents this transformation. [2]

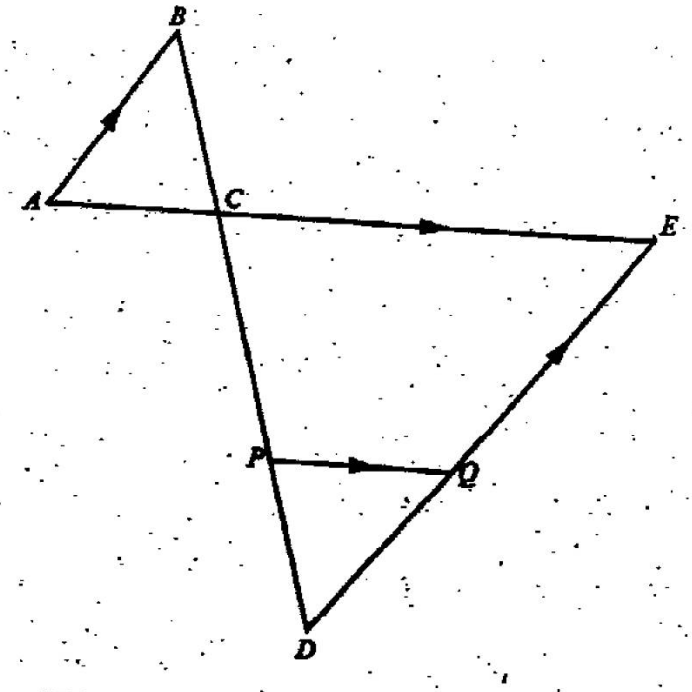
Triangle ABC is mapped onto triangle $A_2B_2C_2$ by a transformation which is represented by the matrix $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$.

(i) Find the coordinates of A_2, B_2 and C_2. [2]

(ii) Write down the matrix which represents the transformation which maps $\triangle A_2B_2C_2$ onto $\triangle ABC$. [1]

(iii) Find the matrix which represents the transformation which maps $\triangle A_2B_2C_2$ onto $\triangle A_1B_1C_1$. [2]

Triangle $A_3B_3C_3$ has vertices $A_3(3, 2)$, $B_3(5, 2)$ and $C_3(8, 3)$.
Describe fully the single transformation that maps $\triangle ABC$ onto $\triangle A_3B_3C_3$. [3]

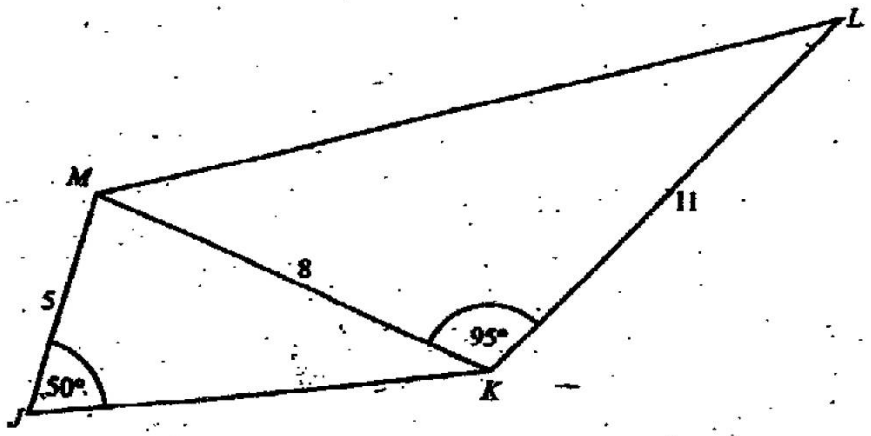


In the diagram, AB is parallel to DE and AE is parallel to PQ. ACE and $BCPD$ are straight lines and $AC = PQ$.

(i) Explain why triangles ABC and EDC are similar.

(ii) Given that $AC = \frac{1}{4}AE$ and that the area of triangle ABC is 2 square units, find the area of the quadrilateral $PQEC$.

(b)



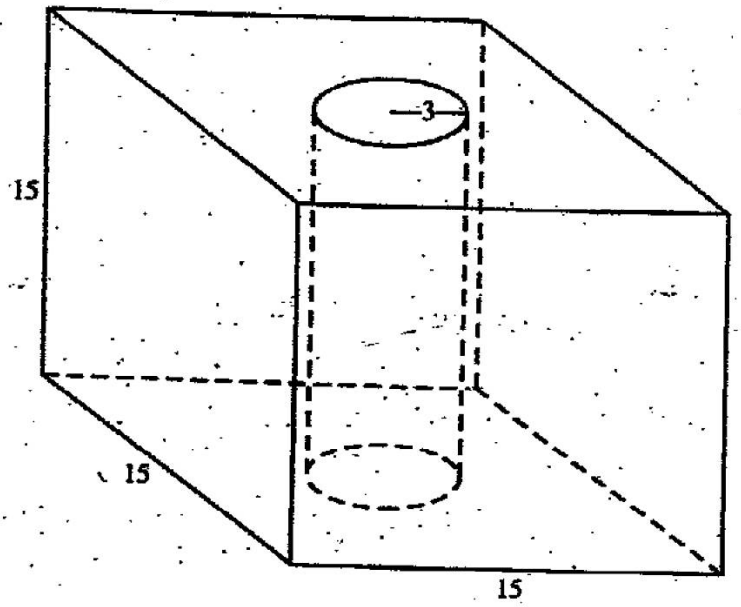
In the diagram, $JKLM$ is a quadrilateral, $JM = 5$ m, $KM = 8$ m and $M\widehat{J}K = 50°$.

(i) Calculate $J\widehat{K}M$.

(ii) Given also that $M\widehat{K}L = 95°$ and $KL = 11$ m, calculate the length of ML.

8 hours a day, should be employed to do the job in 9 days?

(b)



Take π to be 3,142

A cylindrical hole of radius 3 cm was drilled completely through a metal cube of side 15 cm direction perpendicular to one of the faces of the cube, as shown above.

(i) Calculate the volume of the metal removed.

(ii) Express the volume of the metal removed as a percentage of the volume of the original cube.

(iii) Calculate the volume of the remaining metal.

(iv) All the metal removed was melted and made into 45 identical solid spheres. Calculate the radius of each sphere, giving your answer correct to the nearest tenth of a millimetre.

[Volume of sphere $= \frac{4}{3}\pi r^3$]

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

The velocity, v m/s, of a ball after time, t seconds, is given by

$$v = 4 + 5t - t^2.$$

The table below gives some corresponding values of v and t.

t (s)	0	1	2	3	4	5	6
v (m/s)	4	8	10	10	8	4	p

(a) Calculate the value of p.

(b) Taking 2 cm to represent 1 second, draw a horizontal axis for $0 \leqslant t \leqslant 6$.
Taking 2 cm to represent 2 m/s, draw a vertical axis for $-4 \leqslant v \leqslant 12$.
Draw the graph of $v = 4 + 5t - t^2$ for $0 \leqslant t \leqslant 6$.

(c) Use the graph to estimate

(i) the time at which $v = 0$,

(ii) the maximum speed reached by the ball,

(iii) the distance covered by the ball in the first 2 seconds.

(d) **(i)** By drawing a tangent, find the gradient of the graph when $t = 4$.

(ii) State briefly what this gradient represents.