Kingdom of Lesotho
Ministry of Education and Training

EXAMINATIONS COUNCIL OF LESOTHO
Lesotho General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

MATHEMATICS
Paper 4(Extended)

0178/04
October/November 2025
2 hours 30 minutes
Marks: 130

Additional Materials: Electronic Calculator
Geometrical Instruments
Tracing Paper (optional)
Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, centre number and candidate number in the relevant spaces provided at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
Electronic calculators should be used.
If working is needed for any question, it must be shown below that question.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

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

This document consists of **17** printed pages and **3** blank pages.

1 **(a)** Marofa has a bank balance of – M180 at the Automated Teller Machine (ATM) before making a deposit.
After he deposited some money into his account, his new balance is M1 630.

Calculate the amount of money he deposited into his account.

M..... [1]

(b) Thoola Company pays its employee M220 for packaging 500-brick stack.

(i) Find the number of 500-brick stacks packaged if an employee is paid M1 100.

..... [2]

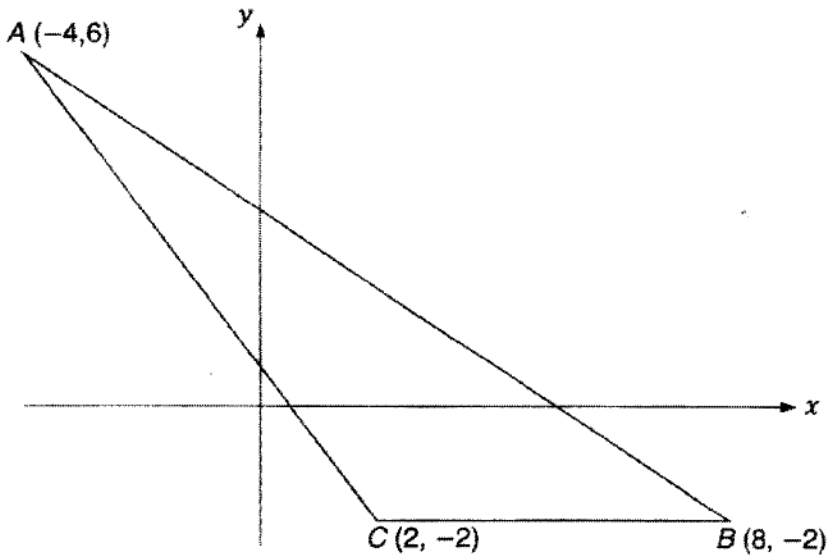
(ii) The Company reserved M15 000 for packaging the bricks.

Find the amount that remains after packaging a maximum number of 500-brick stacks.

M ..... [3]

2 The $xy -$ plane shows triangle ABC.

The coordinates of A, B and C are $(-4,6)$, $(8,-2)$ and $(2,-2)$ respectively.



(a) Calculate the coordinates of the midpoint of the line AB.

.....[2]

(b) Find the equation of the line AB.

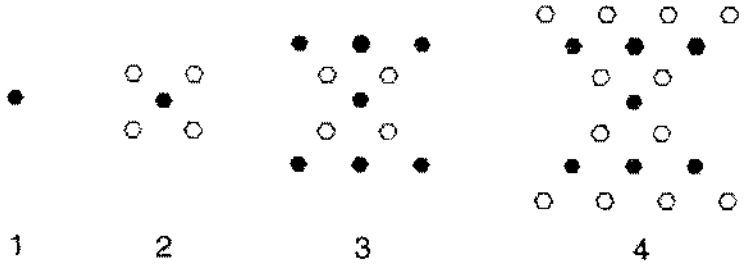
Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

.....[3]

(c) Calculate the area of the triangle ABC.

.....units^2 [2]

3 The diagram shows black and white dots in the first four patterns.



(a) Draw pattern 5. [1]

(b) Complete the table. [2]

pattern	1	2	3	4	5	...	n
black dots	1	1	7			...	
white dots	0	4	4	12		...	
total number of dots	1	5	11	19	29	...	

(c) Find

(i) the number of black dots and white dots in the 6th pattern,

black dots.....

white dots.....[2]

(ii) the nth term for the total number of dots.

..... [3]

(d) Pattern m has a total number of dots as 239.

Find the value of m.

m = ... [3]

4 **(a)** Factorise completely.

(i) $x^2 - x - 20$

..... [2]

(ii) Hence, simplify $\dfrac{x^2 - 25}{x^2 - x - 20}$

..... [2]

(b) $T = 2\pi\sqrt{\dfrac{l}{g}}$

(i) Find T when $l = 22.8$ and $g = 9.8$.

$T =$ ..... [2]

(ii) Express g in terms of π, T and l.

..... [3]

(c) Express as a single fraction in its simplest form.

$\dfrac{a+2}{4} + \dfrac{a+3}{5}$

..... [3]

5 **(a)** In 2021, the cost of printing 1 page was 50 lisente.

A company printed 1 180 pages and was given 7.5% discount on the cost.

(i) Calculate the total discount in Maloti (M).

M..... [2]

(ii) The cost of printing a page in 2021 was an increase of 10% from the cost of printing a page in 2020.

Find the cost, in Maluti, of printing a page in 2020.

M..... [3]

(b) Pule gains M3 600 interest after investing M20 000 at 6% simple interest per annum.

Calculate the number of years he invested.

..... [2]

6 **(a)** Point $P(8, -5)$ is translated by vector $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$.

Find the coordinates of the image of P.

..... [1]

(b) Point $Q(2, 7)$ is reflected upon $y = -1$.

Find the coordinates of the image of Q.

..... [1]

(c) A transformation **R** is represented by the matrix $\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$.

Describe the transformation **R**.

.....

.....[3]

(d) **N** is a matrix such that $\mathbf{N} + \begin{pmatrix} 0 & 2 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 4 \\ 0 & -1 \end{pmatrix}$.

Find the matrix **N**.

N =..... [2]

(e) $\mathbf{M} = \begin{pmatrix} 2 & -1 \\ 3 & 5 \end{pmatrix}$.

Find $\mathbf{M}^{-1}$.

..... [2]

7 There are 150 marbles in a box.

60 of the marbles are red while the others are green and blue.

A marble is chosen at random, and the probability of choosing a green marble is $\frac{7}{30}$.

(a) Find the probability of choosing

(i) a red marble,

.....[1]

(ii) a blue marble.

.....[3]

(b) A marble is chosen at random, observed, but not replaced.
Another marble is then chosen and observed.

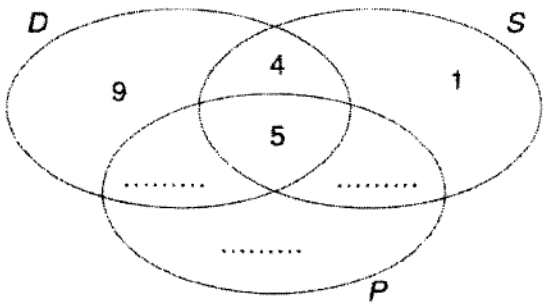
Calculate the probability that one marble is red and the other is green.

.....[3]

8 The school offers debate D, spelling bee S and pronunciation P as its activities.

$n(S) = 15$, $n(P) = 17$ and $n(D \cap P) = 8$.

The Venn diagram represents part of the information.



(a) Complete the Venn diagram. [2]

(b) Find

(i) $n(P')$,

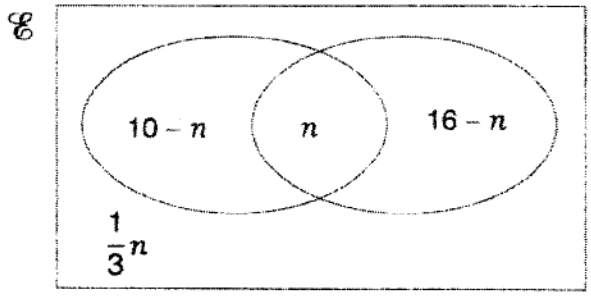
.....[1]

(ii) $n(P \cup D \cap S)$.

..... [1]

(c) Another Venn diagram shows a set of 20 elements.

The number of elements in each subset is given in terms of n.



Find the value of n.

$n =$.....[3]

9 **(a)** Given that $a + b = 9$ and $a^2 + b^2 = 71$, find the value of $(ab)^5$.

..... [3]

(b) Solve $(1 + 2a)^2 = 81$.

$a =$..... or ..... [3]

(c) $f(x) = x - \frac{3}{x}$.

(i) Find the value of x when $f(x) = -2$.

$x =$..... or ..... [3]

(ii) Using the result from **9 (c)(i)** or otherwise, solve $\sqrt{2b - 3} - \frac{3}{\sqrt{2b - 3}} = -2$.

..... [4]

10 The table shows the marks obtained by 60 students in a mathematics quiz.

mark(s)	$0 < s \leq 10$	$10 < s \leq 20$	$20 < s \leq 30$	$30 < s \leq 40$	$40 < s \leq 50$
frequency	3	18	21	13	5

(a) State the modal class.

..... [1]

(b) Calculate the estimated mean score.

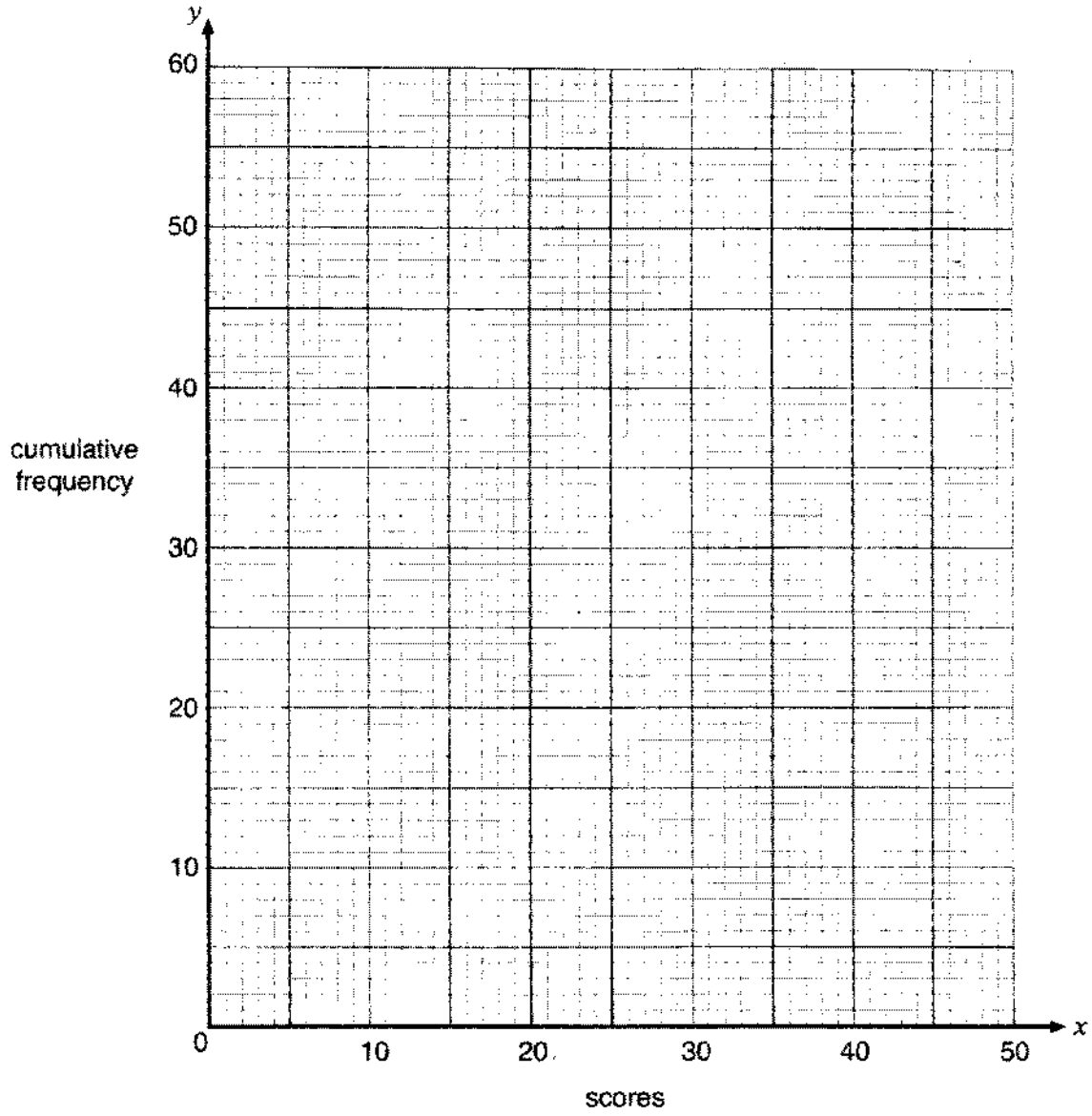
..... [4]

(c) **(i)** Complete the cumulative frequency table. [2]

score (s)	$s \leq 10$	$s \leq 20$	$s \leq 30$	$s \leq 40$	$s \leq 50$
cumulative frequency	3	21			60

[Turn over

(ii) Draw a cumulative frequency curve to represent this information. [3]



(d) Use your graph to estimate

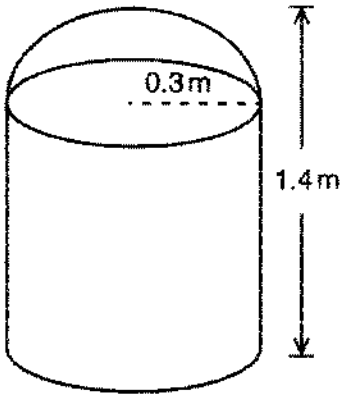
(i) the number of students who scored above 35 marks.

..... [1]

(ii) the interquartile range.

..... [2]

11 The diagram shows a container consisting of a cylinder and a hemispherical top.
The radius of both the cylinder and the hemisphere is 0.3 m each.
The height of the container is 1.4 m.



NOT TO SCALE

(a) Find the height of the cylinder.

..... m [1]

(b) Calculate the total volume of the container.
[The volume of the sphere of radius r is given by $V = \frac{4}{3}\pi r^3$]

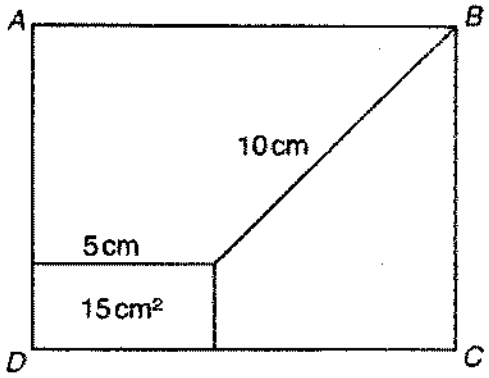
..... m^3 [4]

(c) The container is filled with water up to $\frac{3}{4}$ of the total volume.
Calculate the height reached by the water in the container.

.....m [3]

[Turn over

12 (a) The diagram shows a square *ABCD* with a rectangle whose area is 15 cm^2.
Two other measures, 5 cm and 10 cm, are also shown.



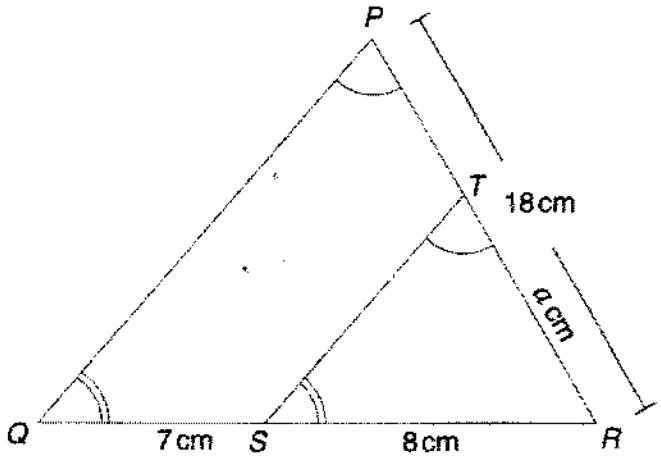
NOT TO SCALE

Find the area of the square *ABCD*.

.....cm^2 [4]

(b) The diagram shows two similar triangles *PQR* and *TSR*.

QS = 7 cm, *SR* = 8 cm, *PR* = 18 cm and *RT* = *a* cm.



NOT TO SCALE

Calculate the value of the length of *PT*.

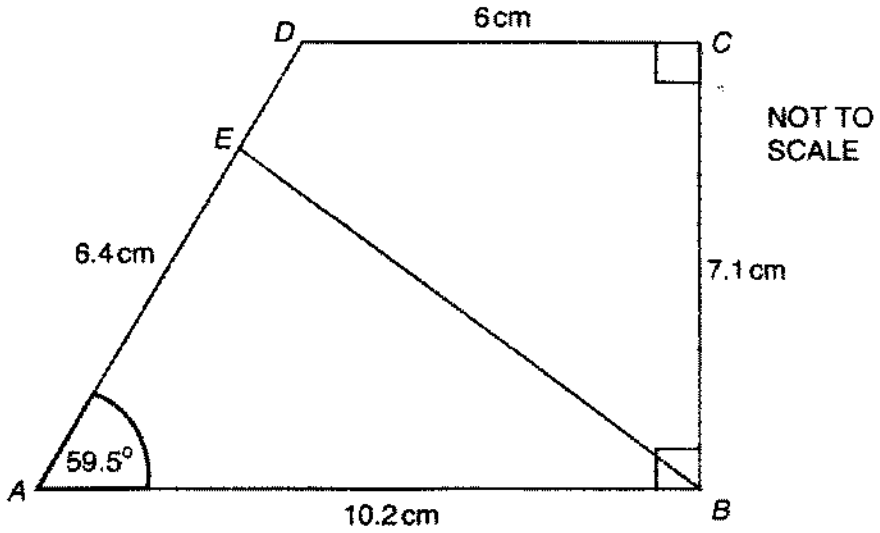
.....cm [3]

13 The diagram shows a trapezium $ABCD$.

Angles ABC and angle BCD are right angles.

E is a point on AD such that $AE = 6.4$ cm.

$AB = 10.2$ cm, $BC = 7.1$ cm, $CD = 6$ cm and angle $EAB = 59.5°$.



Calculate

(a) the area of the shape $ABCD$,

..... cm² [2]

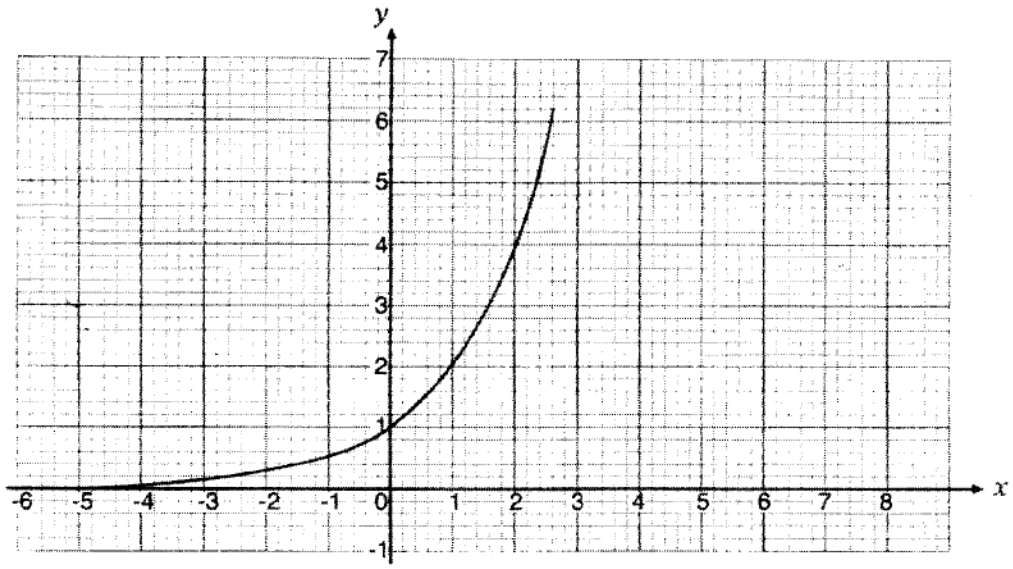
(b) the length of perpendicular line from E to line AB,

.....cm [2]

(c) the length of the line BE.

..... cm [4]

14 The diagram shows the graph of $y = f(x)$.



(a) Use the graph to complete the table below [2]

x	−2	−1	0	1	2
$f(x)$	$\frac{1}{4}$	$\frac{1}{2}$			

(b) The function $f(x)$ can be expressed in the form $f(x) = 2^{ax}$.

Find the value of a.

$a =$ ..... [1]

(c) The table shows the values of $y = \frac{2}{x^2} - x, x \neq 0$.

x	−5	−2	−1.5	−1	−0.7		0.6	1	1.5
y	5.1	p	2.4	3.0	4.8		6.0	q	−0.6

Find the value of p and the value of q.

$p =$ .....[1]

$q =$ .....[1]

(d) Draw the graph of $y = \frac{2}{x^2} - x$ on the same grid. [3]

(e) Use your graphs to solve these equations.

(i) $\frac{2}{x^2} - x = 3$

$x =$ ..... or $x =$ ..... or $x =$..... [3]

(ii) $2^x - \frac{2}{x^2} + x = 0$

..... [1]

(f) The equation $\frac{2}{x^2} - x = 3 - 2x$ can be written in the form $0 = ax^3 + bx^2 - 2$ where a and b are integers.

Find the values of a and b.

$a =$.....

$b =$..... [3]

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