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 3 (Core)

0178/03
May/June 2024
2 hours
Marks: 100

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 **16** printed pages.

Examinations Council of Lesotho

1 **(a)** Evaluate $5\pi^2 \left(\frac{2}{3}\right)^{\frac{1}{4}}$.

Give your answer correct to two decimal places.

..... [2]

(b) A country has a population of 23 042 000.

(i) Write this population in words.

.....

..... [1]

(ii) Write 23 042 000 correct to 3 significant figures.

..... [1]

(iii) The population is expected to increase by 5% in the following year.

Calculate the expected population.

..... [2]

2 **(a)** $200 = 2^3 \times 5^2$ and $60 = 2^2 \times 3 \times 5$.

(i) Express 90 as a product of its prime factors.

90 = ... [1]

(ii) Find the smallest integer value k such that $200k$ is both a square number and a multiple of 60.

k = ... [2]

(b) Show, without using a calculator, that 968 is not a perfect square.

[2]

(c) The distance d, between two places **A** and **B** is 380 m correct to the nearest 10 m.

Complete the statement.

..... $\leq d <$ ..... [2]

(d) A region has an area 800 cm² on the map.

The map scale is 4 cm : 600 m.

Calculate the actual area, in km², of the region.

.....km² [3]

3 (a) Jane, Kopo and Lerato shared M45 000.
Jane got $\frac{4}{9}$ of the money while Kopo and Lerato shared the remaining amount equally.

Write, in simplest form, the ratio of their shares.

..... : ..... : ..... [3]

(b) A TV set costs M5 550 at cash price.
A hire purchase was used with a deposit of M550 followed by M165 monthly installments for 36 months.

Find how much more was paid for the TV set.

M..... [3]

(c) A loan of M6 000 for a term of t years gave interest of M1 800 at 6% simple interest per annum.
Find the length of the term.

.....years [2]

4 **(a)** Mahali takes 48 minutes to walk a distance of 3.6 km to school.
She left home at 07 13.

(i) Find the time she arrived at school.

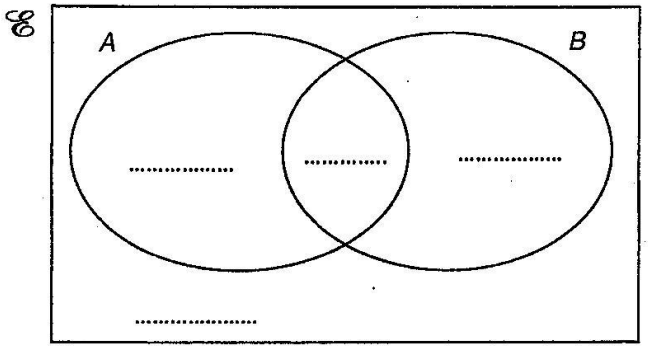
..... [1]

(ii) Calculate her average walking speed in kilometres per hour.

..... km/h [2]

(b) A group of 118 students were asked if they liked Accounting (A) or Biology (B).

$n(\text{A}) = 50, n(B) = 65$ and $n(\text{A} \cup \text{B}) = 108$.

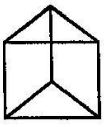


(i) Complete the Venn diagram. [3]

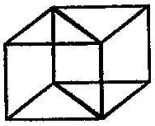
(ii) Find the $n(\text{A} \cap \text{B})'$.

..... [1]

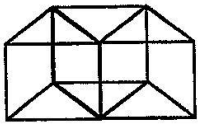
5 The diagram shows patterns made by using sticks.



Pattern 1



Pattern 2



Pattern 3

Pattern number n	Number of sticks	Number of rectangular faces
1	9	3
2	14	5
3	19	7
4		

(a) Complete the table for pattern 4. [2]

(b) Find the nth term for the number of rectangular faces, giving your answer in its simplest form.

..... [2]

(c) A pattern has 109 sticks.

Find

(i) the pattern number,

..... [2]

(ii) the corresponding number of rectangular faces.

..... [2]

6 **(a)** Given that $x^2 + bx + 12$ can be factored such that b is a positive integer, find all possible values of b.

$b =$ ..... [2]

(b) Given that the lines $y = 3x + 1$ and $2y = kx + 12$ are parallel, find the value of k.

$k =$ ..... [2]

(c) Express as a single fraction.

$$\frac{3a+b}{3} + \frac{a-b}{4}$$

..... [3]

7 **(a)** Factorise fully.

(i) $ax + a$

..... [1]

(ii) $x^2 - 5x - 14$

..... [2]

(b) Solve the equations.

(i) $\frac{5t}{3} + 8 = 3$

$t =$ ..... [2]

(ii) $9x^2 = 9x$

$x =$..... or ..... [2]

(iii) $4x + 5y = 7$

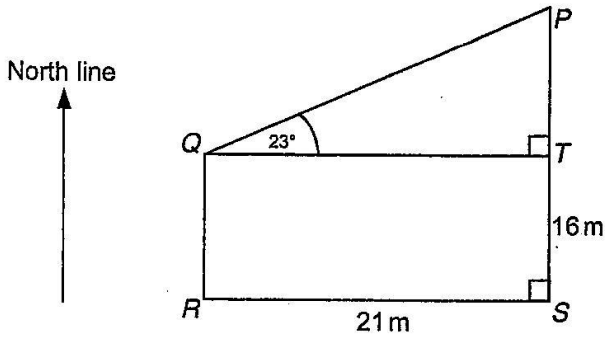
$2x - 5y = -1$

$x =$.....

$y =$..... [3]

8 The diagram shows a rectangular plot $QRST$ on a horizontal land.

PT is a vertical pole, $RS = 21$ m, $ST = 16$ m and $P\hat{Q}T = 23°$.



NOT TO SCALE

Calculate

(a) the length of RT,

.....m [2]

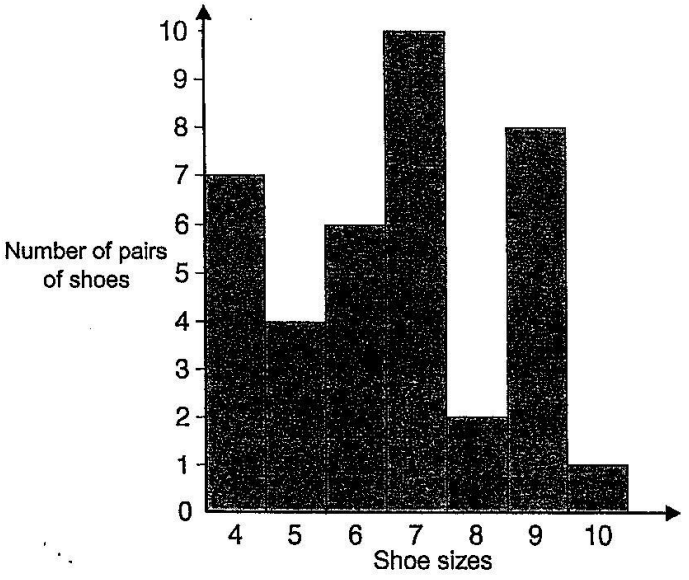
(b) the height of the pole PT,

..... m [2]

(c) the bearing of T from R.

.....° [3]

9 The bar chart shows the shoe sizes at a shoe boutique *A*.



NOT TO SCALE

(a) Find

(i) the range of shoe sizes,

..... [1]

(ii) the total number of pairs of shoes.

..... [1]

(b) A pair of shoes is taken at random.

Find the probability that it is size 7.

..... [1]

(c) The table shows the number of shoe sizes at boutique *B*.

Shoe size	4	5	6	7	8	9
Frequency	8	12	14	13	6	7

(i) A pie chart is to be drawn.

Calculate the sector angle for size 5.

..... ° [2]

(ii) Calculate the mean shoe size.

..... [3]

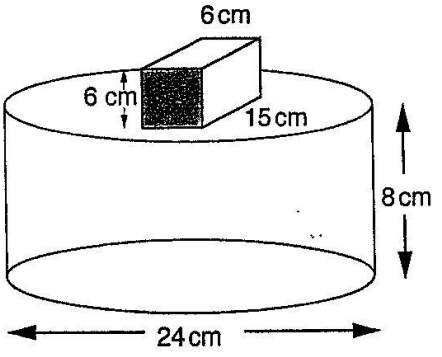
(d) A pair of size 9 shoes is taken at random from each boutique.

Which boutique is size 9 more likely to be picked? Justify.

Boutique ..... because .....

..... [2]

10 The diagram shows a solid made of a cylinder and cuboid.
The cylinder has diameter 24 cm and height 8 cm.
The cuboid has a square face of 6 cm and length 15 cm.



NOT TO SCALE

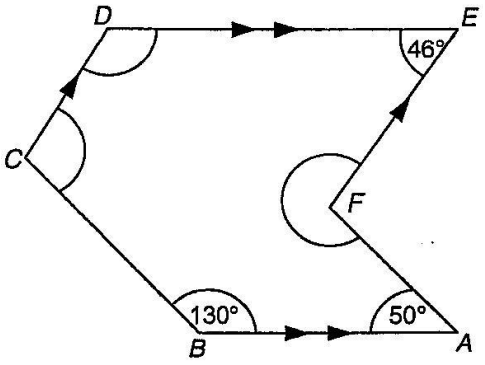
(a) Find the area of the top of the cylinder which is not covered by the cuboid.

.....cm^2 [3]

(b) Calculate, in litres, the volume of the solid.
Give your answer correct to the nearest litre.

.....litres [3]

11 In the diagram AB is parallel to ED and CD is parallel to FE.
Angle $ABC = 130°$, angle $BAF = 50°$ and angle $DEF = 46°$.



NOT TO SCALE

(a) Calculate the size of

(i) the angle CDE,

.....° [1]

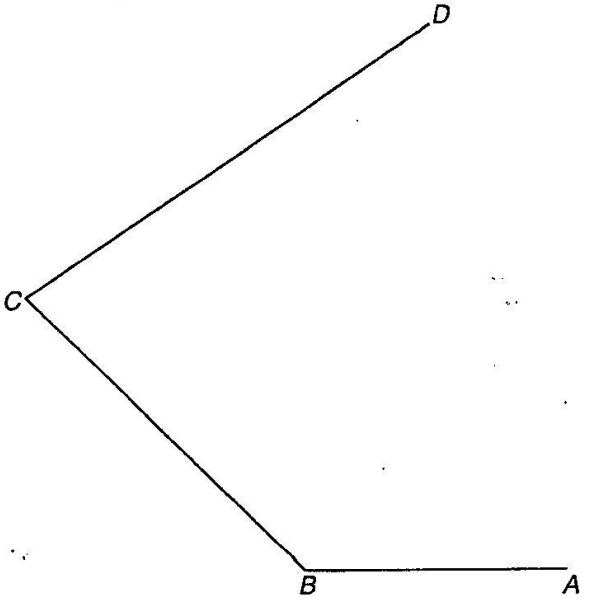
(ii) the angle DCB,

.....° [2]

(iii) the reflex angle AFE.

.....° [2]

(b) The diagram shows part of the pentagon *ABCDE*.



NOT TO SCALE

(i) State the number of angles in a pentagon.

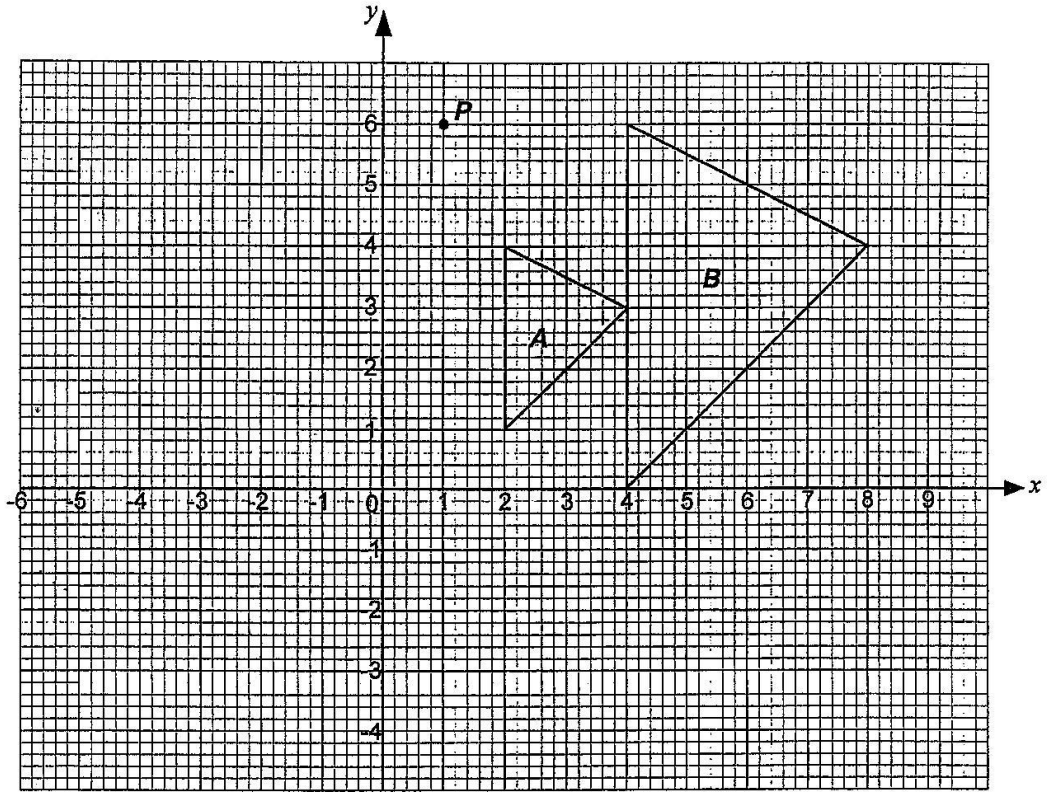
.....angles [1]

(ii) Complete the pentagon *ABCDE* such that

I *EC* is the angle bisector of *BCD*, [1]

II angle *AED* = 124°. [1]

12 The diagram shows point ***P*** and triangles ***A*** and ***B***.



(a) State the coordinates of ***P***.

.....[1]

(b) Describe fully the transformation that maps ***A*** onto ***B***.

.....

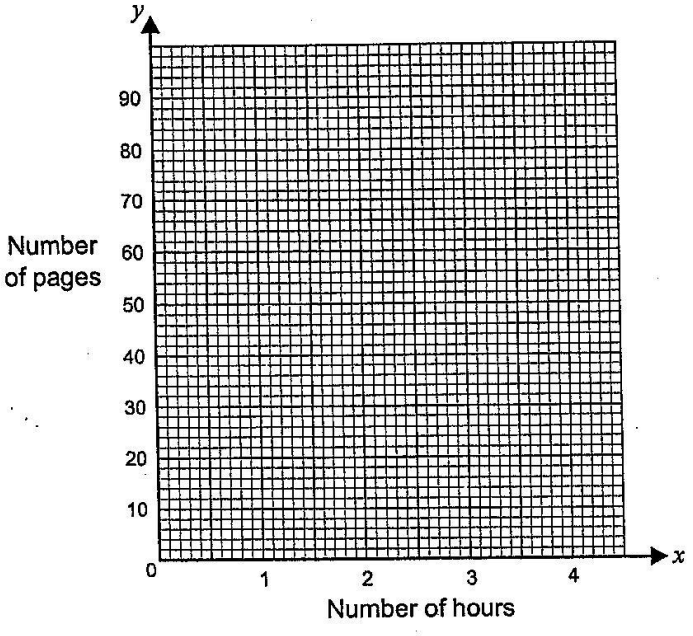
.....[3]

(c) Show the position of ***P*** after translation with translation vector $\begin{pmatrix} 0 \\ -5 \end{pmatrix}$. [1]

(d) Rotate triangle ***A*** about centre (0,0), through 90° anticlockwise. [2]

13 Themba takes half an hour to read 10 pages of a 90-page book.
He reads at this constant rate throughout until he finishes.

(a) Draw a graph to represent his reading rate. [2]



(b) Use the graph to find

(i) how long he takes to read 70 pages,

.....hours [1]

(ii) the number of pages he read after $2\frac{1}{2}$ hours,

.....pages[1]

(iii) how many pages will be left after 4 hours.

.....pages [2]