Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8148412500

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **May/June 2023**

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 Work out.

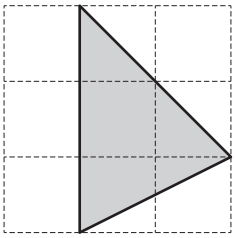
(a) $1234.4 \div 8$

..... [1]

(b) $\frac{3}{7}$ of 56

..... [1]

2 **(a)** Write down the fraction of this 3×3 square that is shaded.



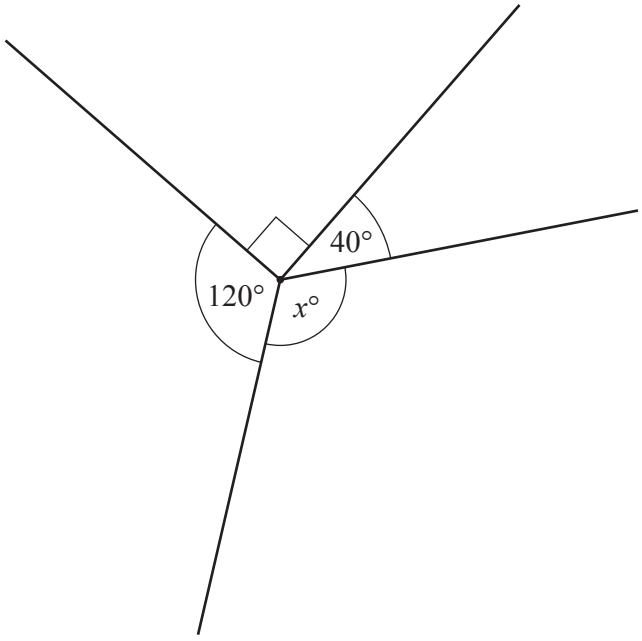
..... [1]

(b) Evaluate 0.5^2.

..... [1]

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3 **(a)**



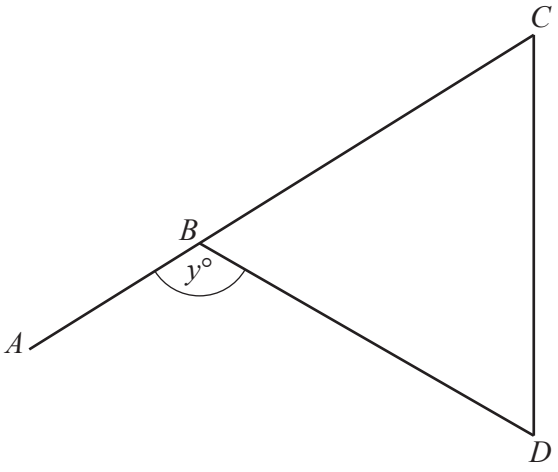
NOT TO SCALE

The diagram shows four straight lines meeting at a point.

Work out the value of x.

$x =$ ..... [1]

(b) ABC is a straight line and BCD is an equilateral triangle.



NOT TO SCALE

Work out the value of y.

$y =$ ..... [1]

4 **(a)** Benjamin's age is t years.

(i) Maryam is 5 years younger than Benjamin.

Write an expression for Maryam's age in terms of t.

..... [1]

(ii) Colin's age is twice Benjamin's age.

Write an expression for Colin's age in terms of t.

..... [1]

(b) Given that $a = 3$ and $b = -2$, evaluate $5a - 2b$.

..... [1]

5 **(a)** Insert one set of brackets to make the calculation correct.

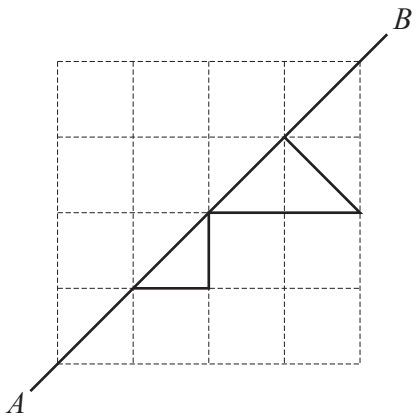
$$3 + 5 \times 2 - 7 = 9$$ [1]

(b) Insert $+$, $-$ and $\times$ to make the calculation correct.

$$3 \quad 5 \quad 2 \quad 7 = 20$$ [1]

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6 **(a)** Complete the pattern so that AB is the only line of symmetry.



[1]

(b) A hexagon has rotational symmetry of order 6.
The perimeter of the hexagon is 30 cm.

Draw a sketch of the hexagon labelling the lengths of the sides.

[1]

7 **(a)** Here are five temperatures in ºC.

$-18 \quad -21 \quad -2 \quad 17 \quad -10$

Write these temperatures in order from coldest to hottest.

....., ..., ..., ..., ... [1]
coldest

(b) Work out the temperature that is 5 ºC colder than −18 ºC.

..... ºC [1]

8 A rope is cut into three pieces with lengths in the ratio 3 : 5 : 4.
The length of the shortest piece of rope is 180 cm.

(a) Find the length, in cm, of the longest piece of rope.

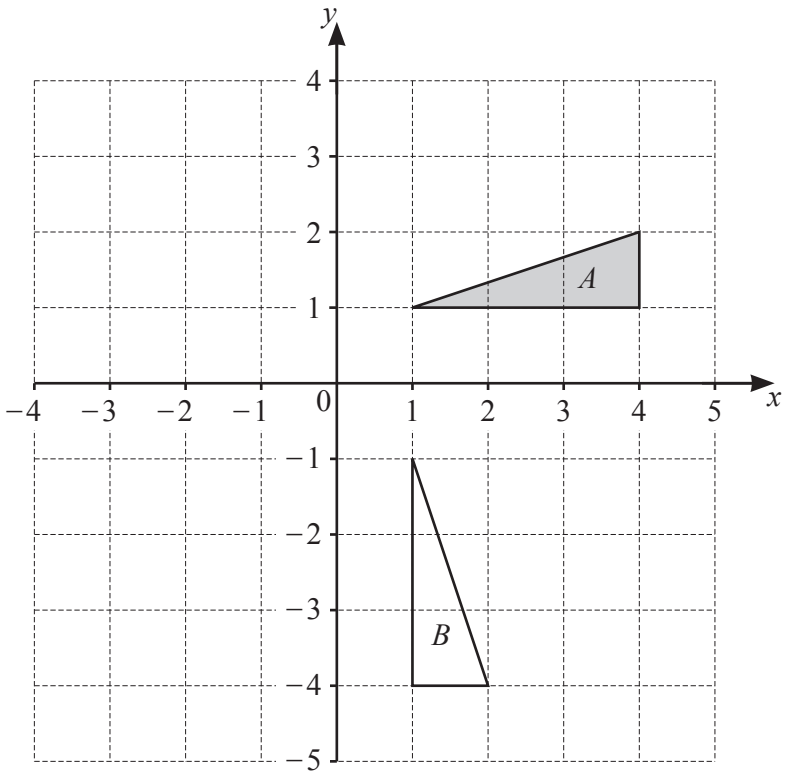
..... cm [2]

(b) Find the total length of rope.
Give your answer in metres.

..... m [2]

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9 The diagram shows triangles A and B.



Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

10 **(a)** Work out $1\frac{1}{3} \times \frac{8}{9}$.
Give your answer as a mixed number in its simplest form.

..... [2]

(b) Kate has a bunch of grapes.
She ate $\frac{1}{4}$ of the grapes in the morning.
She ate $\frac{2}{3}$ of the grapes in the afternoon.

Work out the fraction of the grapes that she has **not** eaten.

..... [2]

11 Solve the inequality $x - 5 > 3x + 7$.

..... [2]

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12 **(a)** Ali keeps a record of the computer games he plays.
Out of the first 6 games, Ali wins 4.
Out of the first 20 games, Ali wins 13.

Use these results to find the best estimate for the probability that Ali will **not** win the next computer game he plays.

..... [1]

(b) A spinner is spun n times.
The spinner lands on red 14 times.
The relative frequency of the spinner landing on red is 0.2 .

Find the value of n.

$n =$ ..... [2]

13 **(a)** The bearing of Mingfield from Lenton is 156º.

Calculate the bearing of Lenton from Mingfield.

..... [1]

(b) On a map, the distance between Lenton and Mingfield is 4.5 cm.
The actual distance between Lenton and Mingfield is 9 km.

Find the scale of the map in the form 1 : n.

1 : ..... [2]

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14 Expand and simplify.

(a) $5(3x-2)-3(2x-3)$

..... [2]

(b) $(2x+3)(x-7)$

..... [2]

15 These are the first four terms of a sequence.

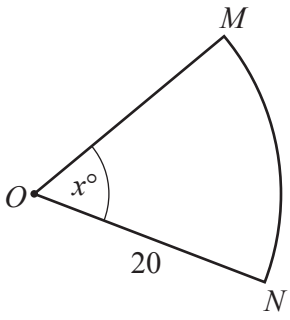
1 7 13 19

Find an expression, in terms of n, for the nth term of this sequence.

..... [2]

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NOT TO SCALE

OMN is a sector of a circle, centre O.
$ON = 20$ cm and the area of the sector is 30π cm^2.

Find the value of x.

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

17 The mass of the planet Saturn is 5.7×10^{26} kg.
The mass of the planet Venus is 4.9×10^{24} kg.

Calculate the difference in mass between Saturn and Venus.
Give your answer in standard form.

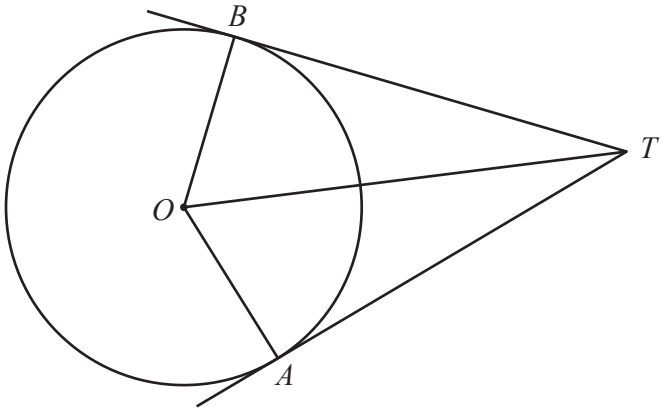
..... kg [2]

18 $y = \sqrt{\dfrac{x+2}{3}}$

Rearrange the formula to make x the subject.

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

19



NOT TO SCALE

A and B are points on the circumference of a circle, centre O.
TA and TB are tangents to the circle.

Show that triangles OBT and OAT are congruent.
Give a reason for each statement you make.

.....

.....

.....

.....

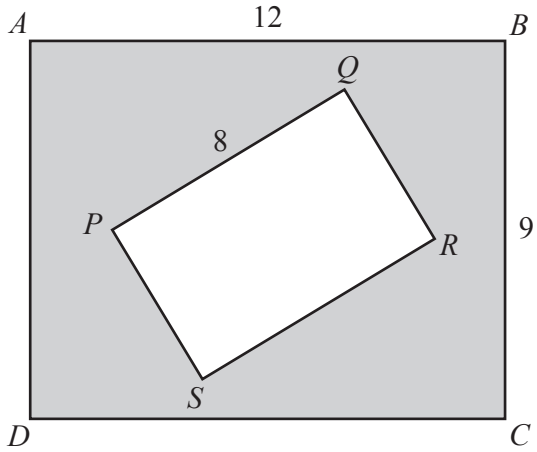
..... [3]

20 $f(x) = 10 + 7x$

Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

21 The diagram shows two rectangles.



NOT TO SCALE

Rectangle $ABCD$ is mathematically similar to rectangle $PQRS$.
$AB = 12$ cm, $BC = 9$ cm and $PQ = 8$ cm.

Find the shaded area.

..... cm^2 [3]

22 Factorise.

(a) $7y + 2xy - 6x - 21$

..... [2]

(b) $3a^2 - 12b^2$

..... [2]

23 The attendance at a cricket match is 36 000 correct to the nearest thousand.

(a) Write down the minimum number of people at the cricket match.

..... [1]

(b) The number of males attending the match is 21 000 correct to the nearest five hundred.

Find the maximum number of females that could be attending the cricket match.

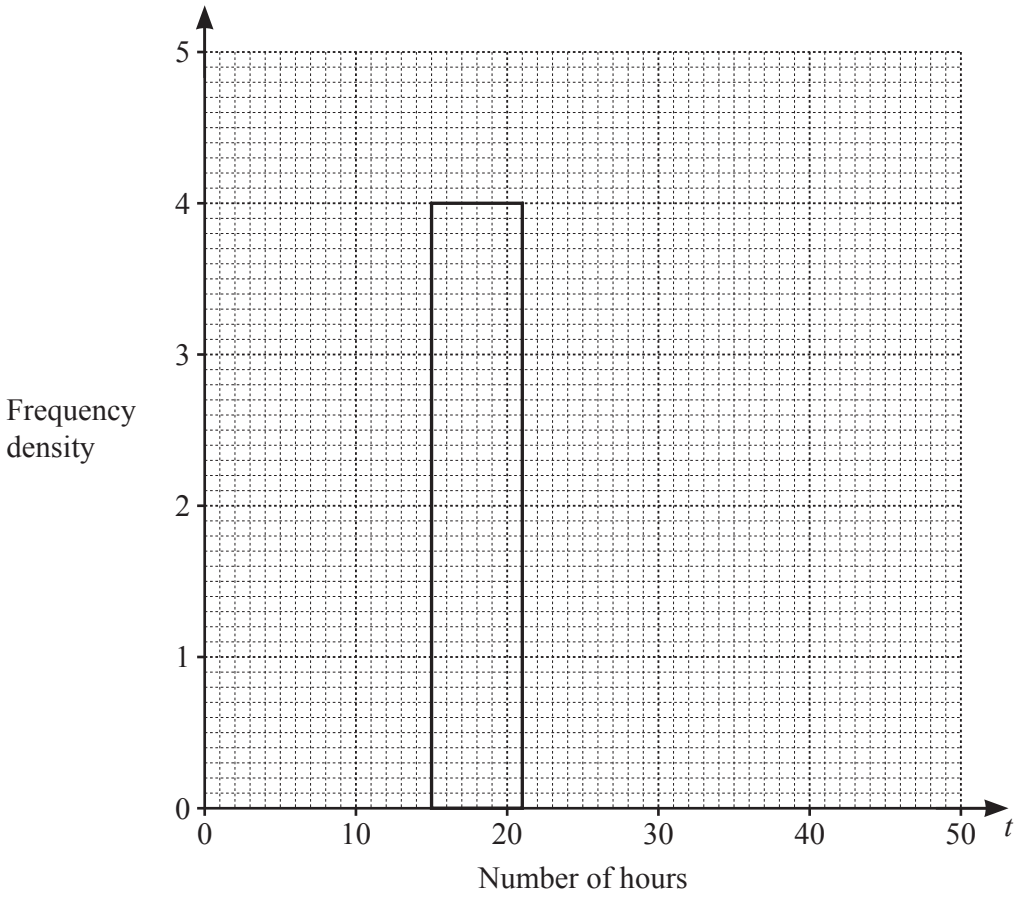
..... [3]

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24 100 batteries are tested to see how long they last.
The table shows the results.

Number of hours (t)	$10 < t \leqslant 15$	$15 < t \leqslant 21$	$21 < t \leqslant 30$	$30 < t \leqslant 50$
Frequency	10	24	36	30

Complete the histogram to show this information.



[3]

25 $(ax^b)^3 = 27x^4$

Find the value of a and the value of b.

$a =$ .....

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

26 A is the point $(-2, 3)$ and B is the point $(4, 7)$.

(a) Find the coordinates of the midpoint of AB.

(....., ...) [1]

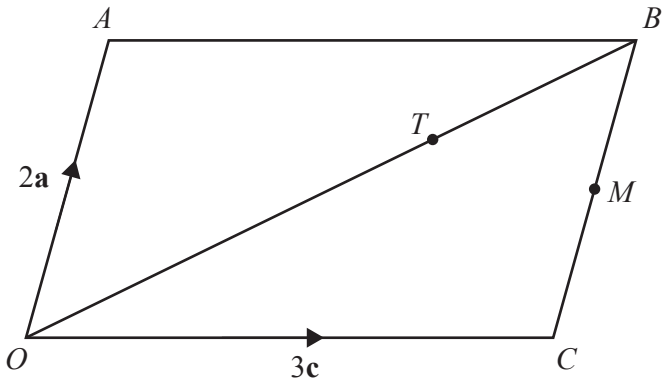
(b) Line l is the locus of points that are equidistant from A and B.

Find the equation of line l.

..... [4]

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27



NOT TO SCALE

$OABC$ is a parallelogram.
$\overrightarrow{OA} = 2\mathbf{a}$ and $\overrightarrow{OC} = 3\mathbf{c}$.
M is the midpoint of BC.
T is the point on OB such that $OT : TB = 2 : 1$.

(a) Find $\overrightarrow{OB}$ in terms of **a** and **c**.

$\overrightarrow{OB} =$ ..... [1]

(b) Express, as simply as possible, in terms of **a** and **c**

(i) $\overrightarrow{AM}$

$\overrightarrow{AM} =$ ..... [1]

(ii) $\overrightarrow{AT}$.

$\overrightarrow{AT} =$ ..... [2]

(c) Show that ATM is a straight line.

.....

.....

.....

.....

..... [2]

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