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.

DC (CJ/CB) 315937/2
© UCLES 2023

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 Work out.

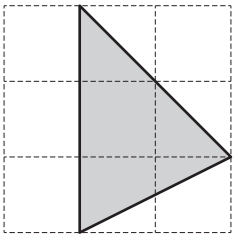
(a) $1234.4 \div 8$

..... [1]

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

..... [1]

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



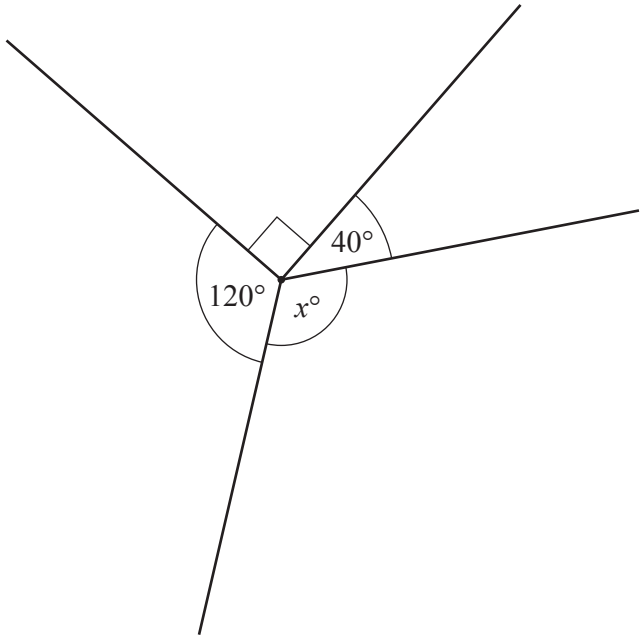
..... [1]

(b) Evaluate 0.5^2.

..... [1]

© UCLES 2023

3 **(a)**



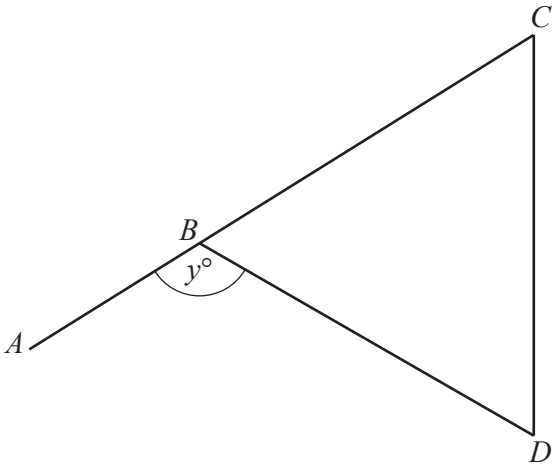
NOT TO SCALE

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]

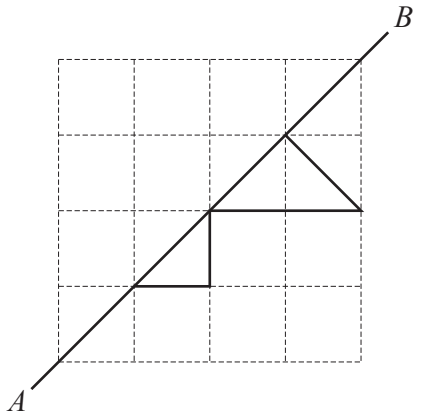
5 **(a)** Insert one set of brackets to make the calculation correct.

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

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

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

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.

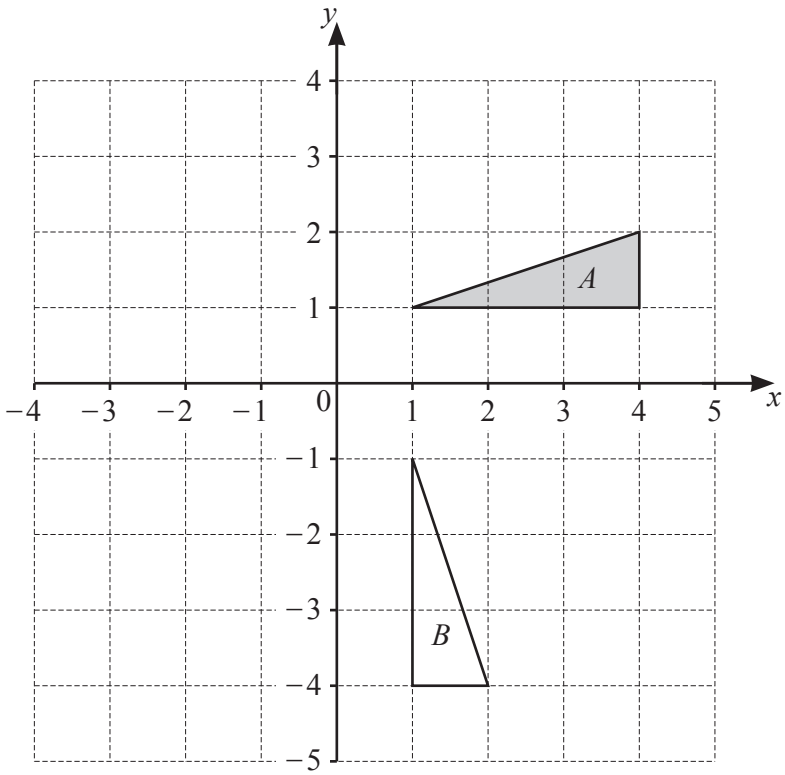
..... cm [2]

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

..... m [2]

© UCLES 2023

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]

© UCLES 2023

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]

14 Expand and simplify.

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

..... [2]

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

..... [2]

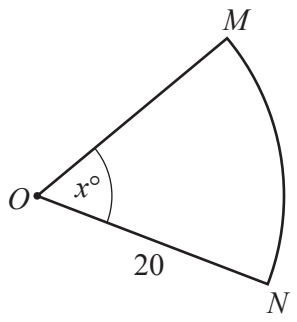
15 These are the first four terms of a sequence.

1 7 13 19

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

..... [2]

16



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.

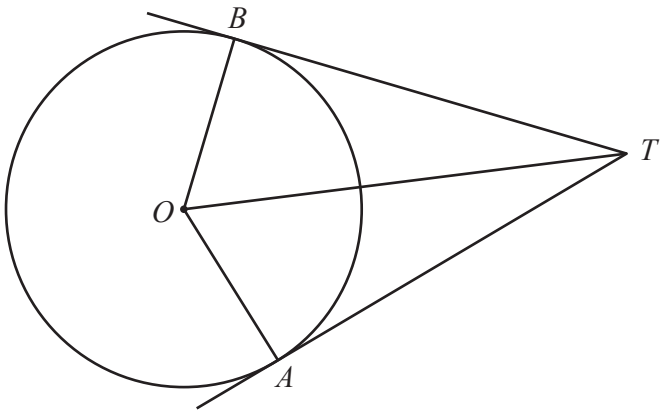
..... kg [2]

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.

.....

.....

.....

.....

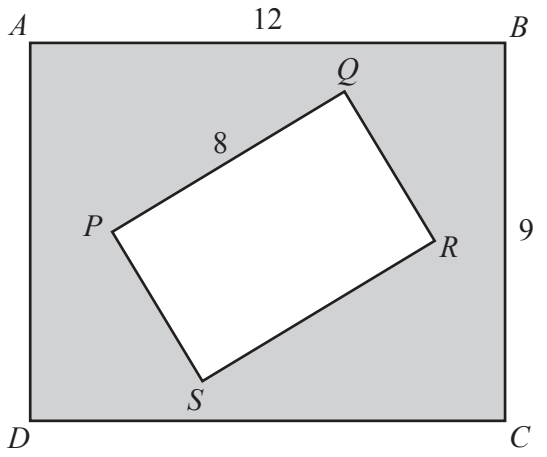
..... [3]

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.

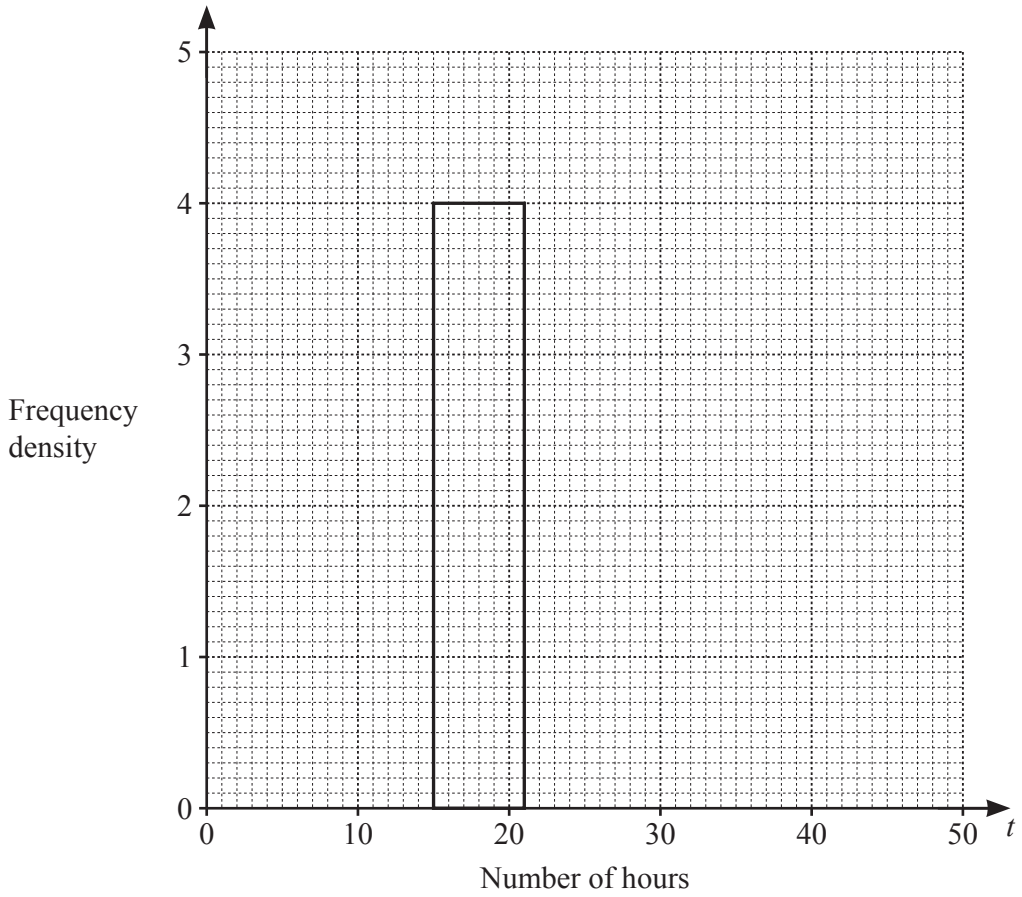
..... [3]

© UCLES 2023

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.

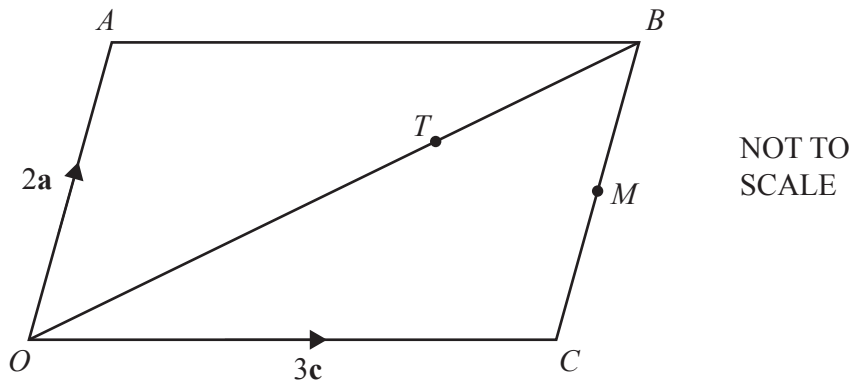
(....., ...) [1]

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

Find the equation of line l.

..... [4]

27



$OABC$ 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]

BLANK PAGE

BLANK PAGE

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

© UCLES 2023