Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/21**

Paper 2 (Extended) **May/June 2023**

1 hour 30 minutes

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.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

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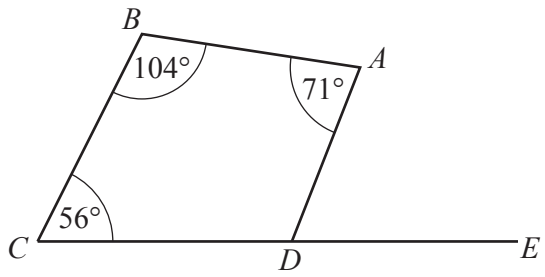
[Turn over

1



NOT TO SCALE

CDE is a straight line.

Find angle *ADE*.

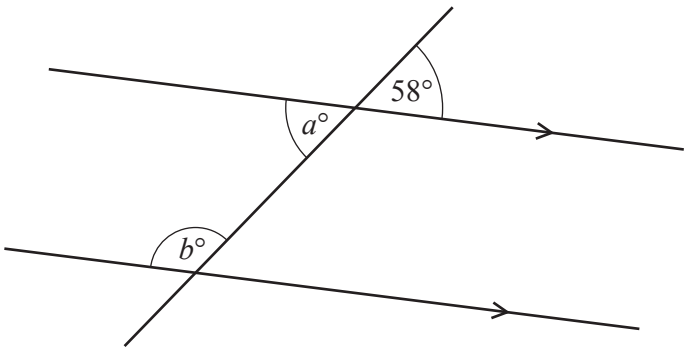
..... [2]

2 A train journey starts at 21 43.
It takes 8 hours and 32 minutes.

Find the time the journey finishes.

..... [1]

3



NOT TO SCALE

The diagram shows a straight line intersecting two parallel lines.

Find the value of *a* and the value of *b*, giving a geometrical reason for each answer.

a = ... because .....

b = ... because ..... [4]

4 By writing each number in the calculation correct to 1 significant figure, work out an estimate for the value of

$$\frac{6.7 \times 2.1}{18 - 5.9}.$$

You must show all your working.

..... [2]

5 Eric has four colours of paint.
The table shows the probability that he uses each colour.

Colour	Red	Blue	Green	Yellow
Probability	0.3	0.35	0.13	x

Find the value of x.

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

6 Calculate the volume of a sphere with diameter 4.8 cm.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm^3 [2]

7 The scale of a map is 1 : 125 000.
On a map, the length of an island is 9.4 cm.

Calculate the actual length of the island, giving your answer in kilometres.

..... km [2]

[Turn over

8 **(a)** The nth term of a sequence is $10 - n^2$.

Write down the first three terms of this sequence.

..... , ... , ... [2]

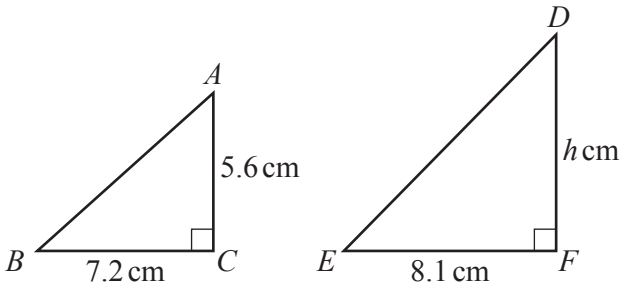
(b) These are the first four terms of another sequence.

7 10 13 16

Find an expression for the nth term of this sequence.

..... [2]

9



NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Calculate the value of h.

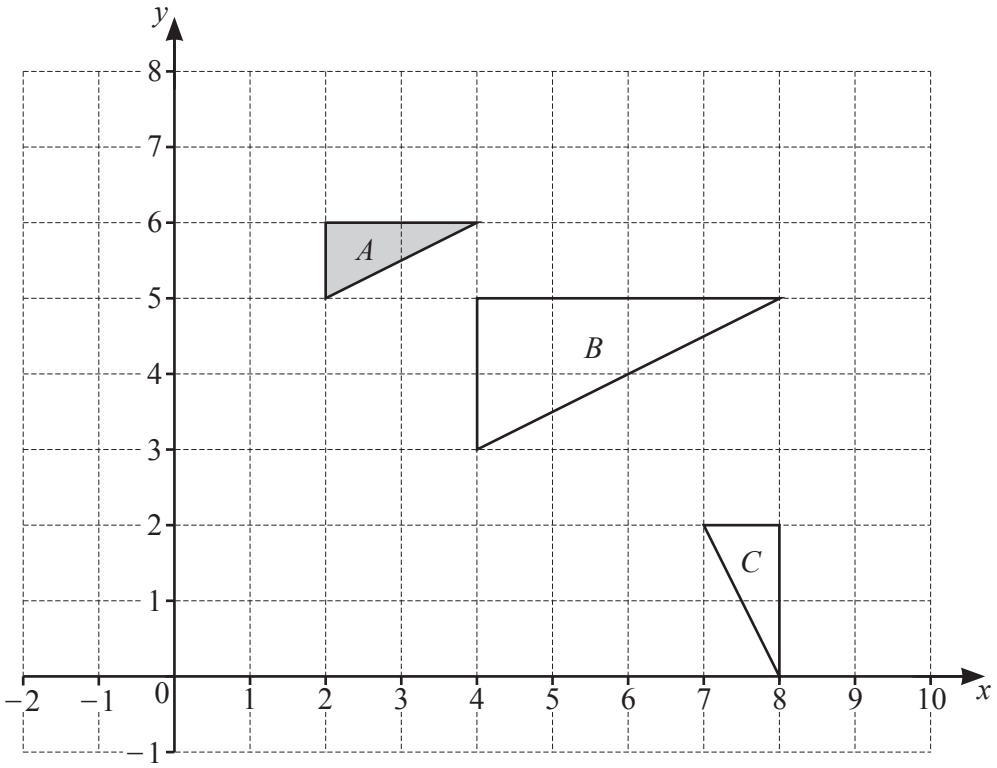
$h =$ ..... [2]

10 **Without using a calculator**, work out $2\frac{1}{7} \div \frac{5}{9}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

11



Describe the **single** transformation that maps

(a) triangle A onto triangle B

.....

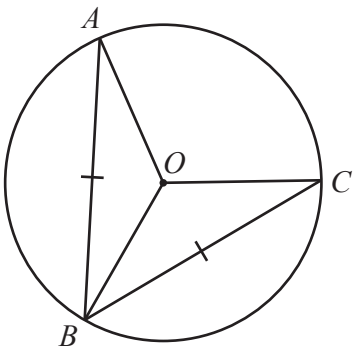
..... [3]

(b) triangle A onto triangle C.

.....

..... [3]

12 (a)



NOT TO SCALE

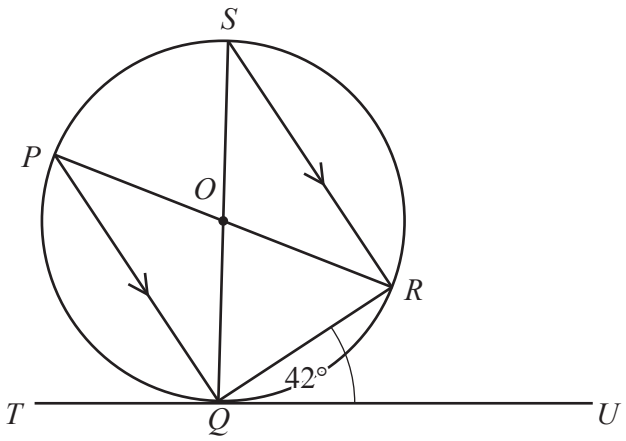
AO, *OB* and *OC* are all radii of the circle.
AB = *BC*.
Therefore triangle *AOB* is congruent to triangle *COB*.

Draw a ring around the correct criterion for this statement.

SAS *RHS* *SSS* *ASA*

[1]

(b)



NOT TO SCALE

P, *Q*, *R* and *S* are points on the circle and *TQU* is a tangent to the circle at *Q*.
PR and *SQ* intersect at the centre of the circle, *O*, and *PQ* is parallel to *SR*.
Angle *RQU* = 42°.

Calculate

(i) angle *QSR*

Angle *QSR* = ... [1]

(ii) angle *PQS*

Angle *PQS* = ... [1]

(iii) angle *POS*.

Angle *POS* = ... [1]

13 Anya invests \$6000 in an account that pays compound interest at a rate of r% per year.
At the end of 8 years, the account has earned \$621.70 in interest.

Calculate the value of r.

$r =$ ..... [3]

14 y is directly proportional to the square of $(x + 3)$.
When $x = 2$, $y = 5$.

Find y when $x = 1$.

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

15 A bag contains 5 green buttons, 2 blue buttons and 6 white buttons.
Maya takes two buttons at random from the bag, without replacement.

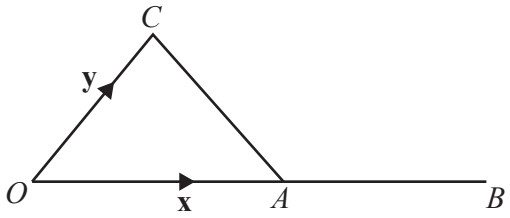
Calculate the probability that one button is green and the other button is not green.

..... [3]

16 **(a)** Find the magnitude of the vector $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$.

..... [2]

(b)



NOT TO SCALE

The diagram shows a triangle OAC.
A is the midpoint of the straight line OB.
$\overrightarrow{OA} = \mathbf{x}$ and $\overrightarrow{OC} = \mathbf{y}$.

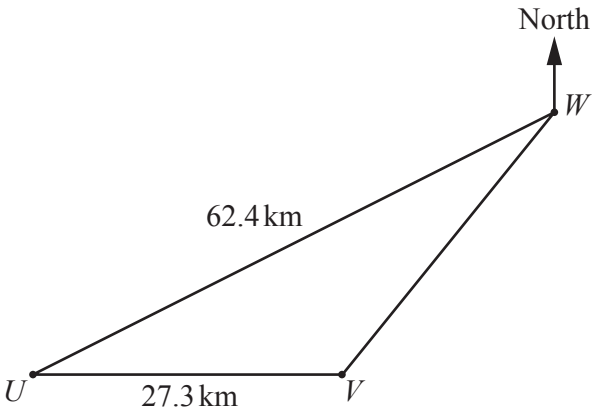
Find $\overrightarrow{CB}$ in terms of $\mathbf{x}$ and $\mathbf{y}$.

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

17 Simplify $\left(81x^{12}\right)^{\frac{3}{4}}$.

..... [2]

18



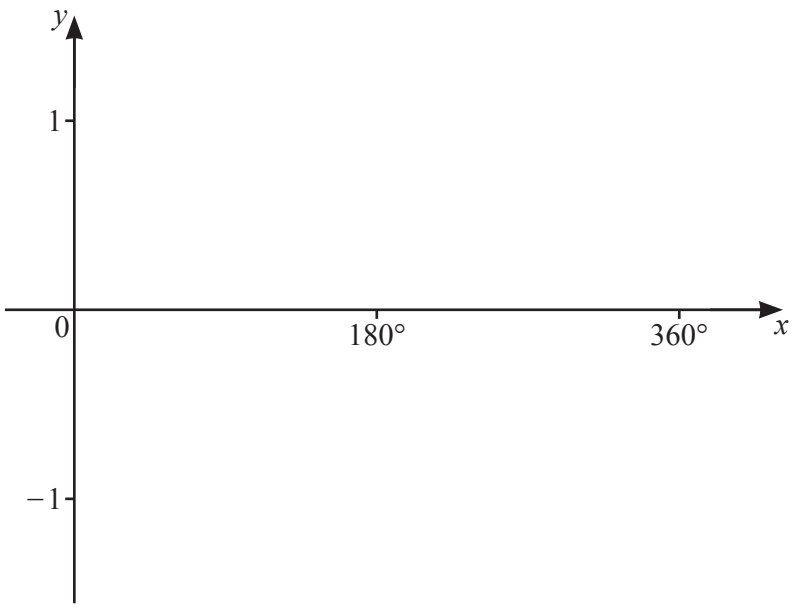
NOT TO SCALE

The diagram shows the position of three towns, U, V and W.
U is due west of V and angle $UVW = 125°$.

Calculate the bearing of U from W.

..... [4]

19 **(a)** On the diagram, sketch the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$.



[2]

(b) Solve the equation $5\cos x + 3 = 0$ for $0° \leqslant x \leqslant 360°$.

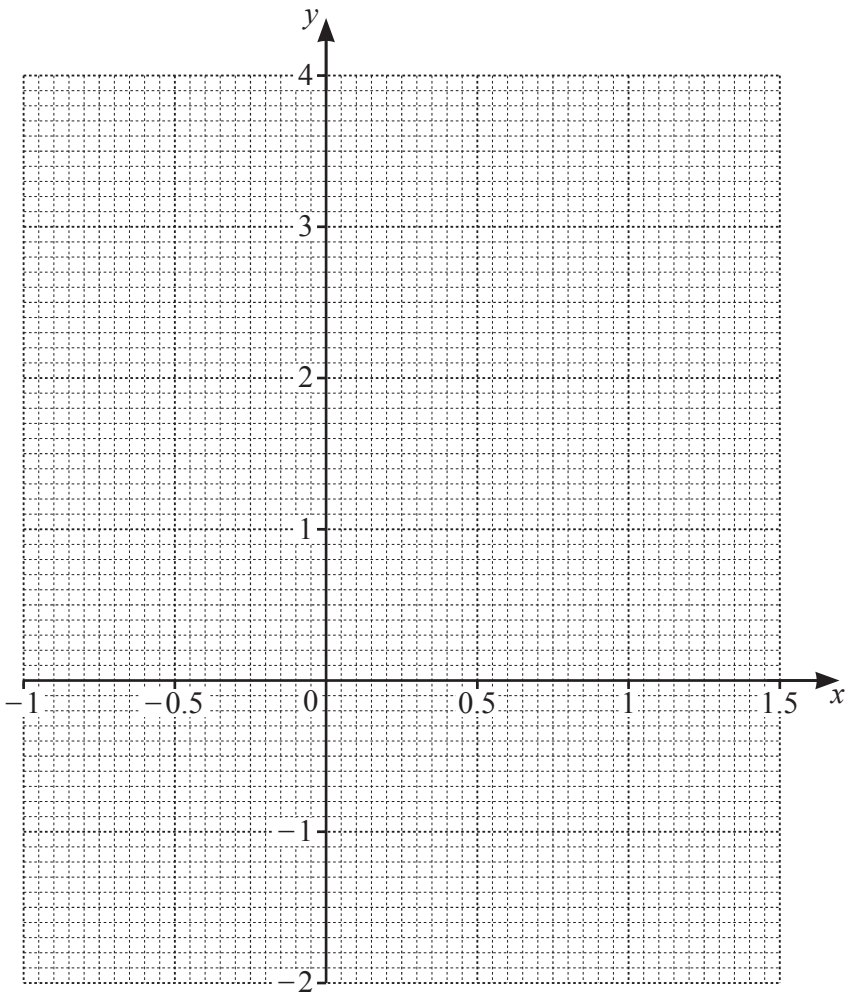
$x =$ ..... or $x =$ ..... [3]

20 The table shows some values for $y = 3x^2 - 2x - 1$.

x	-1	-0.5	0	0.5	1	1.5
y	4		-1		0	2.75

(a) Complete the table. [1]

(b) On the grid, draw the graph of $y = 3x^2 - 2x - 1$ for $-1 \leqslant x \leqslant 1.5$.



[3]

(c) By drawing a suitable straight line, solve the equation $3x^2 - 4x - 2 = 0$ for $-1 \leqslant x \leqslant 1.5$.

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

Question 21 is printed on the next page.

21 A curve has equation $y = x^3 - 12x$.

(a) Find the gradient of the curve at the point (1,−11).

..... [3]

(b) Find the coordinates of the turning points of the curve.

(..... , ...) and (..... , ...) [3]