Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTER NUMBER						CANDIDATE NUMBER				

6402428634

MATHEMATICS (US) **0444/21**

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, center 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 work clearly.
- All answers should be given in their simplest form.

INFORMATION

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

This document has **12** pages.

Formula List

For the equation $ax^2 + bx + c = 0$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Lateral surface area, A, of cylinder of radius r, height h. $A = 2\pi rh$

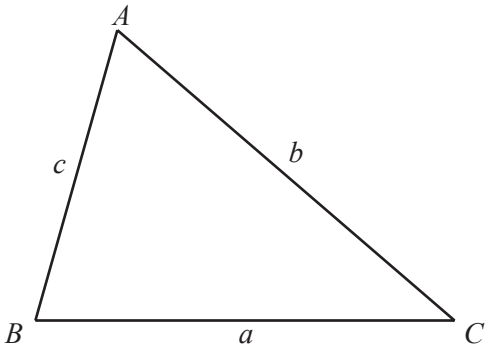
Lateral surface area, A, of cone of radius r, sloping edge l. $A = \pi rl$

Surface area, A, of sphere of radius r. $A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $V = \frac{1}{3}Ah$

Volume, V, of cone of radius r, height h. $V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $V = \frac{4}{3}\pi r^3$

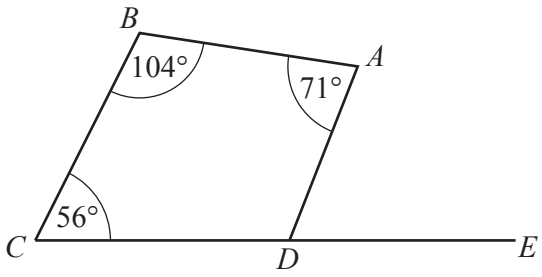


$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc \cos A$

Area $= \frac{1}{2}bc \sin A$

1



NOT TO SCALE

CDE is a straight line.

Find angle *ADE*.

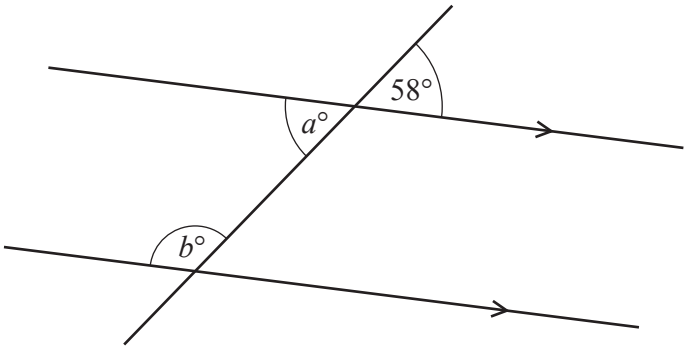
..... [2]

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 geometric reasons for your answers.

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 work.

..... [2]

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

Colors	Red	Blue	Green	Yellow
Probability	0.3	0.4	0.1	x

Find the value of x.

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

6 Work out the volume of a sphere with diameter 6 cm.
Give your answer in terms of π.

..... cm^3 [2]

7 The scale of a map is 1 : 250 000.
On a map, the length of an island is 6 cm.

Work out the actual length of the island, giving your answer in kilometers.

..... km [2]

8 The first four terms of two sequences are given.

Find the nth term of each sequence.

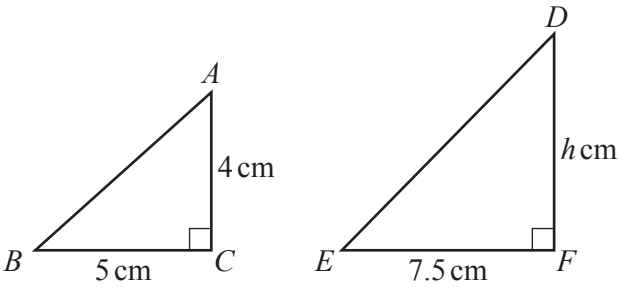
(a) 2 7 12 17

..... [2]

(b) 2 10 50 250

..... [2]

9



NOT TO SCALE

Triangle ABC is similar to triangle DEF.

Work out the value of h.

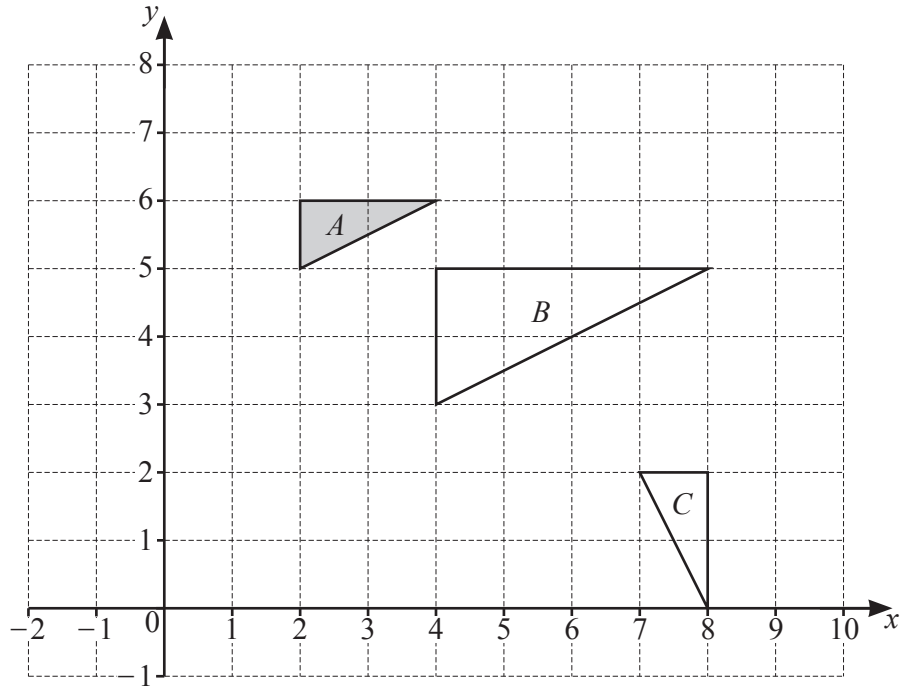
$h =$ ..... [2]

10 Work out $2\frac{1}{7} \div \frac{5}{9}$.

Give your answer as a mixed number in its simplest form.

..... [3]

11



(a) Describe the **single** transformation that maps

(i) triangle A onto triangle B

.....

..... [3]

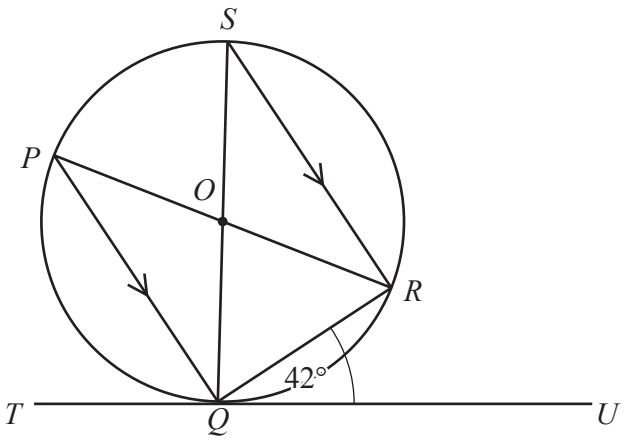
(ii) triangle A onto triangle C.

.....

..... [3]

(b) Stretch triangle A with factor 2 and y-axis invariant. [2]

12



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 center *O* and *PQ* is parallel to *SR*.
Angle $RQU = 42°$.

Find

(a) angle *QSR*

Angle *QSR* = ... [1]

(b) angle *PQS*

Angle *PQS* = ... [1]

(c) angle *POS*.

Angle *POS* = ... [1]

13 Anya invests \$4000 in an account that pays simple interest at a rate of r% per year.
At the end of 6 years, the account has earned \$480 in interest.

Find the value of r.

$r =$ ..... [2]

14 y varies as the square of $(x + 3)$.
When $x = 2$, $y = 50$.

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.

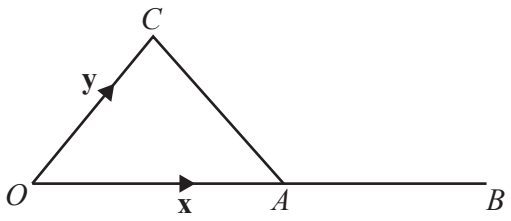
Work out the probability that one button is green and the other button is not green.

..... [3]

16 **(a)** Find the magnitude of the vector $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$.

..... [2]

(b)



NOT TO SCALE

The diagram shows a triangle OAC.
A is the midpoint of 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]

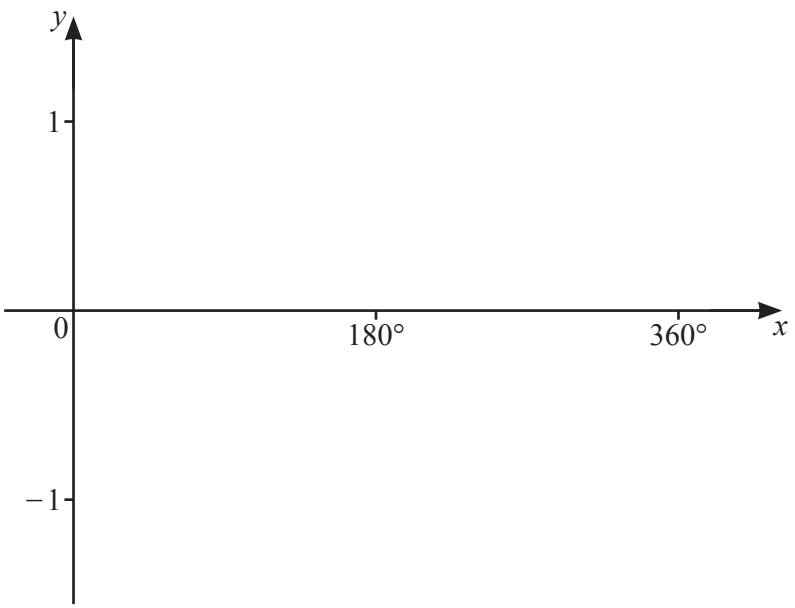
18 **(a)** Simplify $\left(3\sqrt{2}\right)^2$.

..... [1]

(b) Write $\left(\sqrt{5}-\sqrt{3}\right)^2$ in the form $a+b\sqrt{15}$.

..... [2]

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



[2]

(b) Solve the equation $2\cos x + 1 = 0$ for $0° \leqslant x \leqslant 360°$.

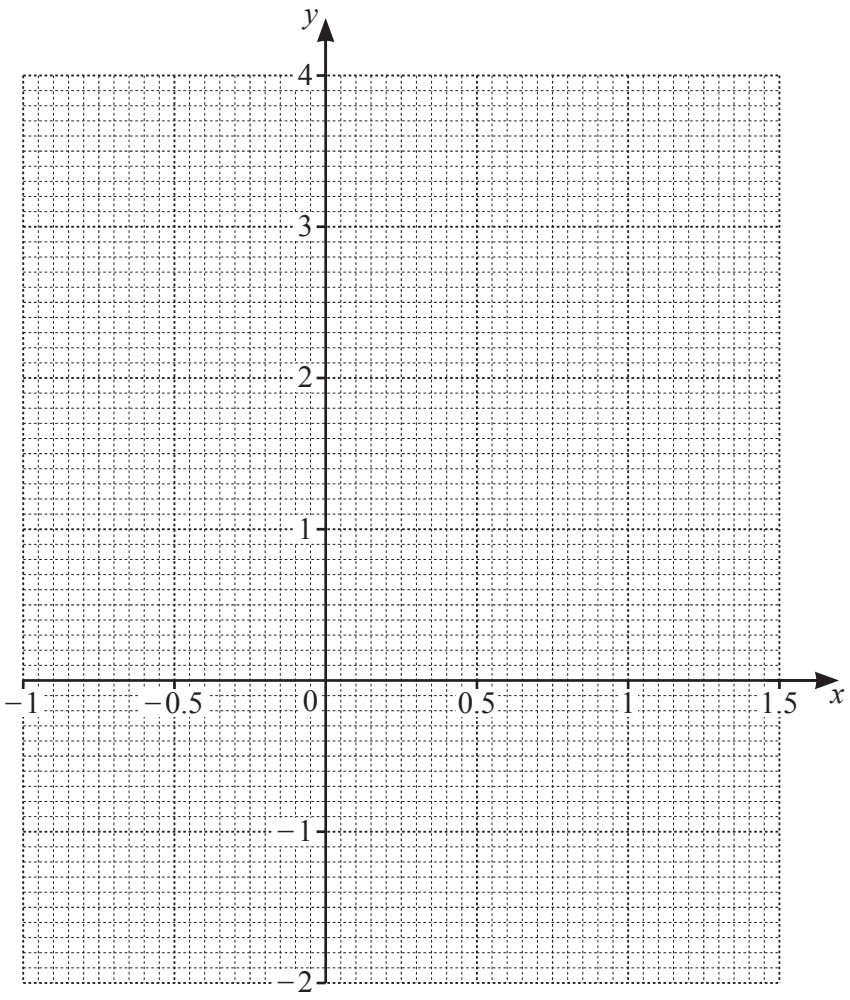
$x =$ ..... or $x =$ ..... [3]

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

x	-1	-0.5	0	0.5	1	1.5
y		0.75	-1	-1.25	0	2.75

(a) Complete the table. [1]

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



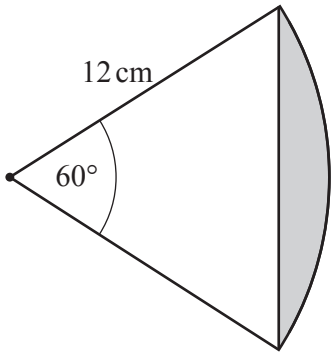
[3]

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

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

Questions 21 and 22 are printed on the next page.

21



NOT TO SCALE

The diagram shows a sector of a circle with radius 12 cm.
Find the area of the shaded segment.
Give your answer in the form $p\pi - q\sqrt{3}$, where p and q are integers.

..... [3]

22 Simplify $\dfrac{2x^2 - 11x - 6}{4x^2 + 2x}$.

..... [4]