Cambridge Assessment International Education

# Cambridge IGCSE™

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| CANDIDATE NAME | | | | | | | | | |
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*6944822940*

**MATHEMATICS (US)** **0444/23**

Paper 2 (Extended) **October/November 2022**

**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.

DC (RW/CT) 311546/2


**[Turn over**

## Formula List

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

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

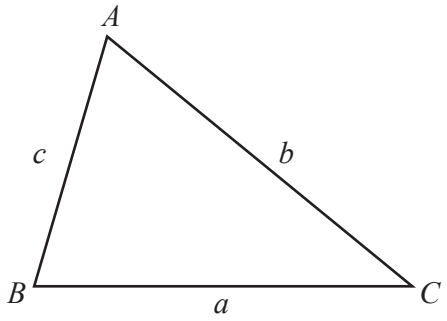
Lateral surface area, $A$, of cone of radius $r$, sloping edge $l$. $\quad A = \pi rl$

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

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

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

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




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

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

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

**1** Marco starts work at 20 45 and finishes at 02 08 the next day.

Find the length of time, in hours and minutes, he works.

..... h ..... min [1]

**2**

117 121 149 164 215

From this list, write down

**(a)** a square number

..... [1]

**(b)** a prime number.

..... [1]

**3** Work out.

$\sqrt{0.000\,009}$

..... [1]

**4** The mean mass of four men in a rowing team is 100 kg.
The modal mass is 101 kg.
The range of the masses is 8 kg.

Find the mass of each of the four men.

..... kg , ..... kg , ..... kg, ..... kg [3]

**5** Work out $\frac{5}{7} - \frac{2}{3}$.

Give your answer as a fraction in its simplest form.

..... [2]

**6** A spinner can land on the colors green, black or red.
The table shows the probabilities of the spinner landing on green or black.

| Color | Green | Black | Red |
|---|---|---|---|
| Probability | 0.4 | 0.25 | |

**(a)** Complete the table. [2]

**(b)** Chang spins the spinner 120 times.

Find the expected number of times it lands on green.

..... [1]

**7** Find the least common multiple (LCM) of 36 and 60.

..... [2]

**8** $A$ is the point $(-3, 5)$ and $B$ is the point $(5, 2)$.

Find the coordinates of the midpoint of the line $AB$.

( ..... , ..... ) [2]

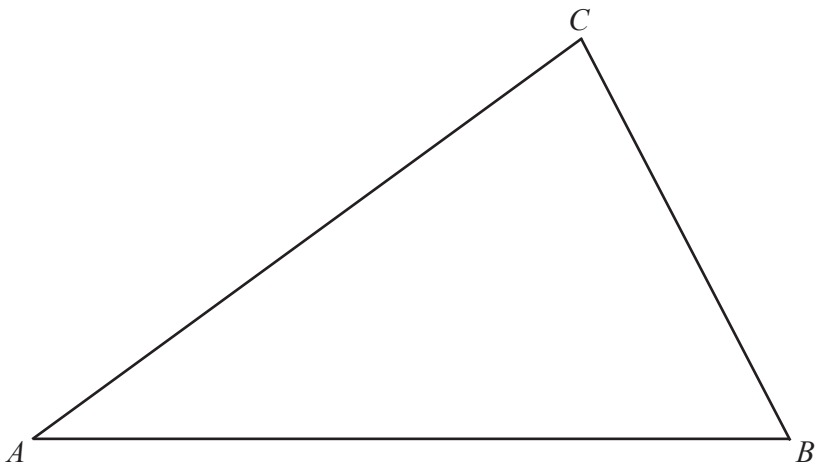
**9** Solve the system of linear equations.

$$3x - 2y = 21$$
$$5x + 2y = 51$$

$x =$ .....

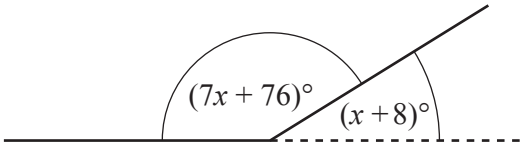
$y =$ ..... [2]

**10**




**Using compass and straight edge only**, construct the circumscribed circle of triangle $ABC$. [4]

**11**




NOT TO SCALE

The diagram shows two sides of a regular polygon.
The interior angle of the polygon is $(7x + 76)°$ and the exterior angle is $(x + 8)°$.

Find the number of sides of this polygon.

..... [4]

**12** Keita invests \$4000 at a rate of 5% per year compound interest.

Work out the interest earned on the investment at the end of 2 years.

\$ ..... [3]

**13** Simplify $\sqrt{75} + \sqrt{363}$.

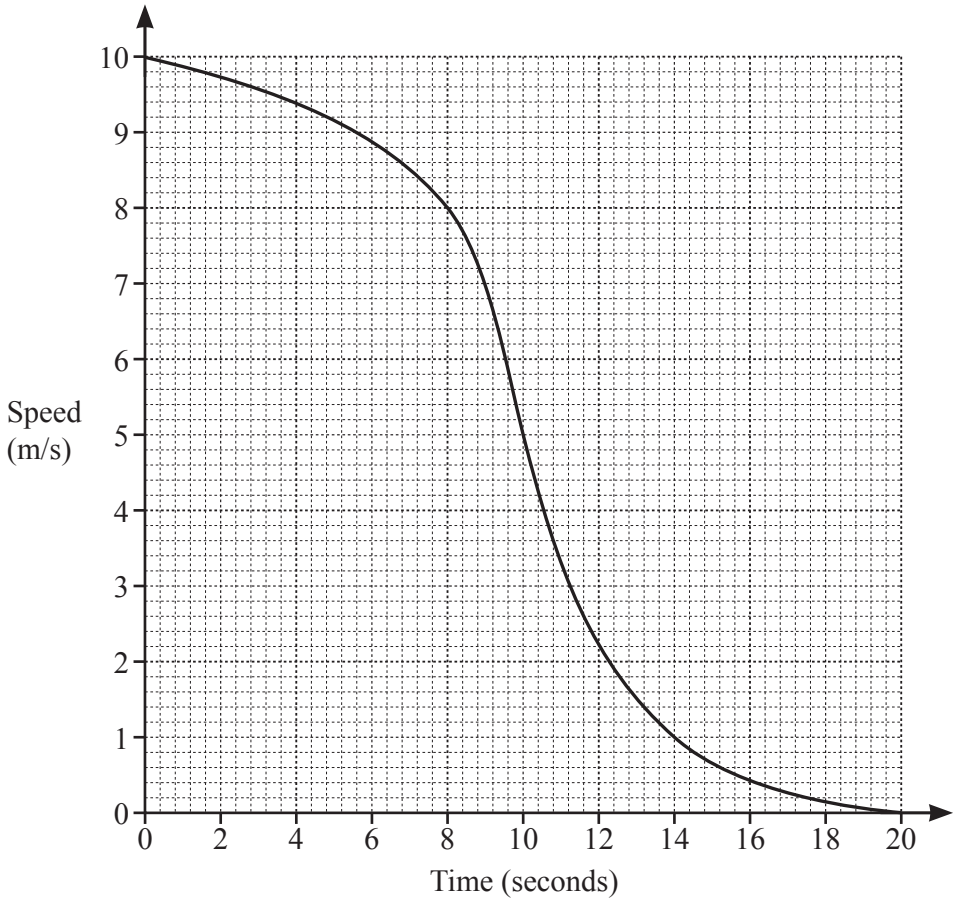
..... [2]

**14** A map has a scale of $1 : 200\,000$.

Find the area, in square kilometers, of a lake that has an area of $13\,cm^2$ on the map.

..... $km^2$ [2]

**15**




The graph shows the speed of a car as it slows down from a speed of 10 m/s until it stops at 20 seconds.

**(a)** Find the speed of the car at 14 seconds.

..... m/s [1]

**(b)** Find the average rate of change of the speed between 8 seconds and 10 seconds.

..... $m/s^2$ [2]

**(c)** By drawing a suitable tangent to the curve, find the rate of change of the speed at 8 seconds.

..... $m/s^2$ [2]

**16** A kite is drawn on a coordinate grid.
The diagonals of the kite intersect at the point (4, 7).

One diagonal has equation $y = 2x - 1$.

Find the equation of the other diagonal of the kite.
Give your answer in the form $y = mx + b$.

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

**17** $y$ varies as the square of $(x - 7)$.
When $x = 12$, $y = 2$.

Find $y$ when $x = 17$.

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

**18** Two bottles are mathematically similar.
The small bottle has a capacity of 270 ml and a height of 9 cm.
The large bottle has a capacity of 640 ml.

Work out the height of the large bottle.

..... cm [3]

**19** $f(x) = 5x - 3,\ x > 1$

$g(x) = \dfrac{10}{x-2},\ x \neq 2$

**(a)** Find $g(f(x))$.
Give your answer in its simplest form.

..... [2]

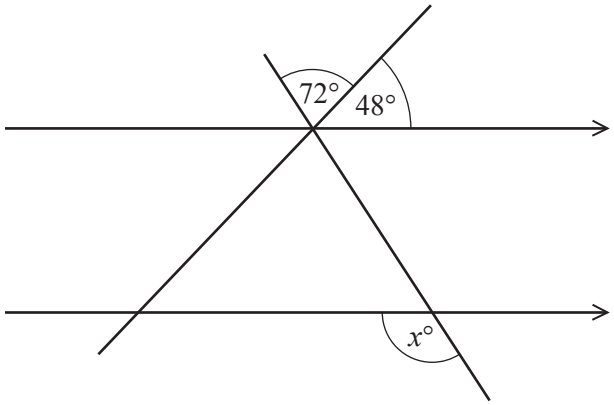
**(b)** Find $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [3]

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

..... [1]

**20 (a)**



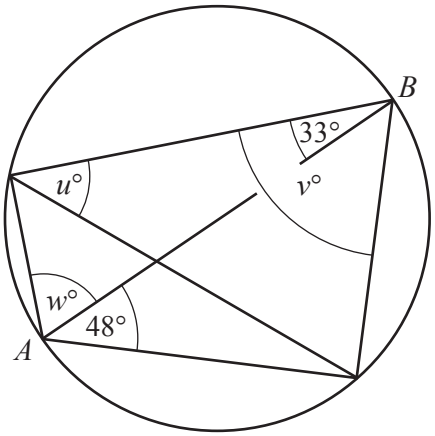

NOT TO SCALE

The diagram shows two straight lines crossing two parallel lines.

Work out the value of $x$.

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

**(b)**




NOT TO SCALE

The diagram shows a cyclic quadrilateral and its diagonals.
$AB$ is a diameter.

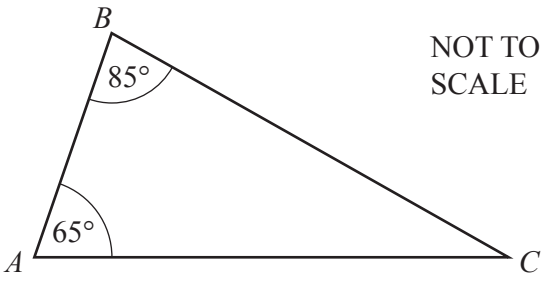
Work out the values of $u$, $v$ and $w$.

$u =$ .....

$v =$ .....

$w =$ ..... [3]

**21 (a)**




NOT TO SCALE

$C$ is due east of $A$.

Find the bearing of

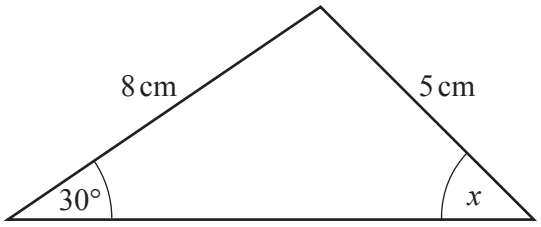
**(i)** $A$ from $B$

..... [1]

**(ii)** $B$ from $C$.

..... [2]

**(b)**




NOT TO SCALE

Find the value of $\sin x$.

..... [2]

**Question 22 is printed on the next page.**

**22** **(a)** Expand and simplify.

$$(3x+1)(x-2)-(x+1)(2x-3)$$

..... [3]

**(b)** Write as a single fraction in its simplest form.

$$\frac{4}{2x-3} \div \frac{2x^2+14x}{2x^2+11x-21}$$

..... [4]