



# Cambridge IGCSE™

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**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.



## Formula List

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

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

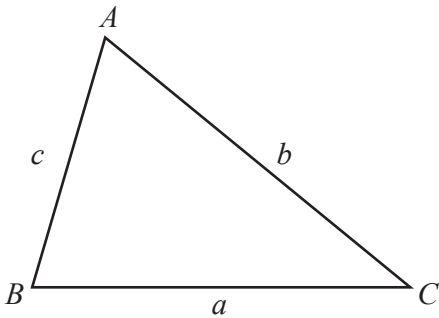
Lateral surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .  $A = \pi rl$

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  $r$ .  $V = \frac{4}{3}\pi r^3$



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

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

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

3

- 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]

5

9 Solve the system of linear equations.

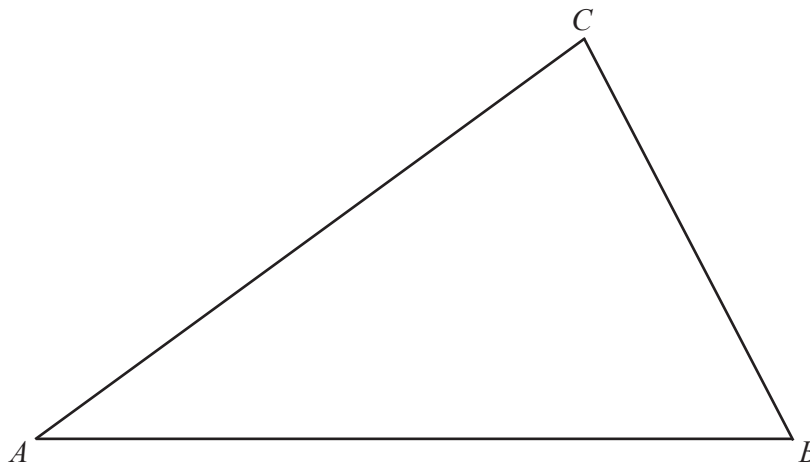
$$3x - 2y = 21$$

$$5x + 2y = 51$$

$$x = \dots\dots\dots$$

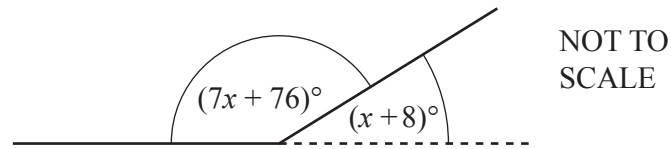
$$y = \dots\dots\dots [2]$$

10



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

11



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

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  $\sqrt{75} + \sqrt{363}$ .

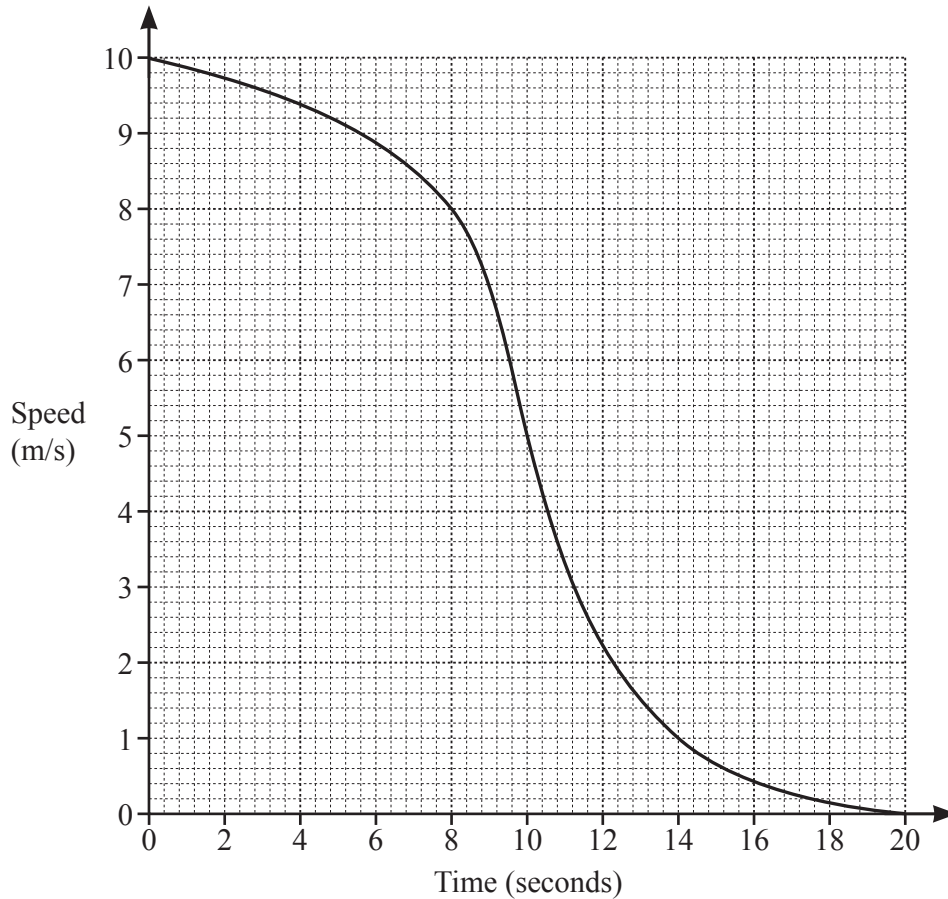
..... [2]

14 A map has a scale of 1 : 200 000.

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

.....  $\text{km}^2$  [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.

.....  $\text{m/s}^2$  [2]

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

.....  $\text{m/s}^2$  [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  $y = mx + b$ .

$$y = \dots\dots\dots [3]$$

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

Find  $y$  when  $x = 17$ .

$$y = \dots\dots\dots [3]$$

- 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.

$$\dots\dots\dots \text{ cm } [3]$$



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

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

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

..... [2]

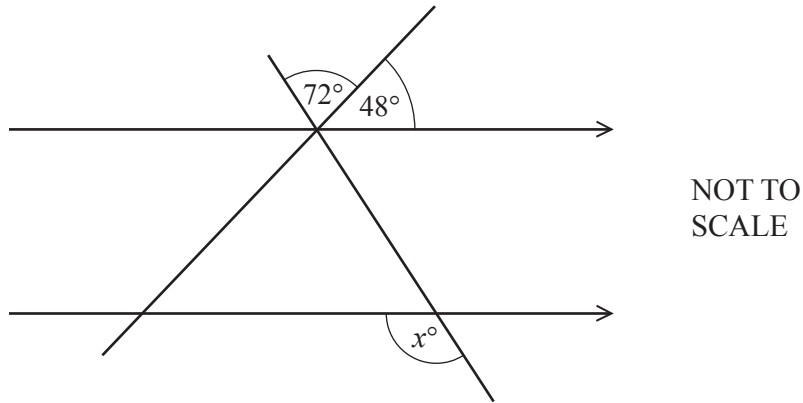
- (b) Find  $g^{-1}(x)$ .

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

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

..... [1]

20 (a)

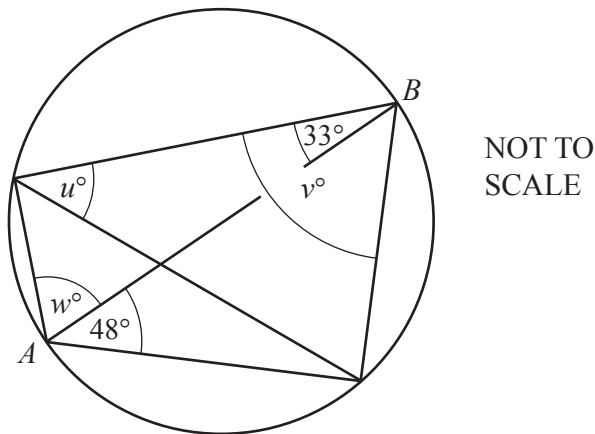


The diagram shows two straight lines crossing two parallel lines.

Work out the value of  $x$ .

$x = \dots\dots\dots$  [2]

(b)

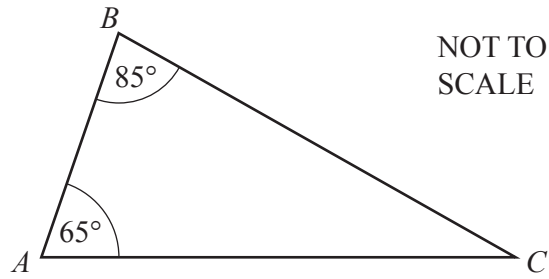


The diagram shows a cyclic quadrilateral and its diagonals.  
 $AB$  is a diameter.

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

$u = \dots\dots\dots$   
 $v = \dots\dots\dots$   
 $w = \dots\dots\dots$  [3]

21 (a)



$C$  is due east of  $A$ .

Find the bearing of

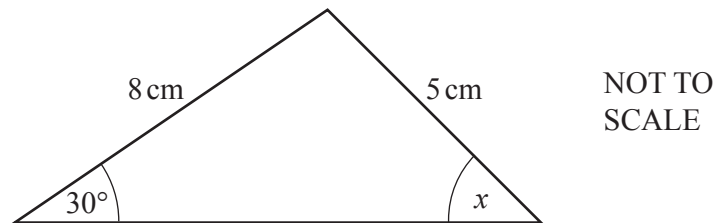
(i)  $A$  from  $B$

..... [1]

(ii)  $B$  from  $C$ .

..... [2]

(b)



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]

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