



# Cambridge IGCSE™ (9–1)

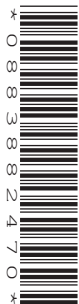
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**MATHEMATICS**

**0980/22**

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  $\pi$ , 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.

- 1 Find the temperature that is  $8^{\circ}\text{C}$  colder than  $-5^{\circ}\text{C}$ .

.....  $^{\circ}\text{C}$  [1]

- 2 There are two prime numbers in this list.

27    47    57    61    75    93

Work out the sum of these two prime numbers.

..... [2]

- 3 On ten days, Stefan records the number of minutes he has to wait for a train.

1    3    12    5    4    23    5    24    11    8

- (a) Complete the stem-and-leaf diagram to show this information.

0	1   3
1	
2	

Key: 0 | 1 represents 1 minute

[2]

- (b) Find the median.

..... min [1]

- 4 The distance from town  $A$  to town  $B$  on a map is 3.5 cm.  
The scale on the map is 1 : 250 000.

Find the actual distance, in kilometres, from town  $A$  to town  $B$ .

..... km [2]

- 5 A spinner is spun.  
The possible outcomes are A, B, C or D.  
The probability of spinning A, C or D is shown in the table.

Letter on spinner	A	B	C	D
Probability	0.2		0.05	0.35

Complete the table.

[2]

- 6  $\mathcal{C} = \{x: 1 \leq x \leq 20\}$   
 $E = \{\text{even numbers}\}$   
 $M = \{\text{multiples of 5}\}$

(a) Find  $n(M)$ .

..... [1]

(b) Find the elements in the set  $E \cap M$ .

..... [1]

(c)  $y \notin E$ .

Write down a possible value of  $y$ .

..... [1]

- 7 **Without using a calculator**, work out  $\frac{4}{7} \div 1\frac{5}{21}$ .

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

..... [3]

- 8 Solve.

(a)  $\frac{30}{x} = 6$

$x =$  ..... [1]

(b)  $11x - 3 \geq 2(2x + 9)$

..... [3]

- 9  $F$  is the point  $(1, -4)$ ,  $\overrightarrow{FG} = \begin{pmatrix} 8 \\ -3 \end{pmatrix}$  and  $\overrightarrow{GH} = \begin{pmatrix} -12 \\ 35 \end{pmatrix}$ .

Find

(a)  $3\overrightarrow{FG}$

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} [1]$$

(b)  $\overrightarrow{FG} + \overrightarrow{GH}$

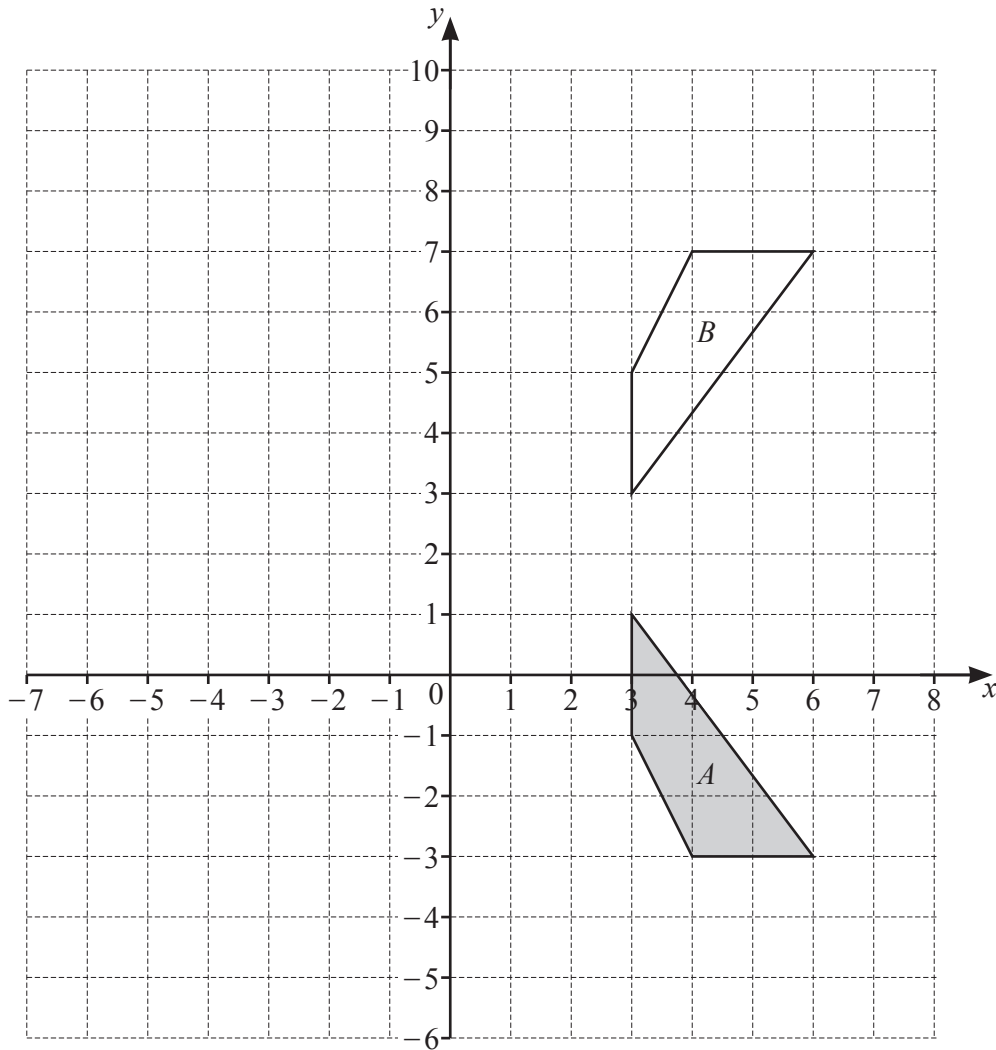
$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} [1]$$

- (c) the coordinates of the point  $G$

$$(\dots\dots\dots, \dots\dots\dots) [1]$$

- (d) the magnitude of vector  $\overrightarrow{GH}$ .

$$\dots\dots\dots [2]$$



- (a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

.....  
 .....

[2]

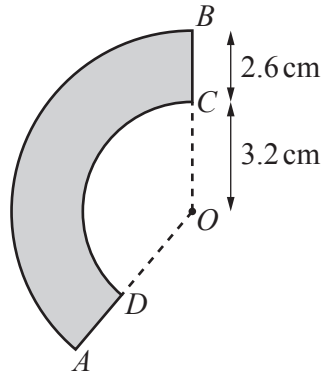
- (b) Rotate shape *A*  $90^\circ$  clockwise about the point  $(-1, 2)$ .

[2]

- (c) Enlarge shape *A* by scale factor  $-2$ , centre  $(2, 0)$ .

[2]

11

NOT TO  
SCALE

The diagram shows a shape,  $ABCD$ , formed by the sectors of two circles with the same centre  $O$ . Both sector angles are  $140^\circ$ ,  $OC = 3.2$  cm and  $CB = 2.6$  cm. The area of the shape is  $k\pi$  cm<sup>2</sup>.

Find the value of  $k$ .

$$k = \dots\dots\dots [3]$$

- 12 One solution of the equation  $ax^2 + b = 181$  is  $x = 8$ .  
 $a$  and  $b$  are both positive integers **greater than 1**.

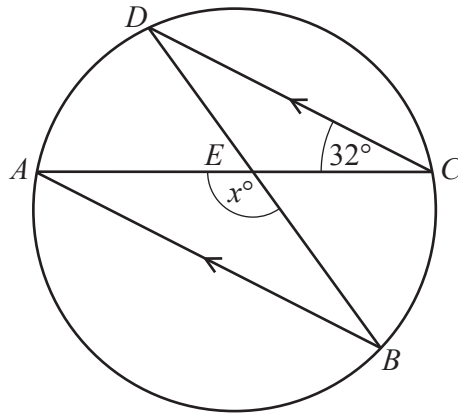
(a) Find the value of  $b$ .

$$b = \dots\dots\dots [2]$$

(b) Write down the other solution of the equation  $ax^2 + b = 181$ .

$$x = \dots\dots\dots [1]$$

13

NOT TO  
SCALE

$A, B, C$  and  $D$  are points on a circle.  
 $AB$  is parallel to  $DC$  and angle  $ACD = 32^\circ$ .  
 Chords  $AC$  and  $DB$  intersect at  $E$ .

Find the value of  $x$ .

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

14  $f(x) = 5x + 2$

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

$f^{-1}(x) = \dots\dots\dots$  [2]



15  $C$  is the point  $(5, -1)$  and  $D$  is the point  $(13, 15)$ .

(a) Find the midpoint of  $CD$ .

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

(b) Find the gradient of  $CD$ .

..... [2]

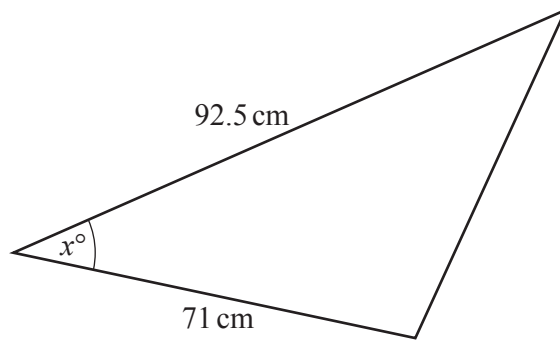
(c) Find the equation of the perpendicular bisector of  $CD$ .  
Give your answer in the form  $y = mx + c$ .

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

16 Write  $0.\dot{6}2\dot{1}$  as a fraction in its simplest form.  
You must show all your working.

..... [3]

17

NOT TO  
SCALE

The diagram shows a triangle with an acute angle marked  $x^\circ$ .  
The area of the triangle is  $2143 \text{ cm}^2$ .

Work out the value of  $x$ .

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

18 Make  $x$  the subject of the formula.

$$c = \frac{3x}{2x-5}$$

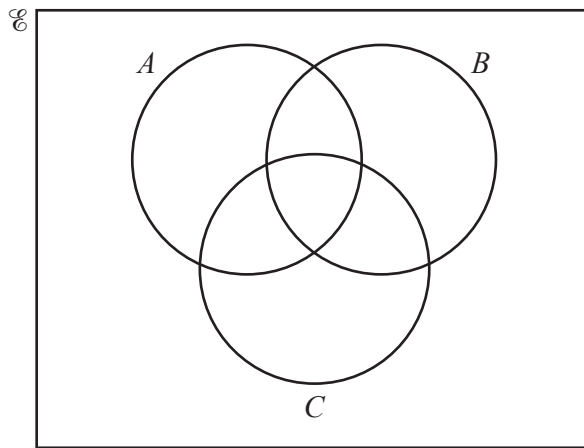
$$x = \dots\dots\dots [4]$$

- 19  $m$  is inversely proportional to the square of  $(t+2)$ .  
 $m = 0.64$  when  $t = 3$ .

Find  $m$  when  $t = 8$ .

$m = \dots\dots\dots$  [3]

- 20 In the Venn diagram, shade the region  $A \cap B' \cap C$ .



[1]

- 21 Solve the equation  $5 \sin x = -3$  for  $0^\circ \leq x \leq 360^\circ$ .

$\dots\dots\dots$  [3]

**Questions 22 and 23 are printed on the next page.**

22 Write as a single fraction in its simplest form.

$$\frac{5}{3x+2} + \frac{4}{2x-1}$$

..... [3]

23 Bag *A* and bag *B* each contain red sweets and yellow sweets.

Anna picks a sweet at random from bag *A*.

Ben picks a sweet at random from bag *B*.

The probability that Anna picks a red sweet is  $\frac{2}{5}$ .

The probability Anna and Ben both pick a yellow sweet is  $\frac{1}{10}$ .

Find the probability that Anna and Ben both pick a red sweet.

..... [3]

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