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MATHEMATICS**0580/22**

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 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.

2

- 1** Find the temperature that is 8°C colder than -5°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]

4

- 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]

5

- 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) $3\overrightarrow{FG}$

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

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

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

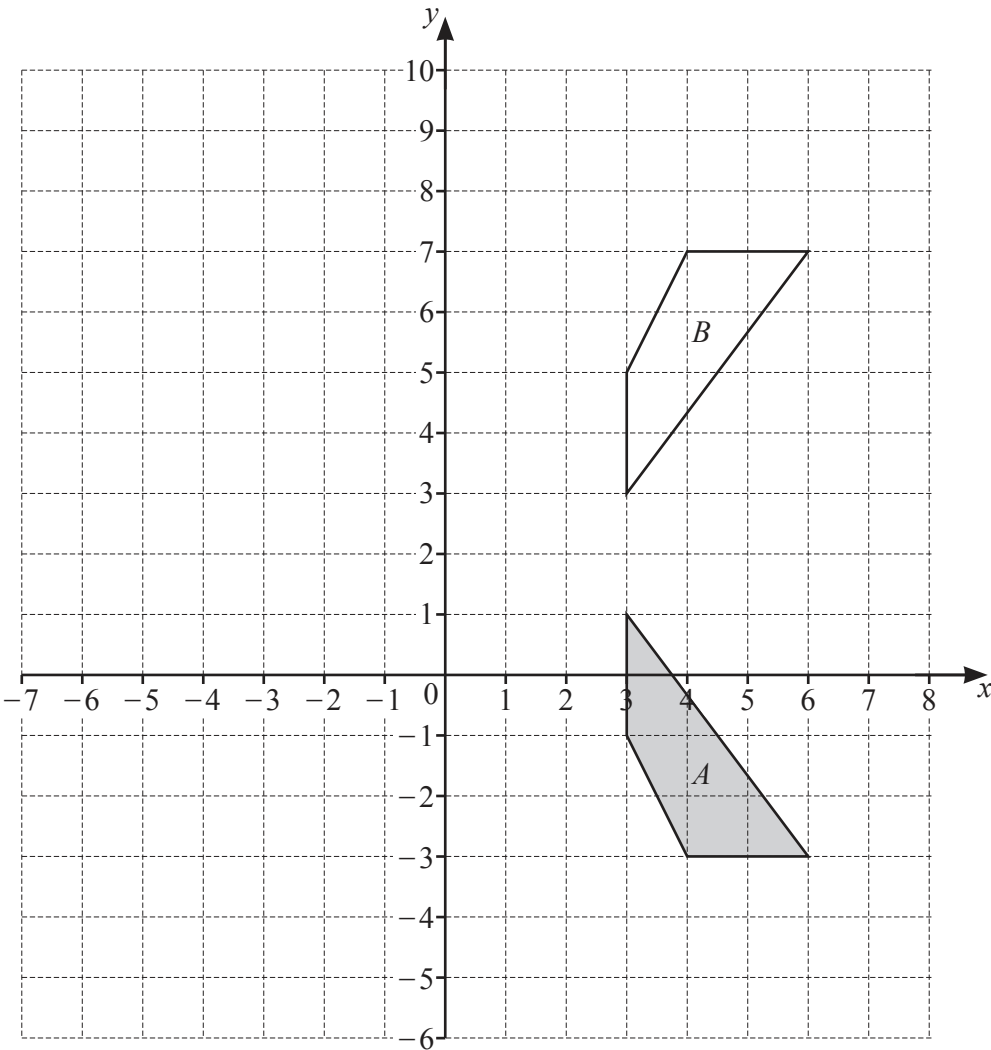
- (c)** the coordinates of the point G

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

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

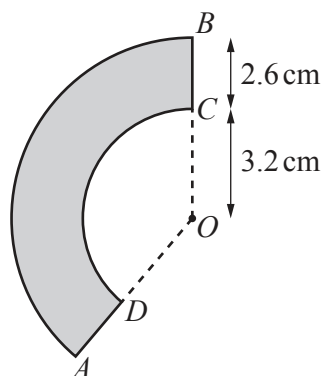
$$\dots\dots\dots [2]$$

10



- (a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.
.....
..... [2]
- (b) Rotate shape *A* 90° 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° , $OC = 3.2\text{ cm}$ and $CB = 2.6\text{ cm}$. The area of the shape is $k\pi\text{ cm}^2$.

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**.

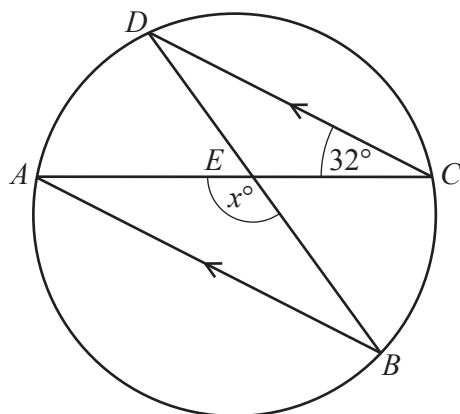
(a) Find the value of b .

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

9

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 $y = mx + c$.

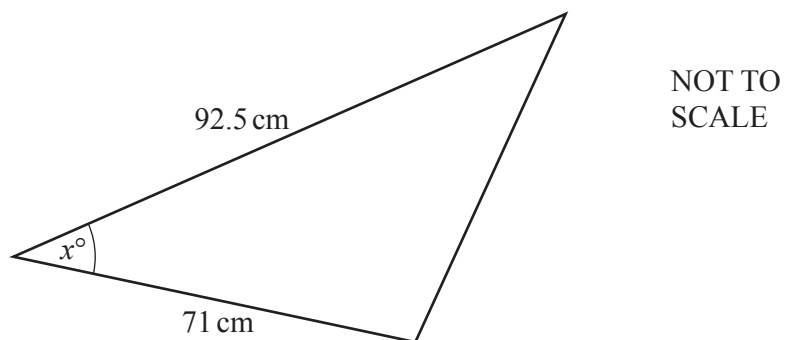
$y =$ [3]

16 Write $0.6\dot{2}1$ as a fraction in its simplest form.
You must show all your working.

..... [3]

10

17



The diagram shows a triangle with an acute angle marked x° .
The area of the triangle is 2143 cm^2 .

Work out the value of x .

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

18 Make x the subject of the formula.

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

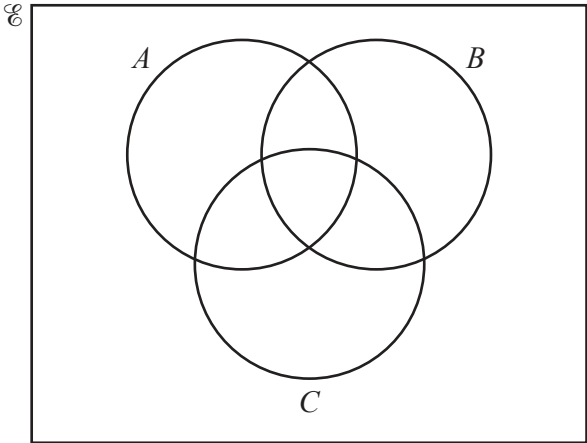
$x = \dots\dots\dots$ [4]

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

Find m when $t = 8$.

$m =$ [3]

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



[1]

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

..... [3]

Questions 22 and 23 are printed on the next page.

12

- 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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