Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

5097909240

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 2021**

2 hours

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.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Work out $\frac{7}{8} - \frac{1}{4}$.

..... [1]

(b) Work out 0.08×0.2 .

..... [1]

2 Write these numbers in order of size, starting with the smallest.

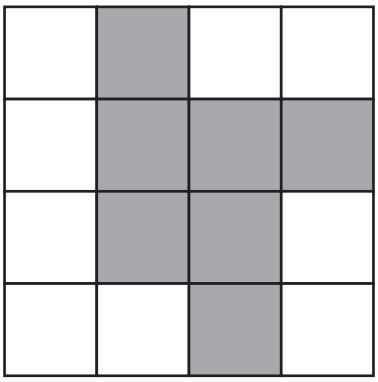
$\frac{3}{4}$ 0.83 $\frac{17}{20}$ 82% 0.8

..... , ... , ... , ... , ... [2]
smallest

3 Work out 45% of 30.

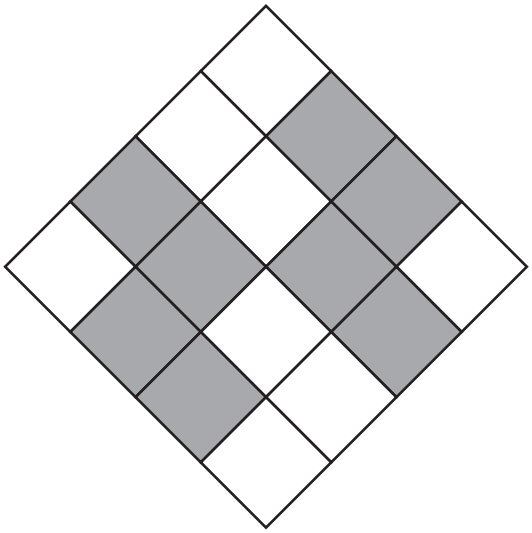
..... [2]

4 **(a)** Shade **one** more small square so the diagram has rotational symmetry of order 4.



[1]

(b) Shade **two** more small squares so the diagram has 2 lines of symmetry.



[1]

5 Simplify $3a - a + 2a$.

..... [1]

6 ABC is a triangle with $AC = 5$ cm and $BC = 7$ cm.

(a) **Using ruler and compasses only**, construct triangle ABC.
Side AB has been drawn for you.

[2]

(b) **Using a straight edge and compasses only**, construct the perpendicular bisector of AB. [2]

(c) A point W lies inside triangle ABC.
The point W is closer to A than to B.

On your diagram, shade the region in which W lies. [1]

7 **(a)** Evaluate 4^0 .

..... [1]

(b) Simplify $m^3 \times m^5$.

..... [1]

8 **(a)** Write 6300 m in kilometres.

..... km [1]

(b) Convert $1\,\text{cm}^2$ to mm^2.

..... mm^2 [1]

9 The interior angle of a regular polygon is 156°.

Find the number of sides of this regular polygon.

..... [2]

10 A triangle has one angle of 55°.
The other two angles in the triangle are in the ratio 3 : 2 .

Calculate the size of the smallest angle in the triangle.

..... [3]

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11 By writing each number correct to 1 significant figure, estimate the value of

$$\frac{58.24}{32.5 \times 0.126}.$$

..... [2]

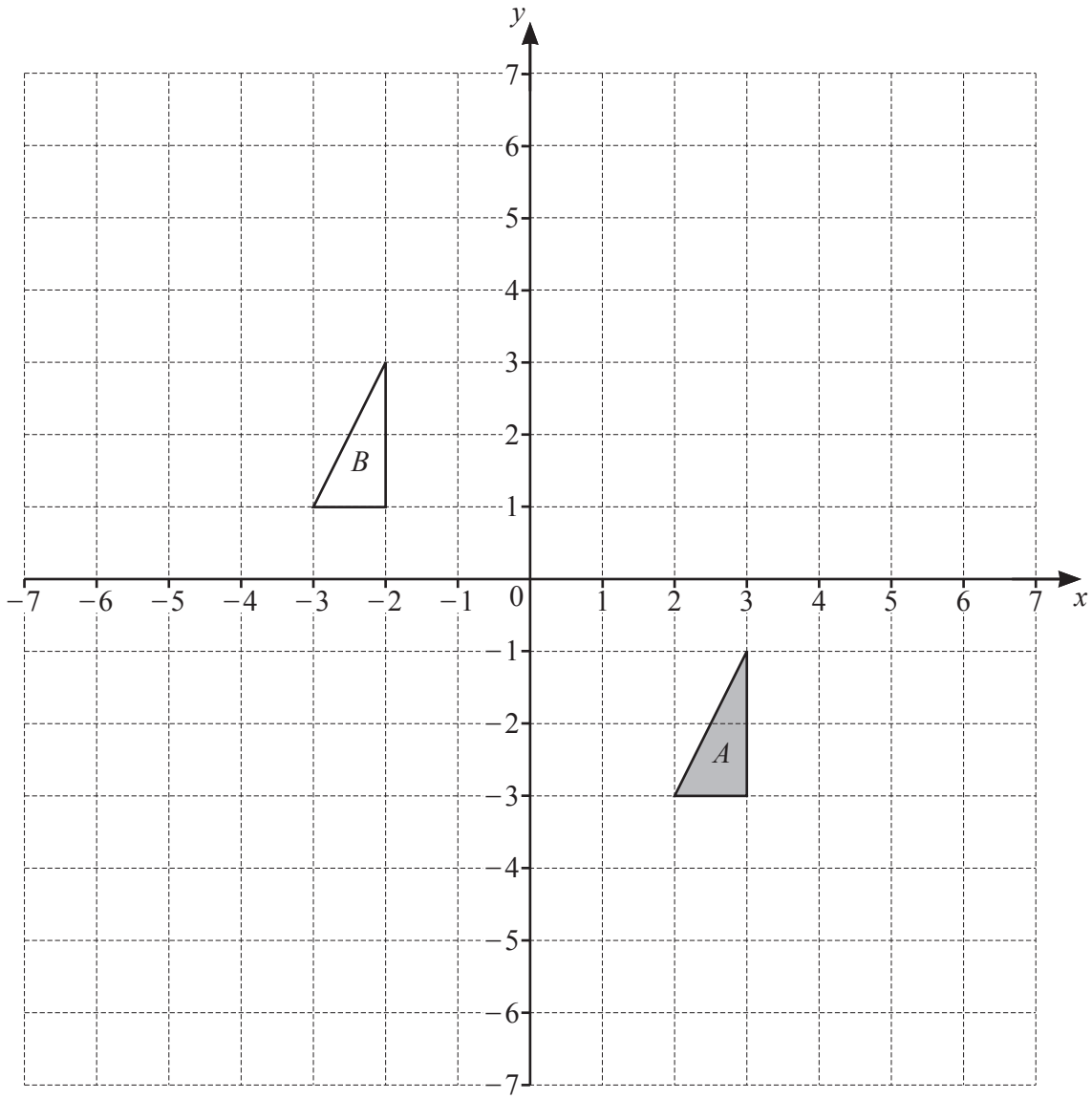
12 Solve the simultaneous equations.
Show all your working.

$$2x - y = 12$$
$$7x + 3y = 29$$

$x =$ .....

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

13 The diagram shows triangle A and triangle B.



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

.....

..... [2]

(b) Triangle A is mapped onto triangle C by an enlargement, centre $(0, -1)$ and scale factor 2.

Draw triangle C. [2]

14 **(a)** Express 60 as the product of its prime factors.

..... [2]

(b) A school buys packs of pens and packs of rulers.
There are 60 pens in each pack of pens.
There are 42 rulers in each pack of rulers.

The school wants to buy exactly the same number of pens and rulers.

Work out the smallest number of each pack the school should buy.

..... packs of pens

..... packs of rulers [3]

15 The point A has position vector $\begin{pmatrix} 3 \\ -7 \end{pmatrix}$ and $\overrightarrow{AB} = \begin{pmatrix} -5 \\ 12 \end{pmatrix}$.

(a) Find the coordinates of point B.

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

(b) Find $\left|\overrightarrow{AB}\right|$.

$\left|\overrightarrow{AB}\right| =$ ..... units [2]

16 A 4-sided spinner numbered 1 to 4 is spun many times.
The table shows the results of the spins.

Number	Frequency
1	6
2	5
3	13
4	p

(a) The mean of the results is 3.

Calculate the value of p.

p = ... [3]

(b) Find the relative frequency of the spinner landing on 2.

..... [1]

17 **(a)** Factorise.

$$4b^2 - c^2$$

..... [1]

(b) Factorise.

$$x^2 + 5x - 6$$

..... [2]

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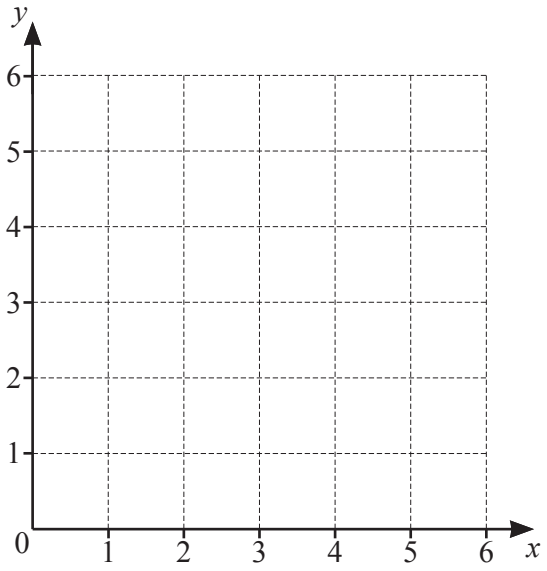
18



The region R is defined by these inequalities.

$$1 \leqslant x \leqslant 5$$
$$0 \leqslant y \leqslant 4$$
$$y \geqslant 3 - x$$

Find and label region R. [4]

19 **(a)** $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
$X = \{2, 3, 5, 7, 11\}$
$Y = \{1, 2, 3, 4, 5, 6\}$

(i) Find $X \cap Y$.

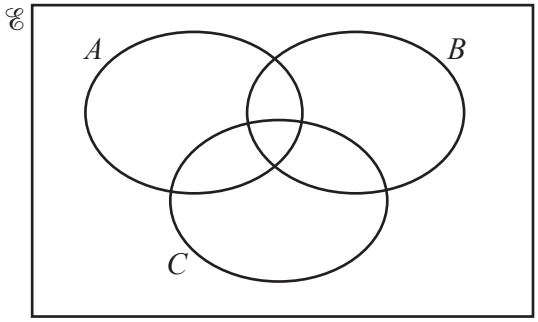
{ ..... } [1]

(ii) A number, k, is chosen at random from $\mathscr{E}$.

Find the probability that $k \notin (X \cup Y)$.

..... [1]

(b) On the Venn diagram, shade the set $A \cap (B \cup C)'$.



[1]

20 These are the first five terms of a sequence.

4 8 16 32 64

(a) Find the next number in the sequence.

..... [1]

(b) The nth term of the sequence above is 2^{n+1} .

Write down an expression, in terms of n, for the nth term of these sequences.

(i) 1 5 13 29 61 …

..... [1]

(ii) 10 19 32 53 90 …

..... [2]

21 $f(x) = \dfrac{6}{2-x}$

(a) Find $f(-1)$.

..... [1]

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

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

(c) $f(t) = f(5t+2)$

Find the value of t.

$t =$ ..... [3]

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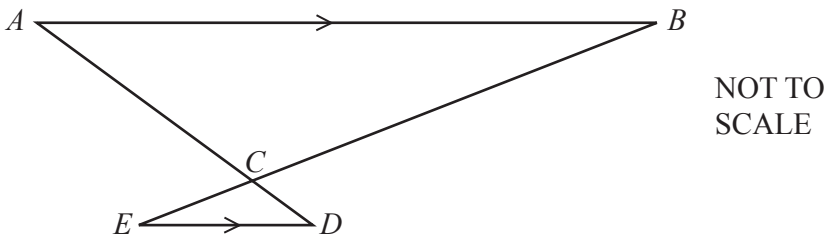
22



ACD and *BCE* are straight lines.
AB is parallel to *ED*.

(a) Prove that triangle *ABC* is similar to triangle *DEC*.
Give a reason for each statement that you make.

.....

.....

.....

..... [3]

(b) $AB = 6$ cm and $ED = 2$ cm.
The area of triangle *ABC* is 45 cm^2.

Calculate the area of triangle *DEC*.

..... cm^2 [2]

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

$$(x+5)(x-2)$$

..... [2]

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

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

..... [3]

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24 **(a)** $\mathbf{A} = \begin{pmatrix} -6 & 2 \\ 1 & 4 \end{pmatrix}$

Find $\mathbf{A}^2$.

$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) $\mathbf{B} = \begin{pmatrix} x & -5 \\ 2 & -3 \end{pmatrix}$

Find the value of x when $|\mathbf{B}| = -2$.

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

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