Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4205439443

MATHEMATICS (SYLLABUS D) **4024/12**

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)** Evaluate $\sqrt{4900}$.

..... [1]

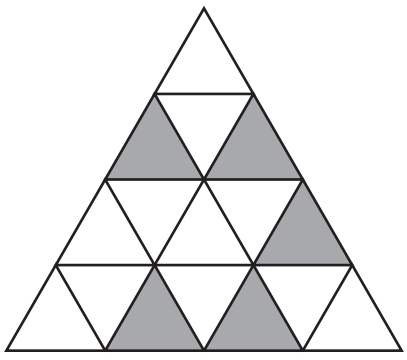
(b) Evaluate 5^3.

..... [1]

2 Work out $-8+7\times(-5)$.

..... [1]

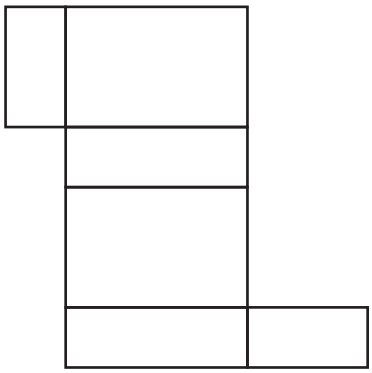
3



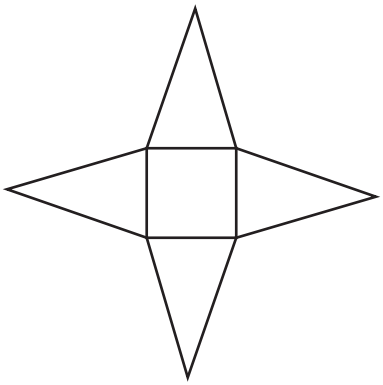
Shade **one** more small triangle so that the shape has rotational symmetry of order 3. [1]

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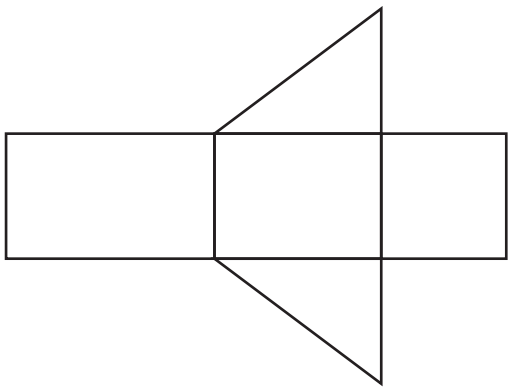
4 Write down the name of the solid formed from each net.



.....



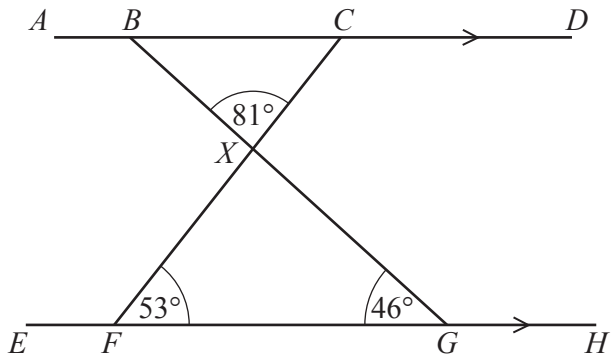
.....



.....

[3]

5



NOT TO SCALE

In the diagram, $ABCD$ and $EFGH$ are parallel lines.
The lines CF and BG intersect at X.
$C\hat{F}G = 53°$, $B\hat{G}F = 46°$ and $B\hat{X}C = 81°$.

(a) Find $C\hat{X}G$.

$C\hat{X}G =$ ..... [1]

(b) Find $B\hat{C}X$.

$B\hat{C}X =$ ..... [1]

(c) Find $A\hat{B}X$.

$A\hat{B}X =$ ..... [1]

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6 **(a)** Work out $69 \div 0.3$.

..... [1]

(b) Work out $1\frac{4}{7} \div \frac{3}{5}$.

Give your answer as a mixed number in its simplest form.

..... [2]

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

$$\frac{8230 \times 0.64}{18.7}.$$

..... [2]

8 **(a)** Write 0.06 km in metres.

..... m [1]

(b) Convert $7\,m^2$ to cm^2.

..... cm^2 [1]

9 **(a)** Write 216 as a product of its prime factors.

..... [2]

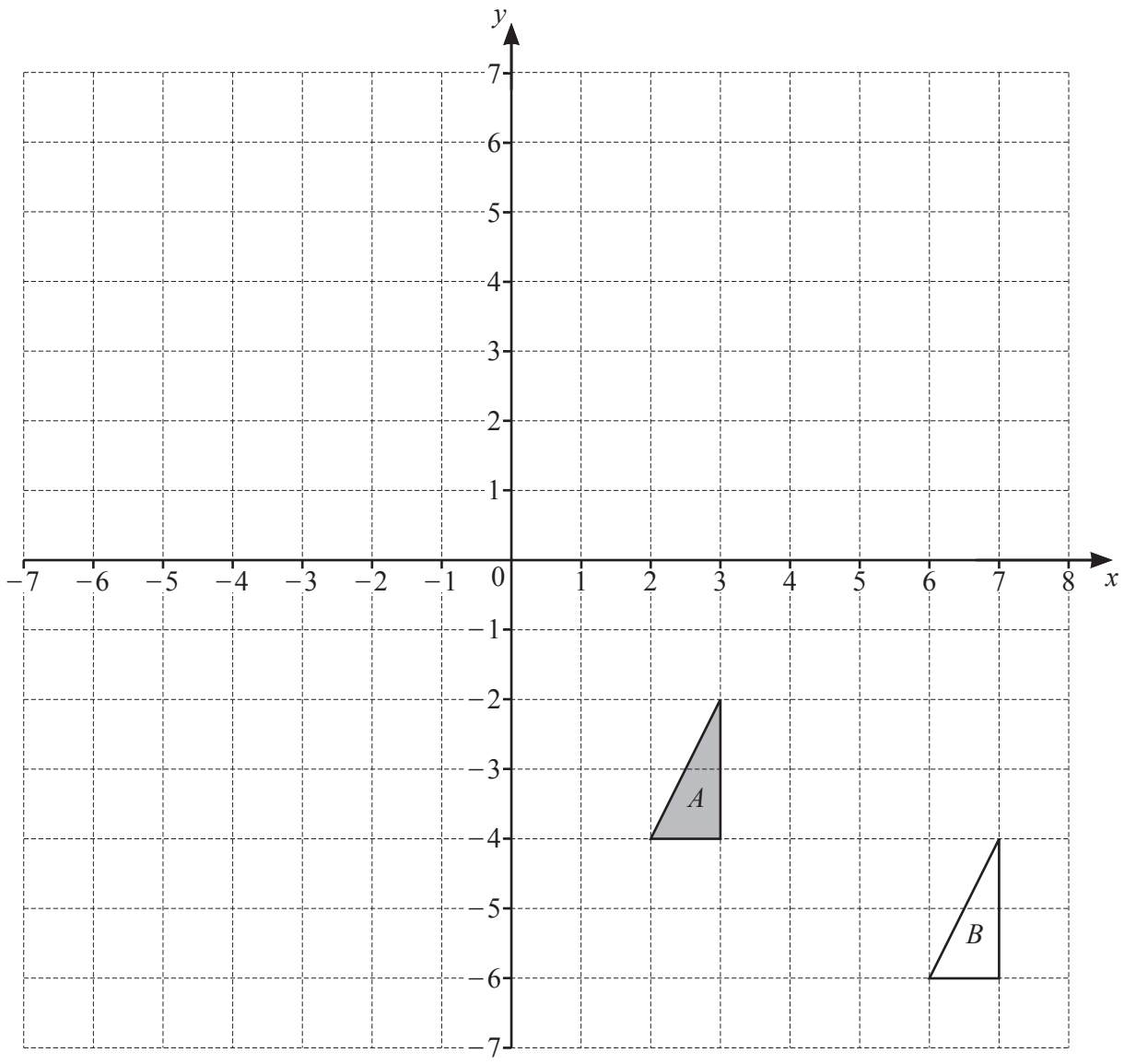
(b) Two positive integers are each greater than 25.
Their lowest common multiple (LCM) is 216.
Their highest common factor (HCF) is 18.

Find the two integers.

..... and ..... [2]

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10 The diagram shows triangle A and triangle B.



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

.....

..... [2]

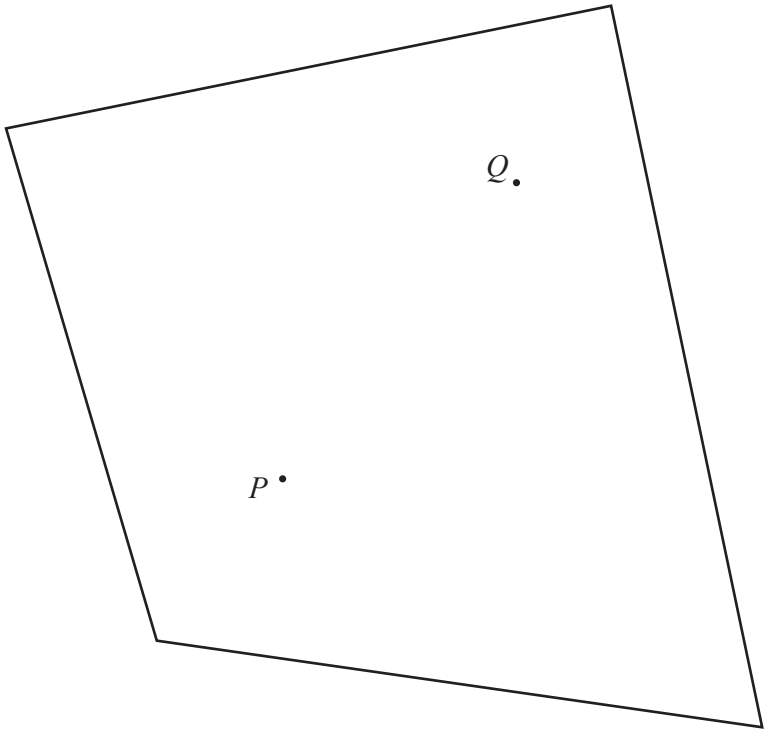
(b) Triangle A is mapped onto triangle C by a rotation, 90° anticlockwise, centre (0, 0).

Draw triangle C. [2]

(c) Triangle A is mapped onto triangle D by an enlargement, scale factor 3, centre (5, −5).

Draw triangle D. [2]

11 The scale drawing shows a garden with two trees P and Q.
The scale is 1 centimetre represents 6 metres.



Scale: 1 cm to 6 m

(a) The garden has a path that is equidistant from P and Q.

Using a straight edge and compasses only, construct the path. [2]

(b) Yuna wants to plant a third tree in the garden that is

- nearer to Q than to P

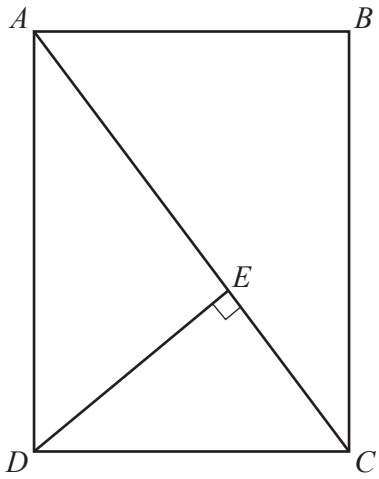
and

- more than 18 m from Q.

Shade the regions where Yuna can plant the tree. [3]

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12



NOT TO SCALE

The diagram shows a rectangle $ABCD$.
E is a point on the diagonal AC such that $D\hat{E}C = 90°$.

Prove that triangle ADC is similar to triangle DEC.
Give a reason for each statement you make.

.....

.....

.....

..... [3]

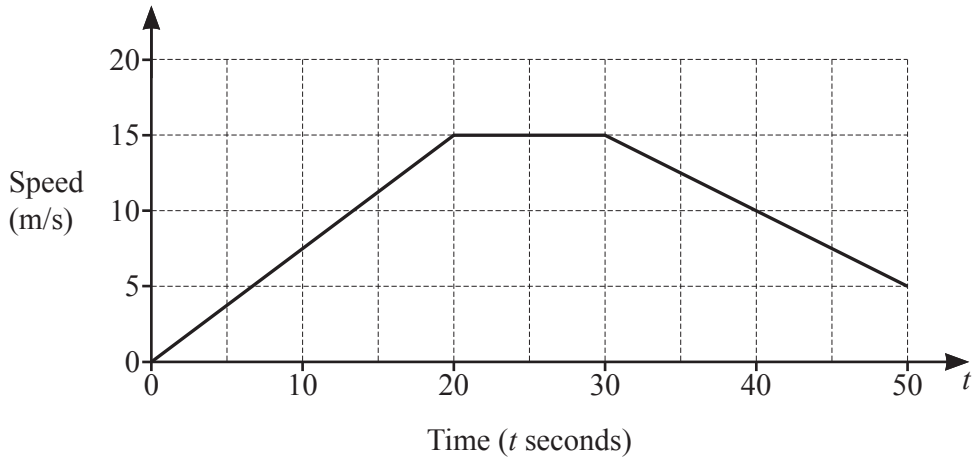
13 The mean of five numbers is 17.

The numbers are listed in order of size, starting with the smallest.
The three smallest numbers are equal.
The middle three numbers add to 35.
The largest number is four times the smallest number.

List the five numbers in order of size.

....., ..., ..., ..., ... [3]
smallest

14 The diagram shows the speed-time graph for the start of a cyclist's journey.



(a) Find the acceleration during the first 20 seconds.

..... m/s^2 [1]

(b) Describe the motion of the cyclist between $t = 20$ and $t = 30$.

..... [1]

(c) Find the total distance travelled in the 50 seconds.

..... m [3]

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15 During one year the value of a bicycle decreased from \$200 to \$160.

Calculate the percentage decrease in the value of the bicycle.

..... % [2]

16 Solve the inequality.

$$23 + 2n > 5 - 6n$$

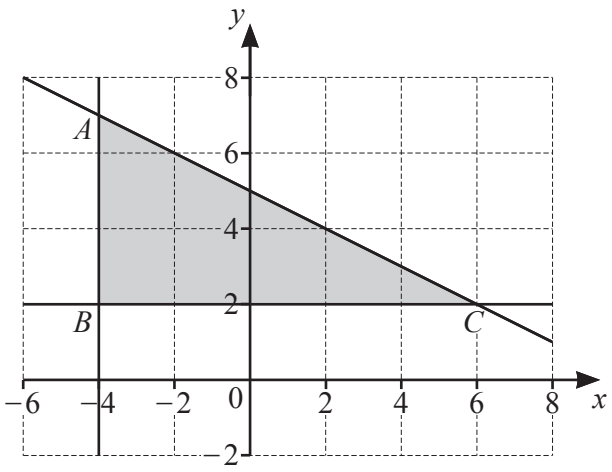
..... [2]

17 Factorise.

$$3xy - qy + 6px - 2pq$$

..... [2]

18



The diagram shows a shaded region ABC.

The equation of the line AC is $y = -\frac{1}{2}x + 5$.

Write down the three inequalities that define the shaded region.

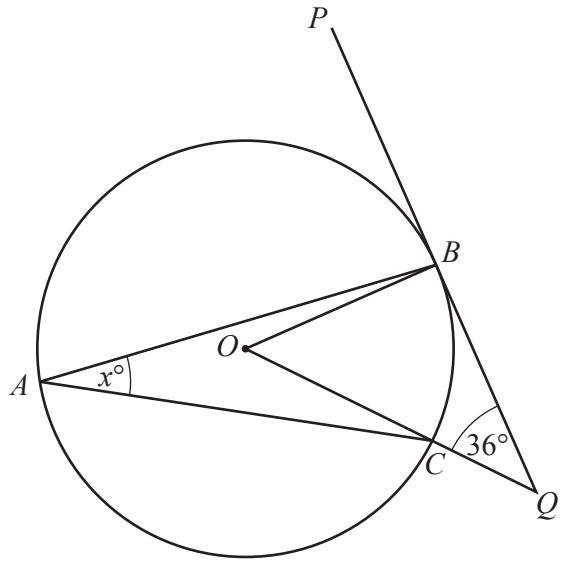
.....

.....

..... [2]

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19



NOT TO SCALE

A, B and C lie on a circle, centre O.
The line PBQ is a tangent to the circle at B.
OCQ is a straight line.
$B\hat{Q}O = 36°$ and $B\hat{A}C = x°$.

Find the value of x.

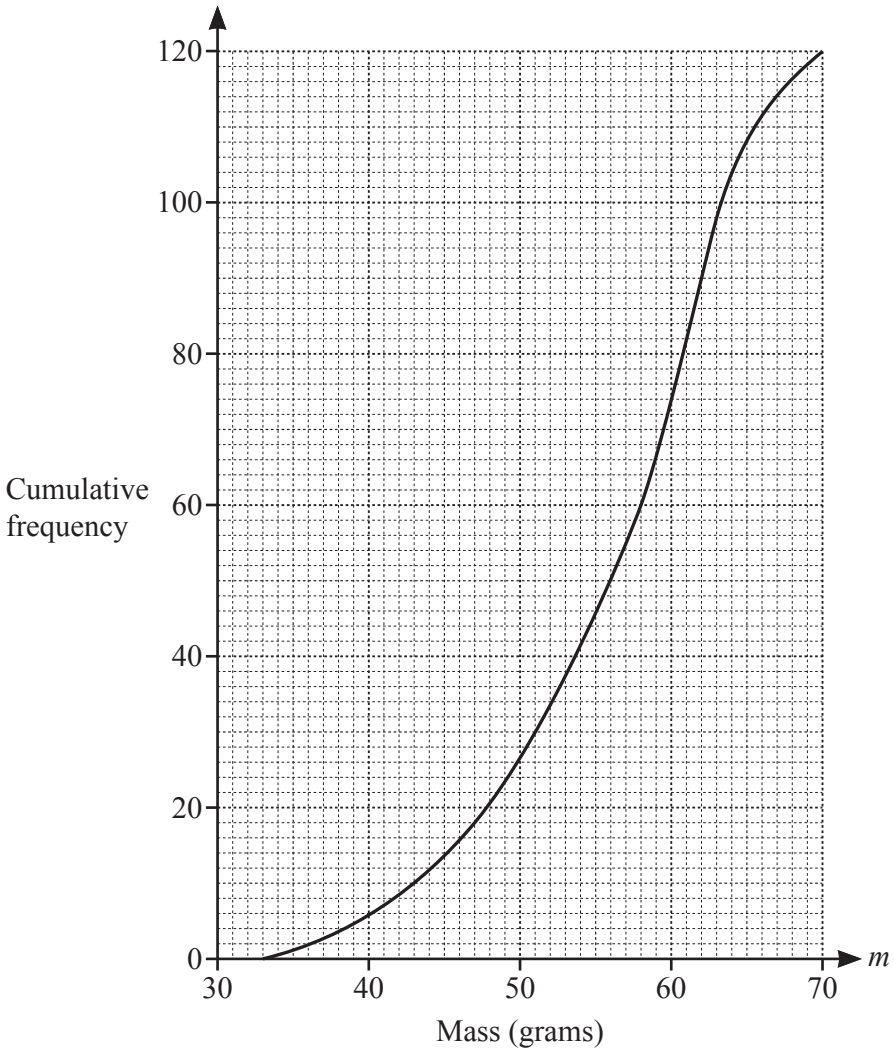
$x =$ ..... [2]

20 Find.

$$\begin{pmatrix} 3 & -2 \\ 1 & 2 \end{pmatrix}^{-1}$$

( ) [2]

21 The cumulative frequency diagram shows the masses, m grams, of 120 eggs.



(a) Use the diagram to estimate

(i) the median,

..... g [1]

(ii) the interquartile range.

..... g [2]

(b) Eggs are described as 'large' if their mass is 63 g or more.

How many of these eggs are large?

..... [2]

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22 **(a)** Solve.

$$27^k = 9$$

$k =$ ..... [2]

(b) Simplify.

$$\left(\frac{16}{x^8}\right)^{-\frac{1}{4}}$$

..... [2]

23 y is inversely proportional to $(x+1)^2$.
When $x = 1$, $y = 5$.

Find y when $x = 9$.

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

24 $f(x) = 2x^2 + 7x + 4$ $g(x) = 2x + 6$

(a) Find

(i) f(3),

..... [1]

(ii) $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [2]

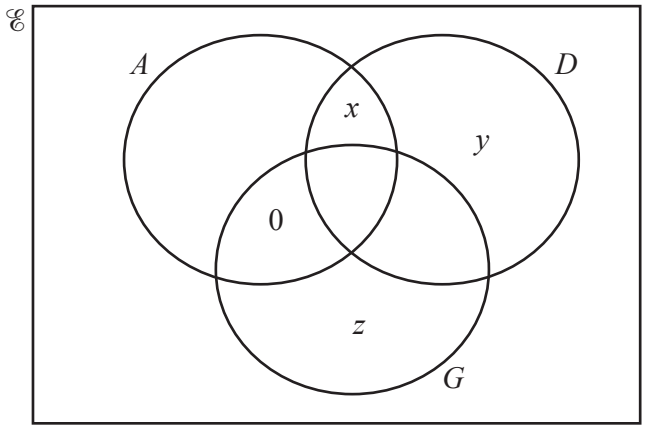
(b) Solve $f(x) - g(x) = 1$.

$x =$ ..... or $x =$ ..... [3]

25 40 students can take part in three activities, Art (A), Dancing (D) and Gardening (G).

- 5 do not take part in any of the activities
- 12 do Art only
- 4 do Dancing and Gardening but not Art
- 1 student does all three activities

(a) Complete the Venn diagram.



[2]

(b) On the Venn diagram, the ratio $x : y : z = 1 : 2 : 3$.

Find the value of each of x, y and z.

$x =$ .....

$y =$ .....

$z =$ ..... [3]

(c) One subset in the Venn diagram in **part (a)** has no students.

Use set notation to describe this subset.

..... [1]

(d) Find $\mathrm{n}((D \cup G) \cap A)$.

..... [1]

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