

Candidate Name _____

Centre Number _____

Candidate Number _____

CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge Ordinary Level

4024/12
MATHEMATICS (SYLLABUS D)
Paper 1

May/June 2018

TIME: 2 hours

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper.

Additional Materials:

Geometrical instruments

Insert for Question 16 and Question 24

READ INSTRUCTIONS OVERLEAF

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer ALL questions.

If working is needed for any question it must be shown in the space below that question.

Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 80.

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**ELECTRONIC CALCULATORS MUST NOT BE USED IN
THIS PAPER**

1 (a) Evaluate $\frac{4}{11} - \frac{2}{7}$.

Answer _____ [1]

(b) Evaluate 0.9×0.011 .

Answer _____ [1]

**2 (a) Cecil bought a camera for \$120.
After two years he sold it for \$90.**

Calculate the percentage loss.

Answer _____ % [1]

- (b) Some money is shared between Miriam and Nina in the ratio $2 : 3$.

What percentage of the total money shared does Miriam receive?

Answer _____ % [1]

- (c) Given that $a : b = 5 : 6$ and $b : c = 3 : 8$
find $a : b : c$.

Answer _____ : _____ : _____ [1]

3

0.05 -0.3 1.3 -1.2 0.2

(a) Arrange the five numbers in order, starting with the smallest.

Answer _____, _____, _____, _____, _____ [1]
smallest

(b) For the five numbers, find

(i) the mean,

Answer _____ [1]

(ii) the range.

Answer _____ [1]

4 y is inversely proportional to the square of x .

Given that $y = 10$ when $x = 3$, find y when $x = \frac{1}{2}$.

Answer $y =$ _____ [2]

5 (a) Factorise $25t^2 - 4$.

Answer _____ [1]

(b) Factorise $x^2 - 6x - 3xy + 18y$.

Answer _____ [2]

6 A rectangle has length 64 mm and width 37 mm each correct to the nearest millimetre.

(a) Write down the lower bound for the length.

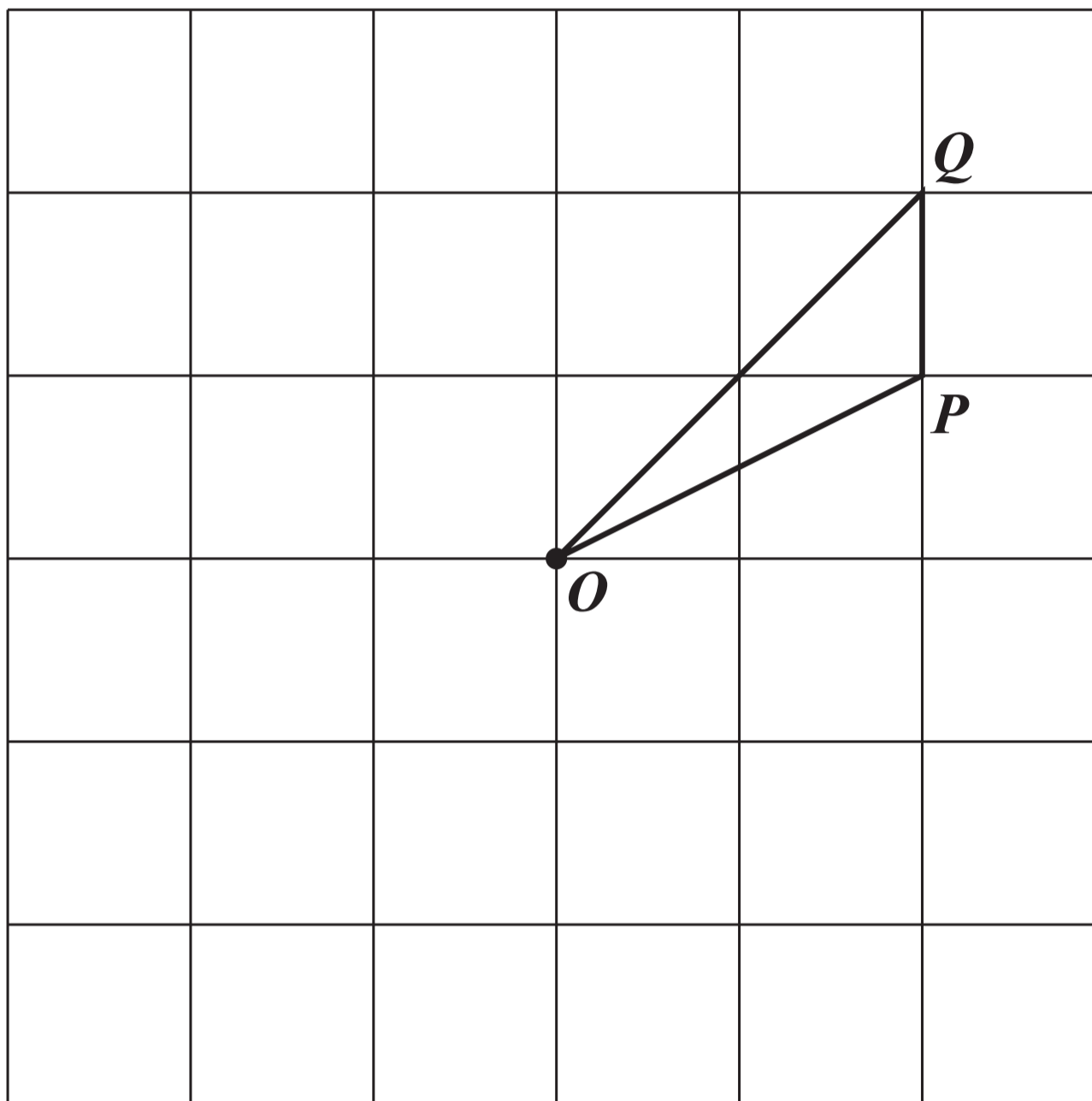
Answer _____ mm [1]

(b) Calculate the lower bound for the perimeter of the rectangle.

Answer _____ mm [1]

- 7 (a) Triangle OPQ is PART of a figure that has rotational symmetry of order 2 about the point O .

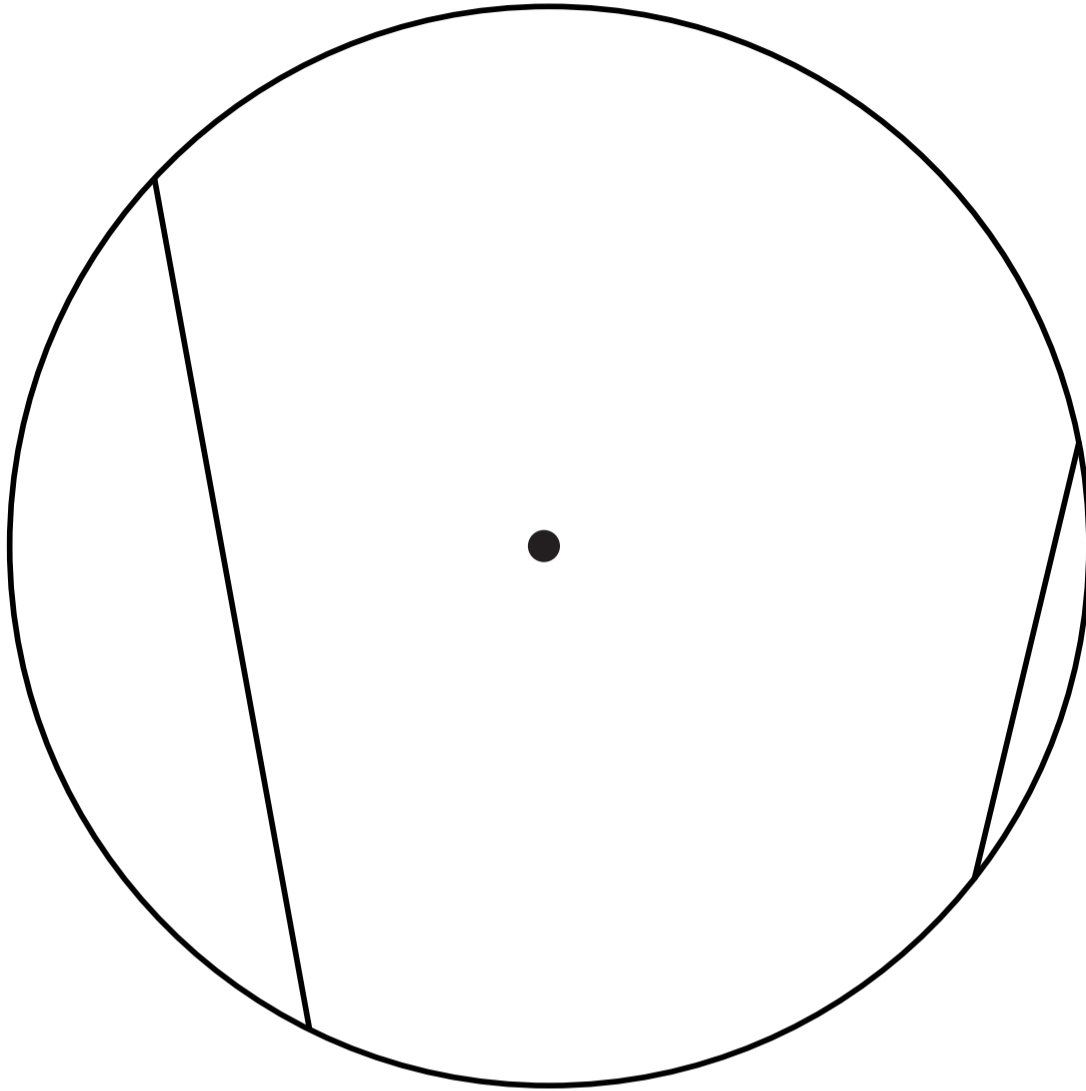
Complete the figure.



[1]

(b) The diagram shows a circle, its centre, and two chords.

Add ONE chord, to give a diagram that has one line of symmetry.



[1]

8 Solve $\frac{4}{x-11} = \frac{1}{3x}$.

Answer $x =$ _____ [2]

9 Express each of the following as a single fraction in its simplest form.

(a) $\frac{2}{3a} + \frac{5}{2a}$

Answer _____ [1]

(b) $\frac{5}{2b^2} \div \frac{15}{4b^3}$

Answer _____ [2]

10 By writing each number correct to 2 significant figures, calculate an estimate of

$$\frac{596 \times \sqrt{16.12}}{0.2984}$$

Answer _____ [2]

11

$$f(x) = \frac{1}{3x + 2}$$

(a) Find $f(-2)$.

Answer _____ [1]

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

Answer $f^{-1}(x) =$ _____ [2]

- 12 A dice is thrown 400 times.
The results are shown in the table.**

Number thrown	Frequency
1	65
2	80
3	70
4	75
5	50
6	60

- (a) Find the relative frequency of throwing the number 2.**

Answer _____ [1]

- (b) Imran throws the dice 1000 times.**

How many times would you expect the number 2 to be thrown?

Answer _____ [1]

13 In a school of 270 children, the distance each child can swim was recorded.

The distances are summarised in the table.

Distance (d metres)	Number of children	Frequency density
$0 \leq d < 100$	110	
$100 \leq d < 200$	50	
$200 \leq d < 500$	60	
$500 \leq d < 1000$	50	

**(a) Complete the table to show the frequency densities.
There are four spaces to fill.**

[2]

**(b) Calculate an estimate for the number of children who
could swim more than 400 metres.**

Answer _____ **[1]**

14 An irregular polygon has 22 sides.

(a) Calculate the sum of all its interior angles.

Answer _____ [2]

**(b) Two of the angles in the polygon are each 170° .
The remaining 20 angles are equal to each other.**

Calculate the size of ONE of the 20 equal angles.

Answer _____ [2]

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15 During two weeks, a shopkeeper records the number of packets of two different types of tea he sells and the profit he makes from them.

Week 1

- Type A tea, 30 packets sold, profit of \$1.20 on each packet
- Type B tea, 20 packets sold, profit of \$2 on each packet

Week 2

- Type A tea, 40 packets sold, loss of \$0.50 on each packet
- Type B tea, 30 packets sold, profit of \$3 on each packet

This information can be represented by these matrices.

$$\begin{pmatrix} 30 & 20 \end{pmatrix} \quad \begin{pmatrix} 40 & 30 \end{pmatrix} \quad \begin{pmatrix} 1.2 \\ 2 \end{pmatrix} \quad \begin{pmatrix} -0.5 \\ 3 \end{pmatrix}$$

(a) Work out $\begin{pmatrix} 30 & 20 \end{pmatrix} \begin{pmatrix} 1.2 \\ 2 \end{pmatrix} - \begin{pmatrix} 40 & 30 \end{pmatrix} \begin{pmatrix} -0.5 \\ 3 \end{pmatrix}$.

Answer

[2]

(b) Explain the meaning of your answer to part (a).

[1]

- 16 The masses of 200 beetles were measured.
The results are summarised in the cumulative frequency table and part of the cumulative frequency curve is drawn.

Mass (m grams)	Cumulative frequency
$m \leq 0.5$	0
$m \leq 1$	25
$m \leq 1.5$	75
$m \leq 2$	150
$m \leq 2.25$	170
$m \leq 2.5$	185
$m \leq 3$	200

(a) Complete the cumulative frequency curve. (Insert) [1]

(b) Use the curve to find an estimate for

(i) the median,

Answer _____ g [1]

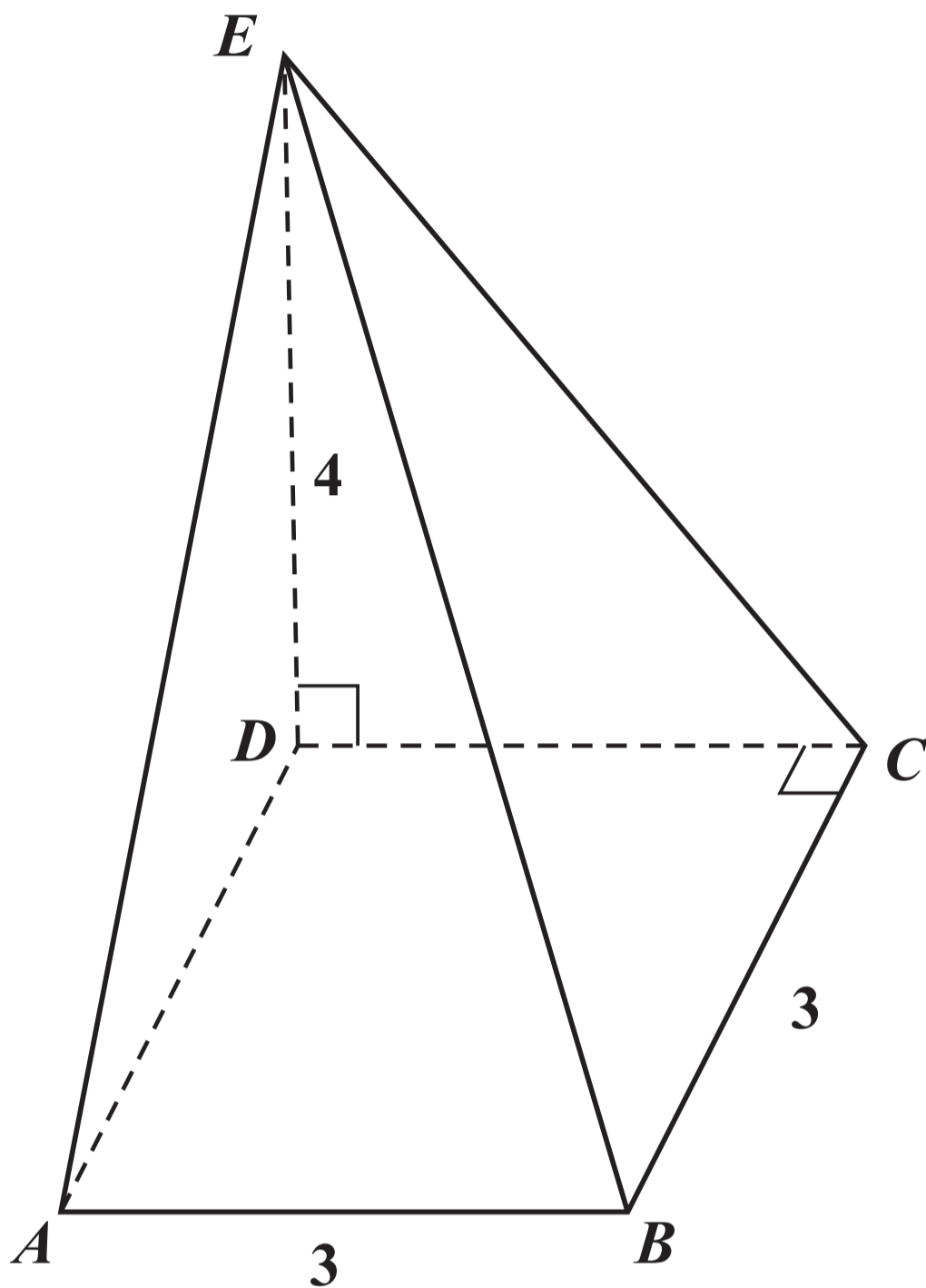
(ii) the lower quartile,

Answer _____ g [1]

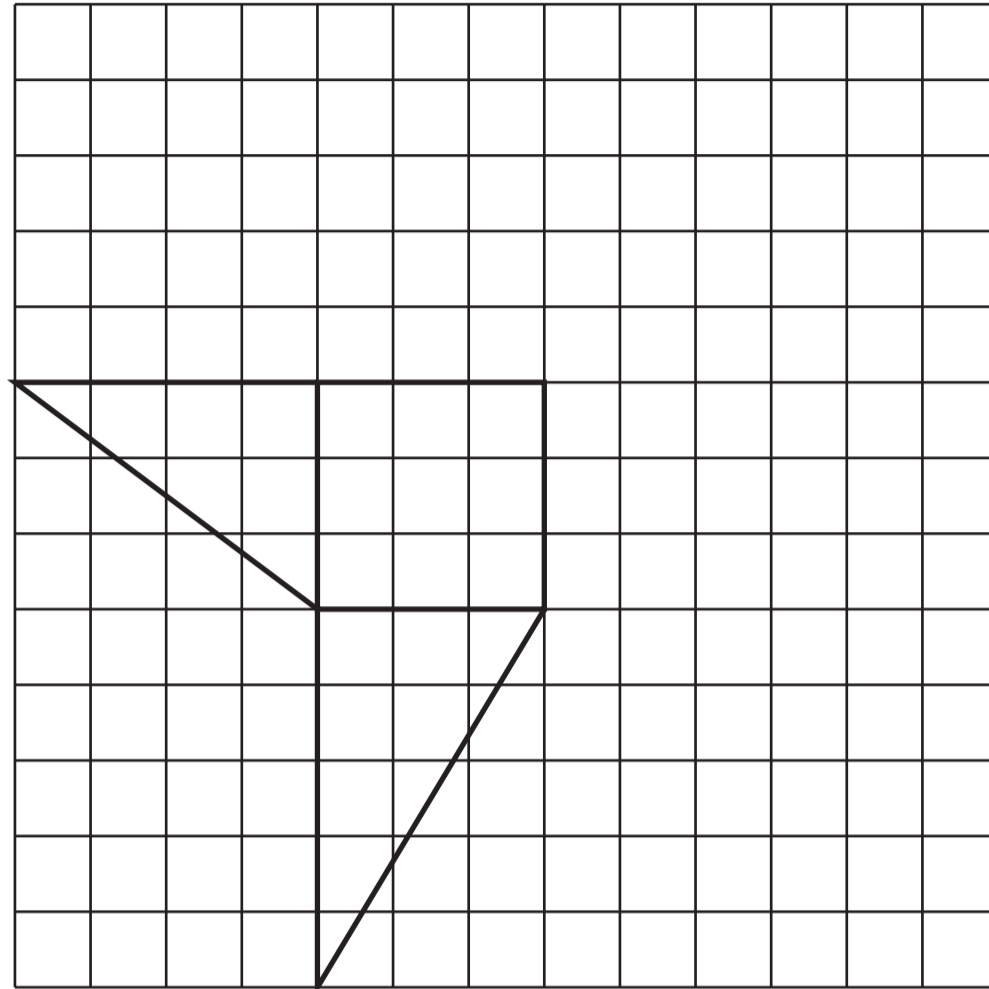
(iii) the number of beetles that have a mass greater than 1.85 grams.

Answer _____ **[2]**

- 17 The diagram shows a pyramid.
The square base, $ABCD$, has an edge of 3 cm.
The base is horizontal, and vertex E is
vertically above D , where $ED = 4$ cm.



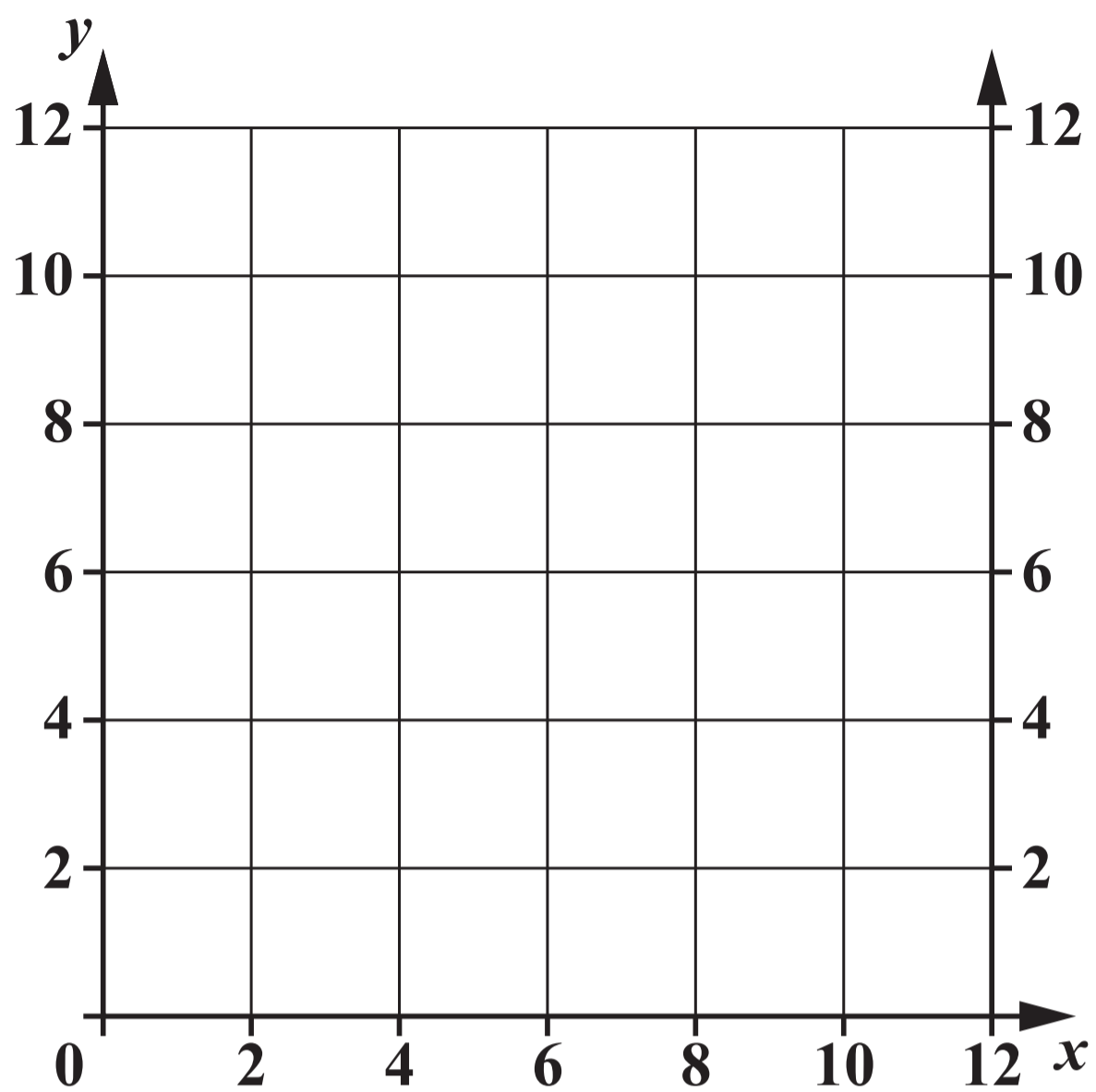
- (a) On the grid below, complete the accurate drawing of a net of the pyramid.
Do NOT draw outside the grid.



[2]

- (b) Calculate the TOTAL surface area of the pyramid.

Answer _____ cm^2 [2]



The region R is defined by the inequalities

$$2 \leq x \leq 8$$

$$5 \leq y \leq 10$$

$$x + y \geq 10.$$

On the diagram, shade and label the region R .

[3]

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19 Look at the diagram on the opposite page.

(a) On the diagram, construct the perpendicular bisector of AB . [1]

(b) On the diagram, construct the locus of points inside triangle ABC , that are

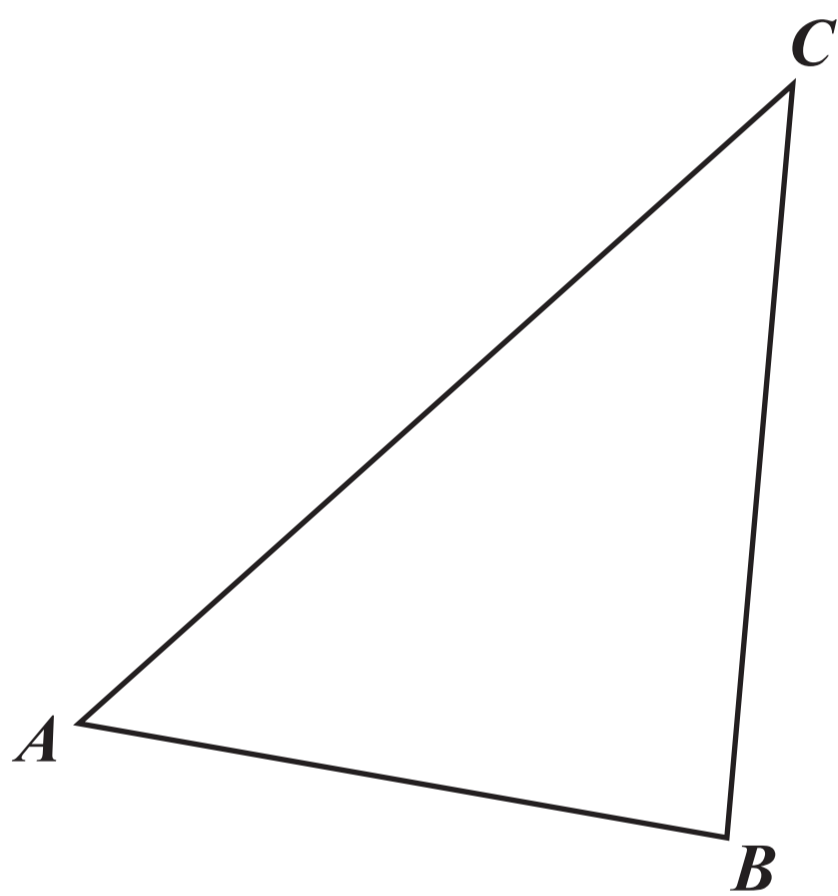
(i) 7 cm from C , [1]

(ii) equidistant from AB and AC . [1]

(c) P is any point which is

**equidistant from A and B
and more than 7 cm from C
and nearer to AC than AB .**

Find the extremes of the possible positions of P and label them P_1 and P_2 . [1]



20

$$N = 2 \times 10^8$$

(a) Giving your answers in standard form, find the value of

(i) $N \times 700$,

Answer _____ [1]

(ii) $\frac{1}{N}$.

Answer _____ [2]

(b) Find the smallest positive integer M , given that MN is a cube number.

Answer $M =$ _____ [1]

21 The first four terms, u_1 , u_2 , u_3 and u_4 , in a sequence of numbers are given below.

$$u_1 = 1 \times 3 + 2^2 = 7$$

$$u_2 = 2 \times 4 + 3^2 = 17$$

$$u_3 = 3 \times 5 + 4^2 = 31$$

$$u_4 = 4 \times 6 + 5^2 = 49$$

(a) Evaluate u_5 .

Answer _____ [1]

(b) The n th term of the sequence, u_n , is of the form $n(n + p) + (n + q)^2$.

Write down the value of p and the value of q .

Answer $p =$ _____

$q =$ _____ [1]

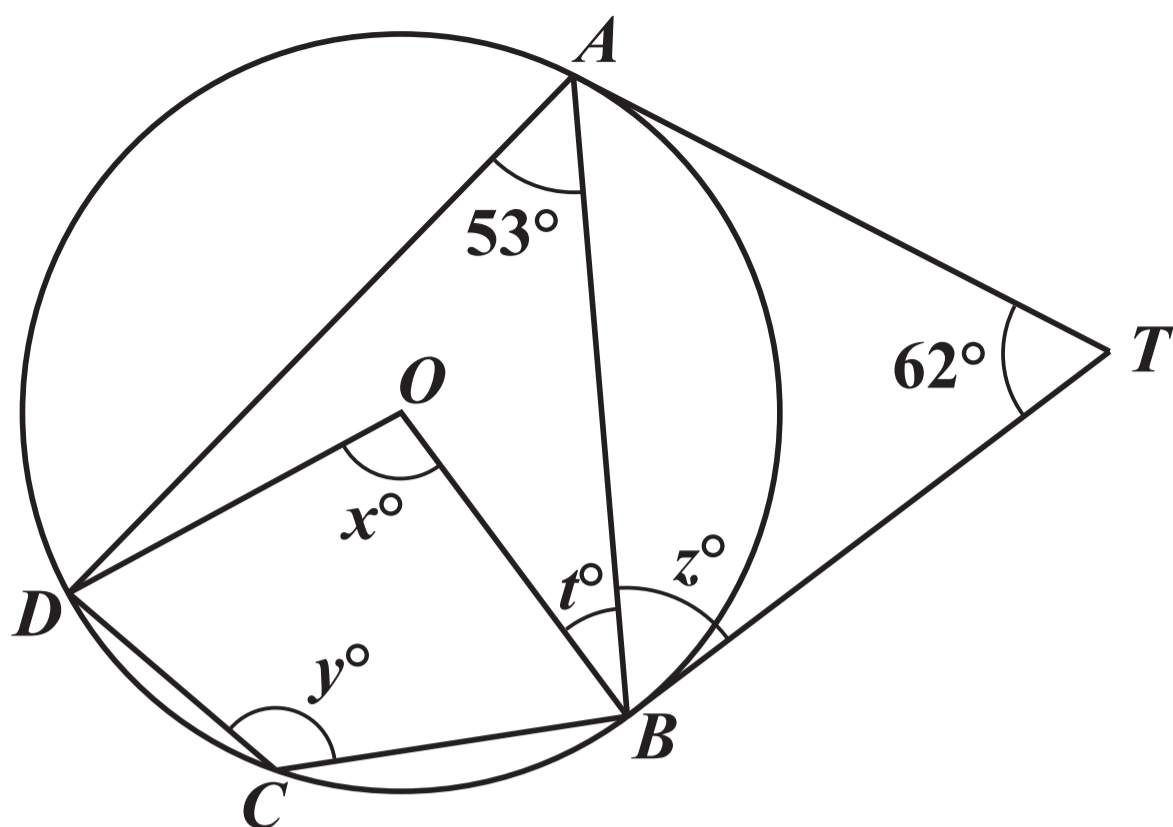
(c) u_n can also be written in the form $An^2 + Bn + C$.

Find the values of A , B and C .

Answer $A =$ _____

$B =$ _____

$C =$ _____ [2]



The diagram shows a circle, centre O , that passes through A , B , C and D .

The tangents at A and B meet at T .

$\hat{ATB} = 62^\circ$ and $\hat{DAB} = 53^\circ$.

(a) Find x .

Answer $x =$ _____ [1]

(b) Find y .

Answer $y =$ _____ [1]

(c) Find z .

Answer $z =$ _____ **[1]**

(d) Find t .

Answer $t =$ _____ **[1]**

23

$$\mathbf{A} = \begin{pmatrix} 4 & -1 \\ 2 & 0 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 6 & -3 \\ 0 & -2 \end{pmatrix}$$

(a) Find the matrix \mathbf{X} , such that $2\mathbf{A} + \mathbf{X} = \mathbf{B}$.

Answer $\left(\begin{array}{cc} & \\ & \end{array} \right)$ [2]

(b) Find the matrix Y , such that $AY = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

Answer

[3]

24 Look at the Insert for Question 24.

Triangle A is mapped onto triangle B by a translation, FOLLOWED BY an enlargement with centre $(10, -4)$.

The translation maps triangle A onto triangle C .

The enlargement maps triangle C onto triangle B .

(a) Write down the scale factor of the enlargement.

Answer _____ [1]

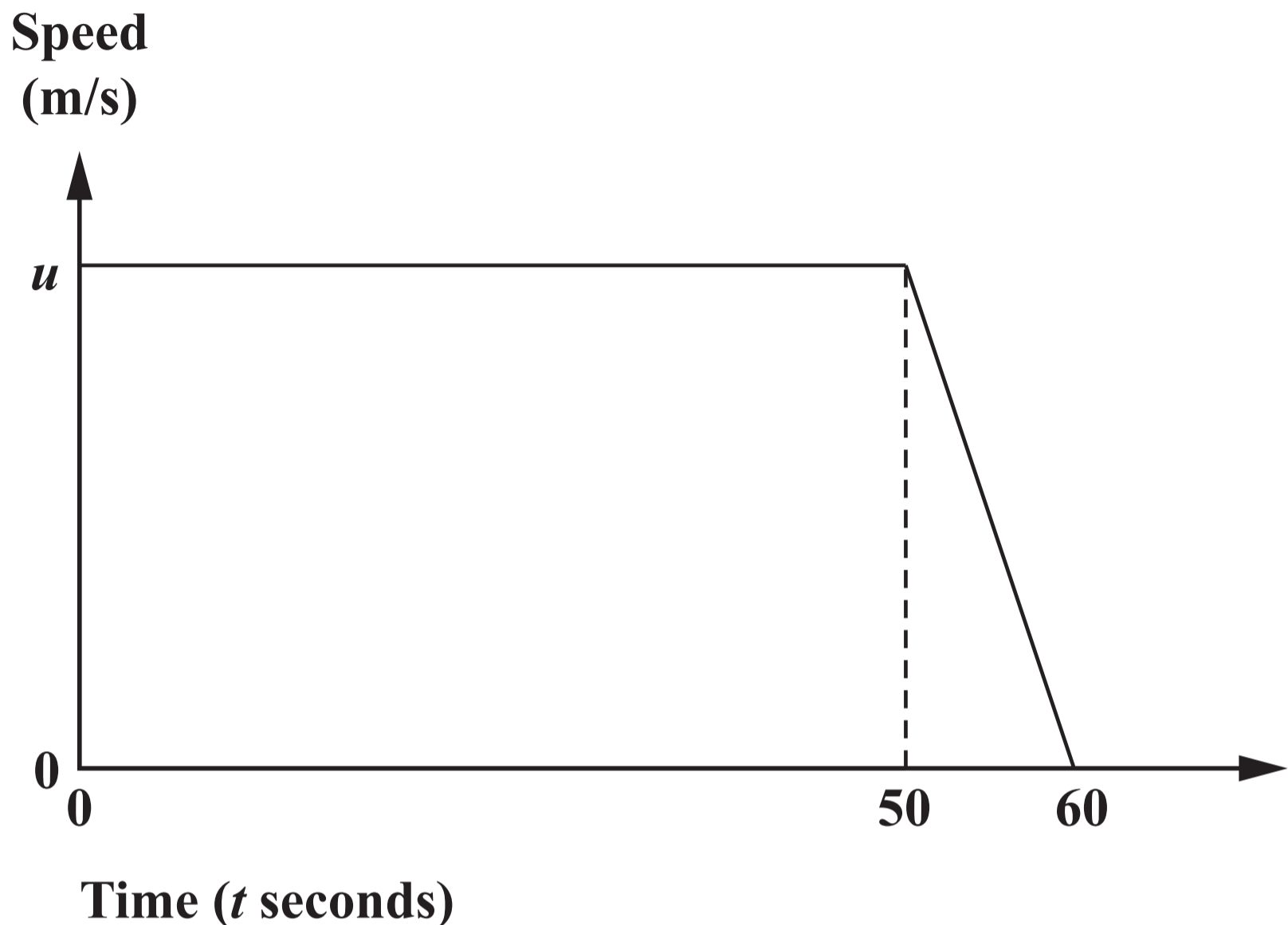
(b) Draw triangle C on the grid. [2]

(c) Find the column vector that represents the translation that maps triangle A onto triangle C .

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

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- 25 The diagram is the speed–time graph for 60 seconds of a train’s journey.
At the beginning of this part of the journey the train is travelling at u m/s.



Giving each answer in its simplest form, find expressions in terms of u , for

- (a) the deceleration for the last 10 seconds,

Answer _____ m/s² [1]

(b) the speed when $t = 55$,

Answer _____ m/s [1]

(c) the distance travelled during these 60 seconds.

Answer _____ m [2]

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