Question 1
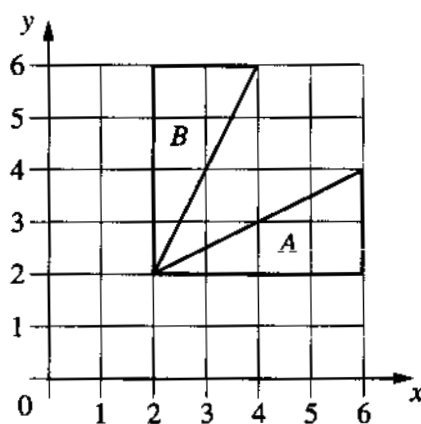
Claudia records the midday temperature from Monday to Friday. She finds that the mean temperature is 0°C, the mode is –2.4°C and the median is –1.3°C. The temperature either stays the same or increases each day and the maximum temperature is 4.5°C. Fill in the temperatures in the table below.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature (°C)					

[3]

Question 2

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

Answer (a) .... [2]

(b) Find the 2 × 2 matrix which represents this transformation.

Answer (b) [2]

Question 3

$$A = \begin{pmatrix} 4 & x \\ -3 & 6 \end{pmatrix}, \quad B = \begin{pmatrix} 5 & -3 \\ -2 & 2 \end{pmatrix}, \quad C = \begin{pmatrix} 6 & 2 \\ y & 21 \end{pmatrix}.$$

(a) If $AB = C$, find the value of x and the value of y.

Answer (a) x = ...

y = ... [3]

(b) Find B^{-1}, the inverse of B.

Answer (b) $B^{-1} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$

[2]

Question 4
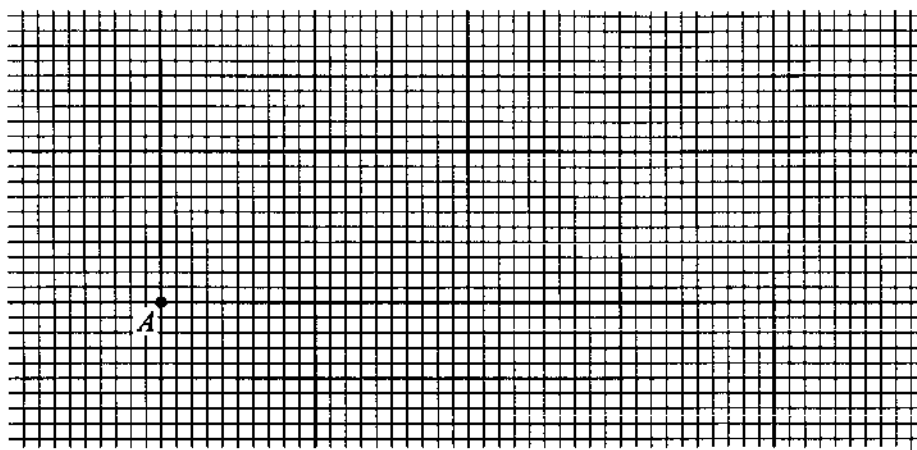
(a) Using a scale of 1 centimetre to represent 1 unit, draw the vectors

$$\overrightarrow{AB} = \begin{pmatrix} 5 \\ 0 \end{pmatrix} \quad \text{and} \quad \overrightarrow{BC} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad \text{on the grid.} \qquad [2]$$

(b) Calculate $|\overrightarrow{BC}|$, the magnitude of vector $\overrightarrow{BC}$.

Answer (b) $|\overrightarrow{BC}| =$ .... [2]

(c) Find vectors $\overrightarrow{AD}$ and $\overrightarrow{DC}$ such that the quadrilateral $ABCD$ is a kite.

Answer (c) $\overrightarrow{AD} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

$\overrightarrow{DC} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

Question 5

Answer the whole of this question on a sheet of graph paper.
500 eggs were sorted by mass into five different sizes.

	Mass (m grams)	Frequency
Small	$35 \leqslant m < 40$	20
Medium	$40 \leqslant m < 50$	60
Standard	$50 \leqslant m < 60$	200
Large	$60 \leqslant m < 75$	180
Extra large	$75 \leqslant m < 80$	40

(a) Draw an accurate histogram to represent this information.
Use a scale of 2 cm to represent 5 grams on the horizontal axis, and an area scale of 1 square centimetre to represent 5 eggs. [6]

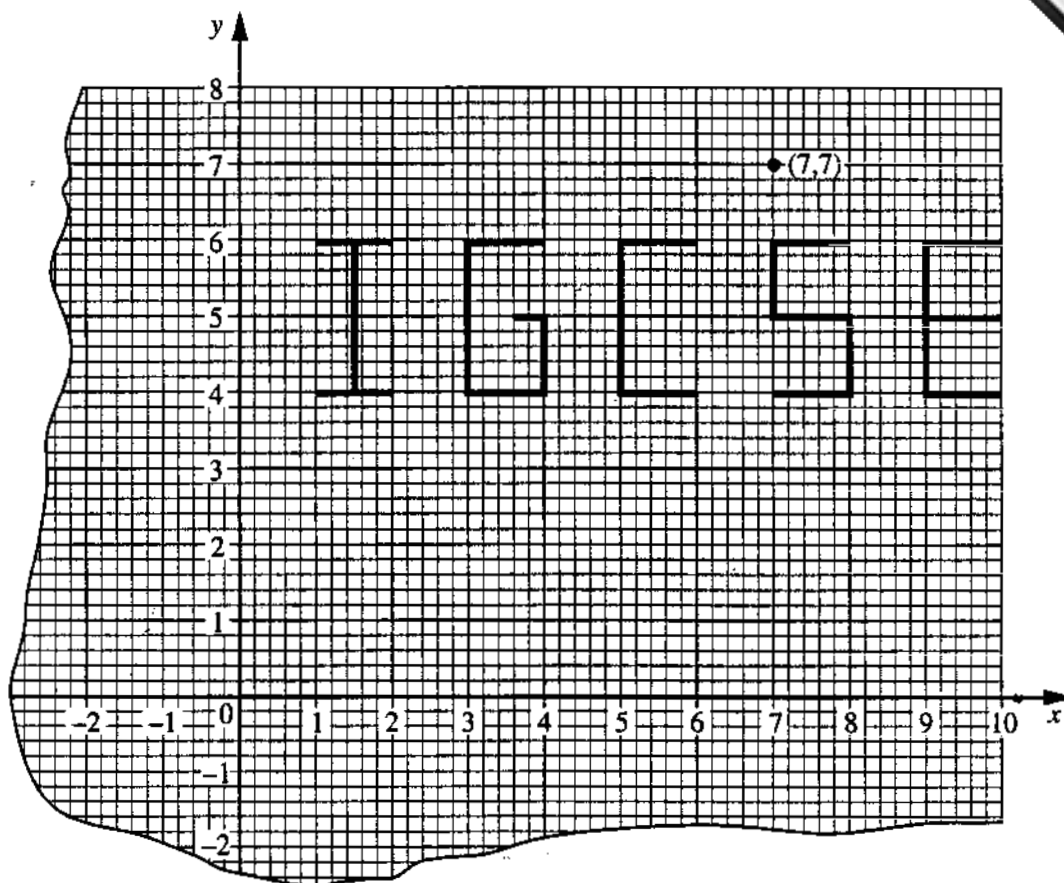(b) **Calculate** an estimate of the mean mass of these eggs. [4]

(c)
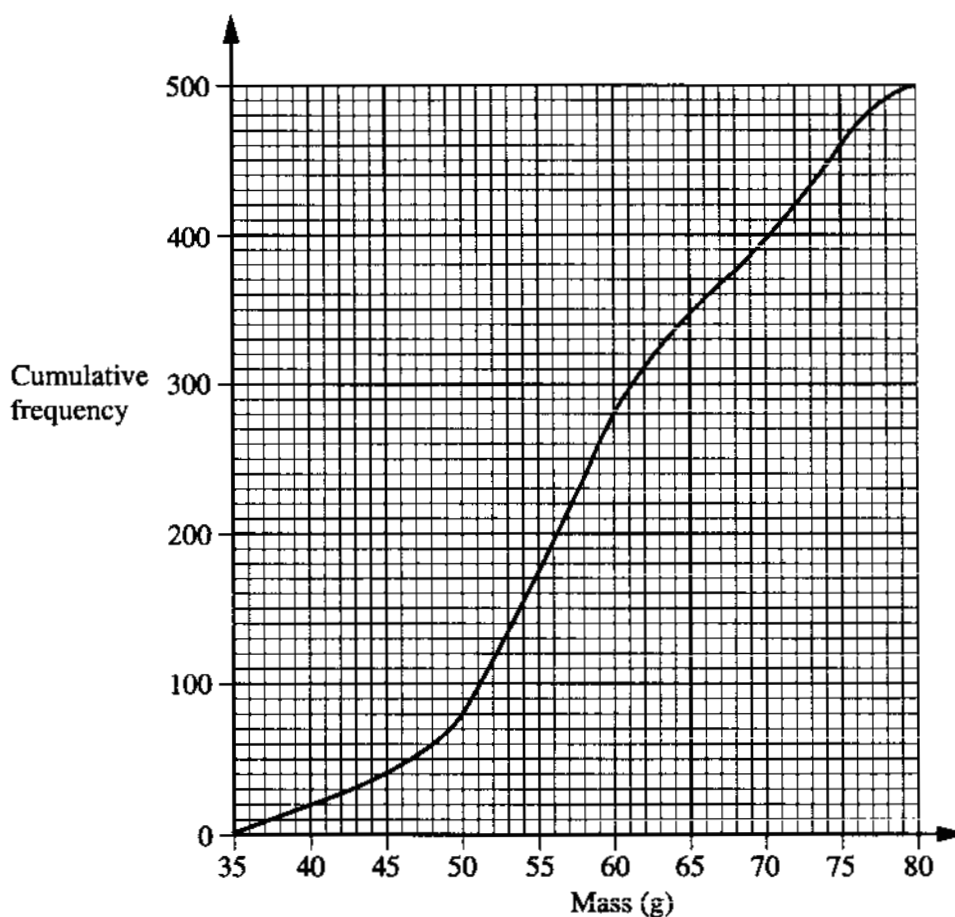
This cumulative frequency curve has been drawn using the information in the table above.

(i) Explain why the point (60, 280) is on the curve. [2]

(ii) Estimate the median mass of the eggs. [1]

(iii) Estimate the interquartile range of the masses of the eggs. [2]

Answer the whole of this question on one sheet of graph paper.

(a) Using a scale of 1 centimetre to represent 1 unit on each axis, draw an x-axis for $-6 \leqslant x \leqslant 10$ and a y-axis for $-6 \leqslant y \leqslant 8$.

Copy the letters IGCSE accurately from the diagram above onto the **same position** on your graph paper. Each letter is 2 cm high and 1 cm wide.

[For example, the letter I lies in the rectangle $1 \leqslant x \leqslant 2$ and $4 \leqslant y \leqslant 6$.]   [2]

(b) Draw accurately the image of your letters under the following transformations.

    (i) Rotate your letter I by 90° clockwise about the origin.   [2]

    (ii) Reflect your letter G in the y-axis.   [2]

    (iii) Enlarge your letter C, scale factor 4, centre (7, 7).   [2]

    (iv) Translate your letter S by the vector $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$.   [2]

    (v) Stretch your letter E parallel to the y-axis, stretch factor 0.5, with the x-axis invariant.   [2]

(c) (i) Find the transformation matrix **M** which represents rotation by 90° clockwise about the origin.   [2]

    (ii) Find the inverse matrix $\mathbf{M}^{-1}$ and describe in words the transformation which it represents.   [3]

QUESTION	ANSWER	MARK	
1	−2.4, −2.4, −1.3, 1.6, 4.5	3	(SC1) for 1.6 anywhere in table (SC1) for **only** one − 1.3 in middle position (SC1) for exactly 2 values of −2.4 and no other values
2 (a)	Reflection in y = x	1 1	dependent on first mark
(b)	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	2	(B1) for row or column correct **or** (M1) for correct method
3 (a)	x = 7, y = -27	3	(M1) for $\begin{pmatrix} 20-2x & 2x-12 \\ -27 & 21 \end{pmatrix}$
(b)	$\frac{1}{4}\begin{pmatrix} 2 & 3 \\ 2 & 5 \end{pmatrix}$	2	(B1) for $k\begin{pmatrix} 2 & 3 \\ 2 & 5 \end{pmatrix}$ **or** $\frac{1}{4}\begin{pmatrix} .. & .. \\ .. & .. \end{pmatrix}$
4 (a)	$\overrightarrow{AB}$, $\overrightarrow{BC}$ drawn on the grid	2	(B1) for $\overrightarrow{AB}$ correct. (B1) for $\overrightarrow{BC}$ correct
(b)	2.24	2	(M1) for $\sqrt{2^2 + 1^2}$
(c)	$\begin{pmatrix} 4 \\ 3 \end{pmatrix}$ $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$	1 1	
5 (a)	Given scale used on m-axis Blocks 2, 3, 10, 6, 4 cm high	1 5	1 mark for each correct block
(b)	59.4	4	(M1) for at least 3 correct mid-interval values seen (M1) for (37½x20)+(45x60)+(55x200)+(67½x180)+(77½x40) (M1) for ÷500
(c)(i)	Explanation for 60 Explanation for 280	1 1	'End of interval used' for points on m-axis, or equivalent Explain cumulative, e.g. 280 = 20 + 60 + 200, or equivalent
(c)(ii)	58.5 grams (± 0.5)	1	
(c)(iii)	15 to 16 grams	2	(SC1) for LQ = 52½ **or** UQ =68 (± 0.2) seen
6 (a)	Scales correct All 5 letters correct size and position	1 1	At least −6 ≤ x ≤ 10 **and** −6 ≤ y ≤ 8 Reasonably generous
(b)(I)	Letter I correctly rotated 90° clockwise	2	√ award (B2) for correct rotation of 'his' letter I
(b)(ii)	Letter G correctly reflected in *y*-axis	2	√ award (B2) for correct reflection of 'his' letter G
(b (iii)	Letter C enlarged and in correct position	2	(SC1) for correct C (4cm wide, 8cm high) in wrong place
(b)(iv)	Letter S correctly translated by $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$	2	√ award (B2) for correct translation of 'his' letter S
(b)(v)	Correct stretch of letter E	2	(SC1) for correct E (all 1cm lines) in wrong place
(c)(I)	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	2	(B1) for row or column correct **or** (M1) for correct method
(c)(ii)	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ Rotation anti-clockwise (about origin)	2 1	√ award (B2) for correct inverse of (c)(i) (B1) for $k\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ **or** det**M** = 1 Condone omission of origin

TYPES OF MARK

Most of the marks (those without prefixes and 'B' marks) are given for accurate results, drawings or statem...

*Indicates that it is necessary to look in the working after an incorrect answer

'M' marks are awarded for any correct method applied to the appropriate numbers.

'B' marks are given for a correct statement or step.

'A' marks are for accurate results or statements but are awarded only if the relevant 'M' marks have been earned.

'SC' marks are awarded in special cases.

The symbol '√' indicates that a previous error is to be 'followed through' i.e. the mark can be gained if the candidate has made no further error in obtaining the relevant result.