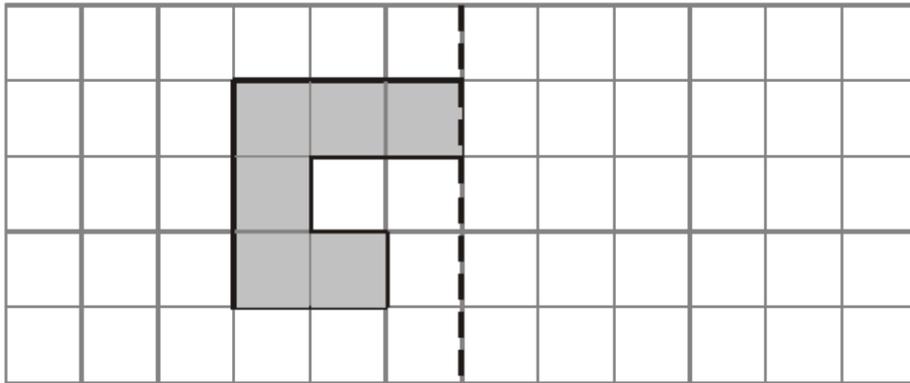


Q1.

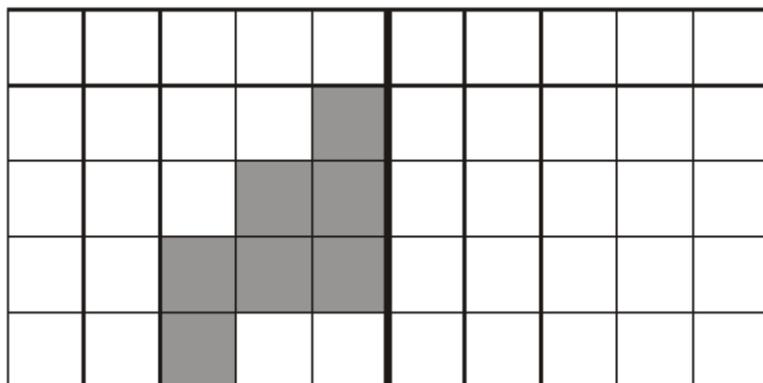


Mirror Line

Reflect the shaded shape in the mirror line.

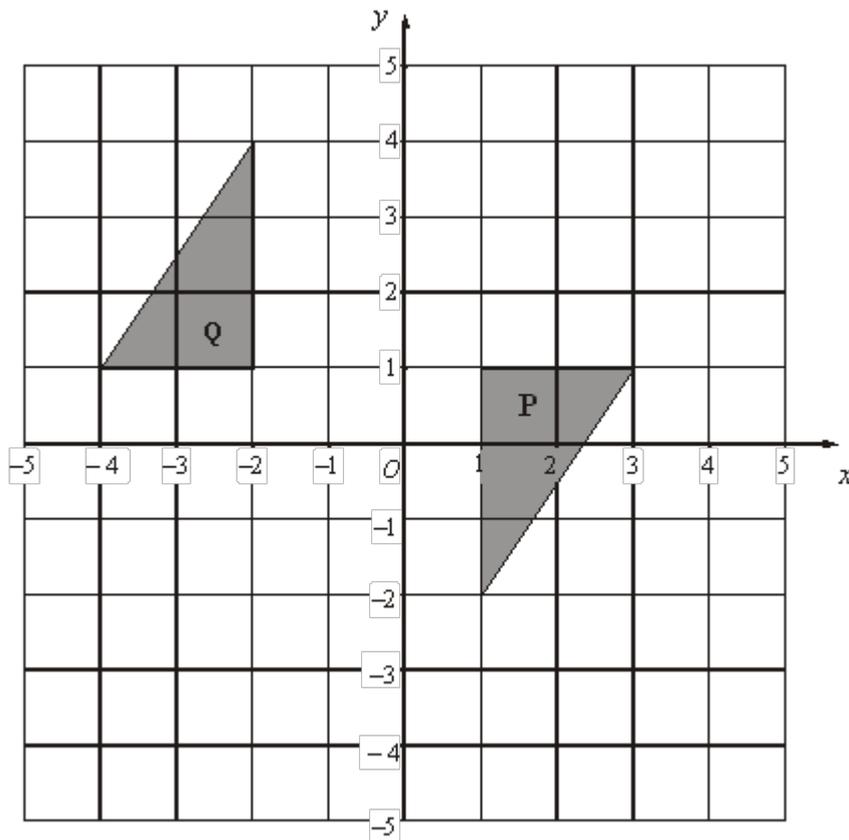
(Total 1 mark)

Q2. (a) Reflect the shaded shape in the mirror line.



(1)

(b) Describe the single transformation that moves shape **P** to shape **Q**.



.....

(2)
(Total 3 marks)

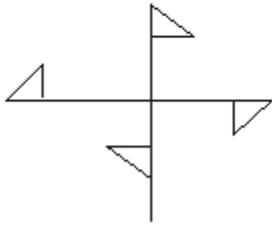
Q3. (a) Draw all the lines of symmetry of this shape.



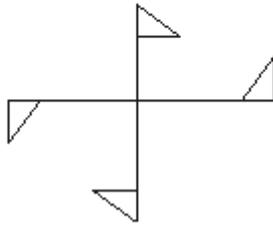
(1)

(b) Which of these shapes has rotational symmetry?

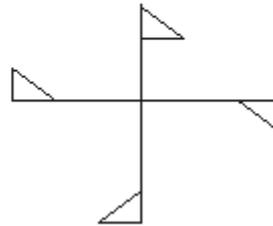
A



B



C

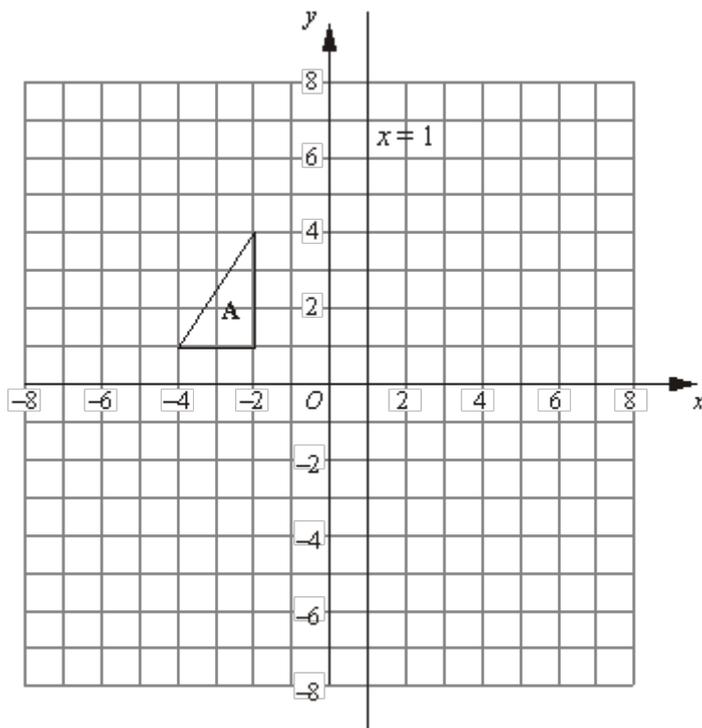


(1)

- (c) In the space below, draw a shape that has line symmetry and rotational symmetry order 3.

(2)
(Total 4 marks)

Q4.



Triangle **A** is reflected in the x -axis to give triangle **B**.

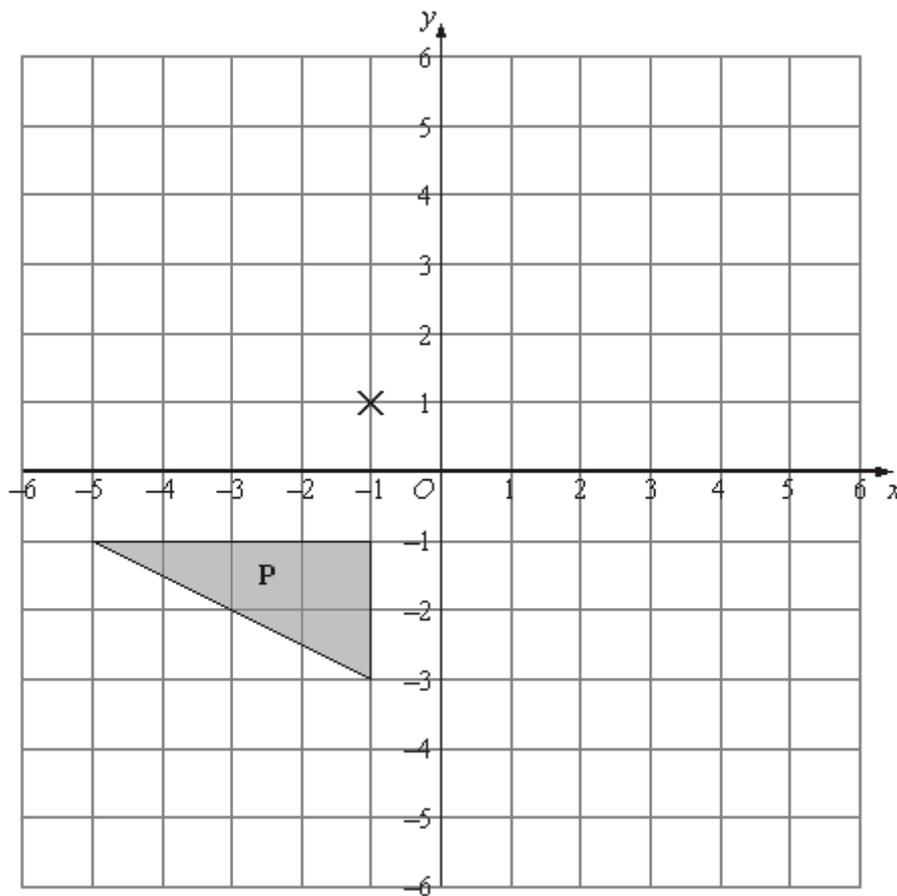
Triangle **B** is reflected in the line $x = 1$ to give triangle **C**.

Describe the **single** transformation that takes triangle **A** to triangle **C**.

.....

(Total 3 marks)

Q5.



- (a) Rotate triangle **P** 180° about the point $(-1, 1)$.

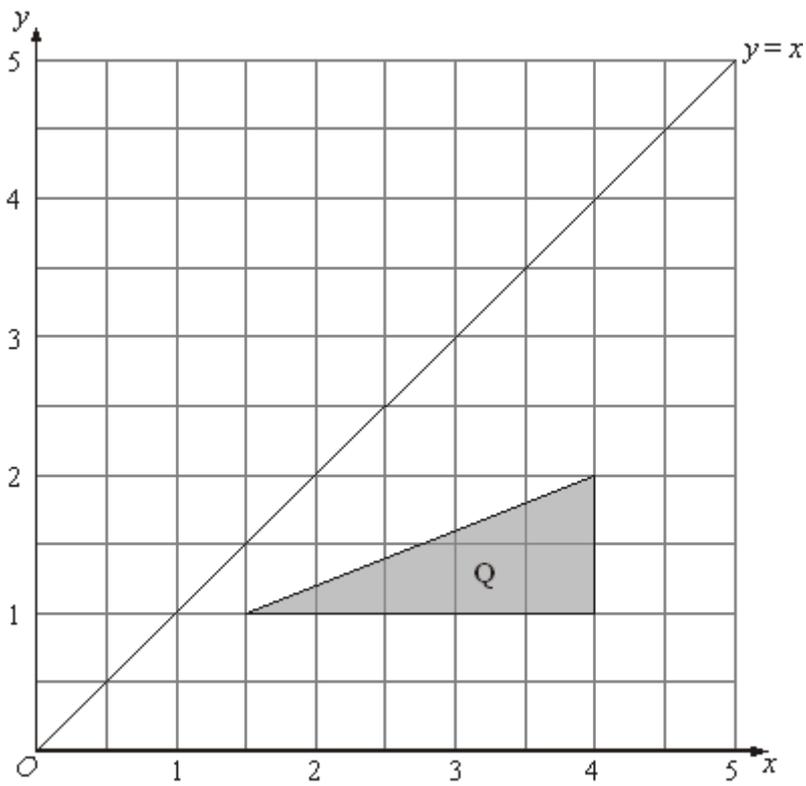
Label the new triangle **A**.

(2)

- (b) Translate triangle **P** by the vector $\begin{pmatrix} 6 \\ -1 \end{pmatrix}$.

Label the new triangle **B**.

(1)

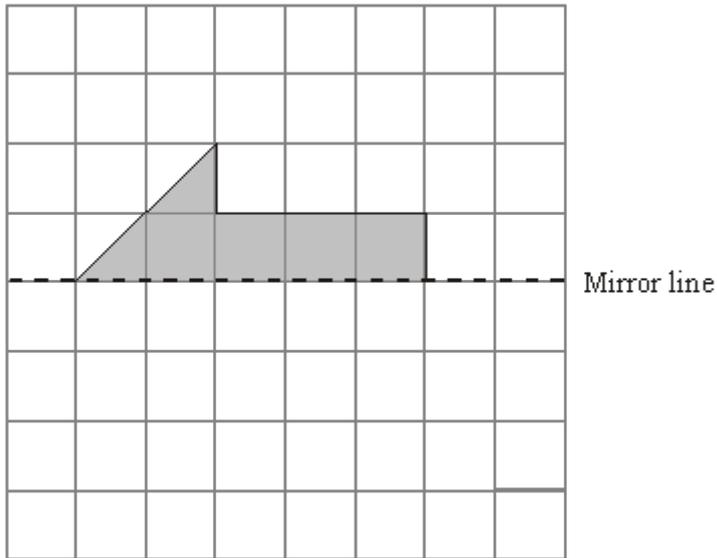


(c) Reflect triangle **Q** in the line $y = x$.

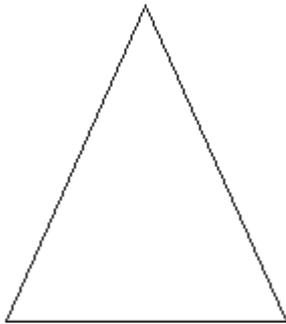
Label the new triangle **C**.

(2)
(Total 5 marks)

Q6.



(a) Reflect the shaded shape in the mirror line.



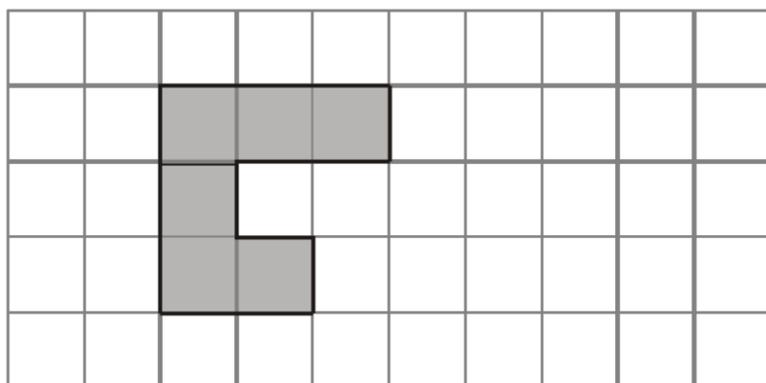
(1)

(b) Draw the line of symmetry on this triangle.

(1)

(Total 2 marks)

Q7.



The shaded shape is drawn on a grid of centimetre squares.

- (a) Find the perimeter of the shaded shape.

..... cm

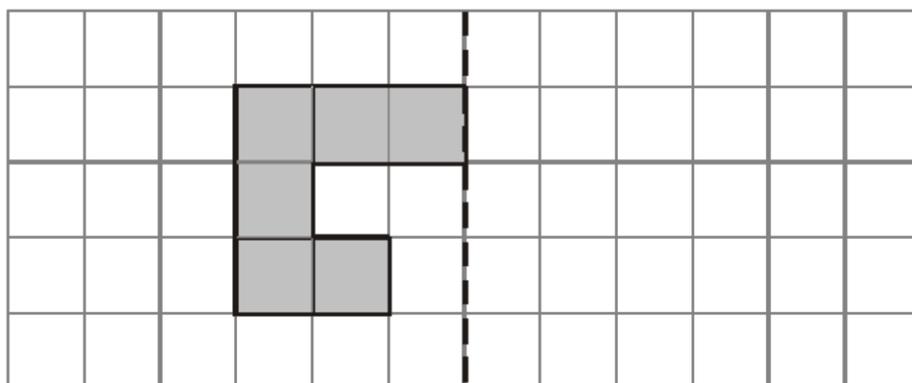
(1)

- (b) Find the area of the shaded shape.

..... cm²

(1)

Mirror Line



- (c) Reflect the shaded shape in the mirror line.

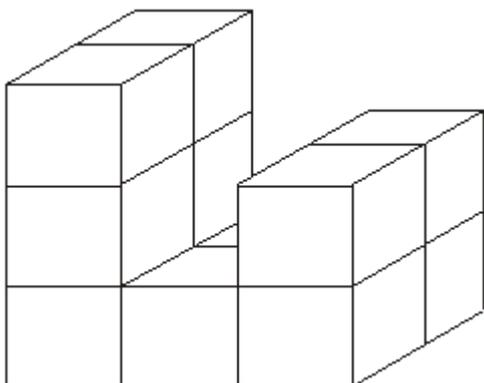


Diagram **NOT** accurately drawn

(1)

Here is a prism made of centimetre cubes.

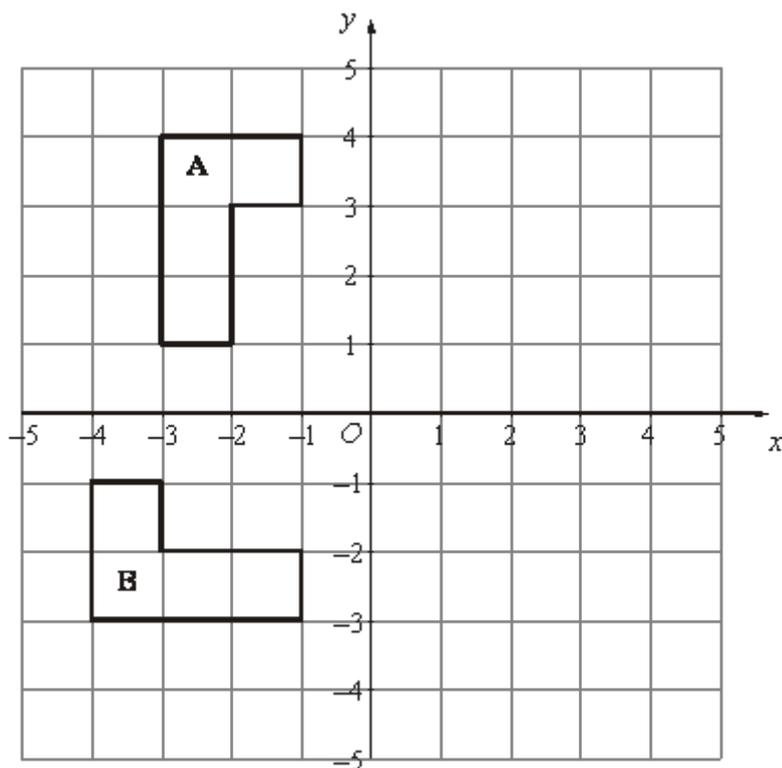
(d) Find the volume of the prism.

..... cm³

(1)

(Total 4 marks)

Q8.



(a) Reflect shape **A** in the y axis.

(2)

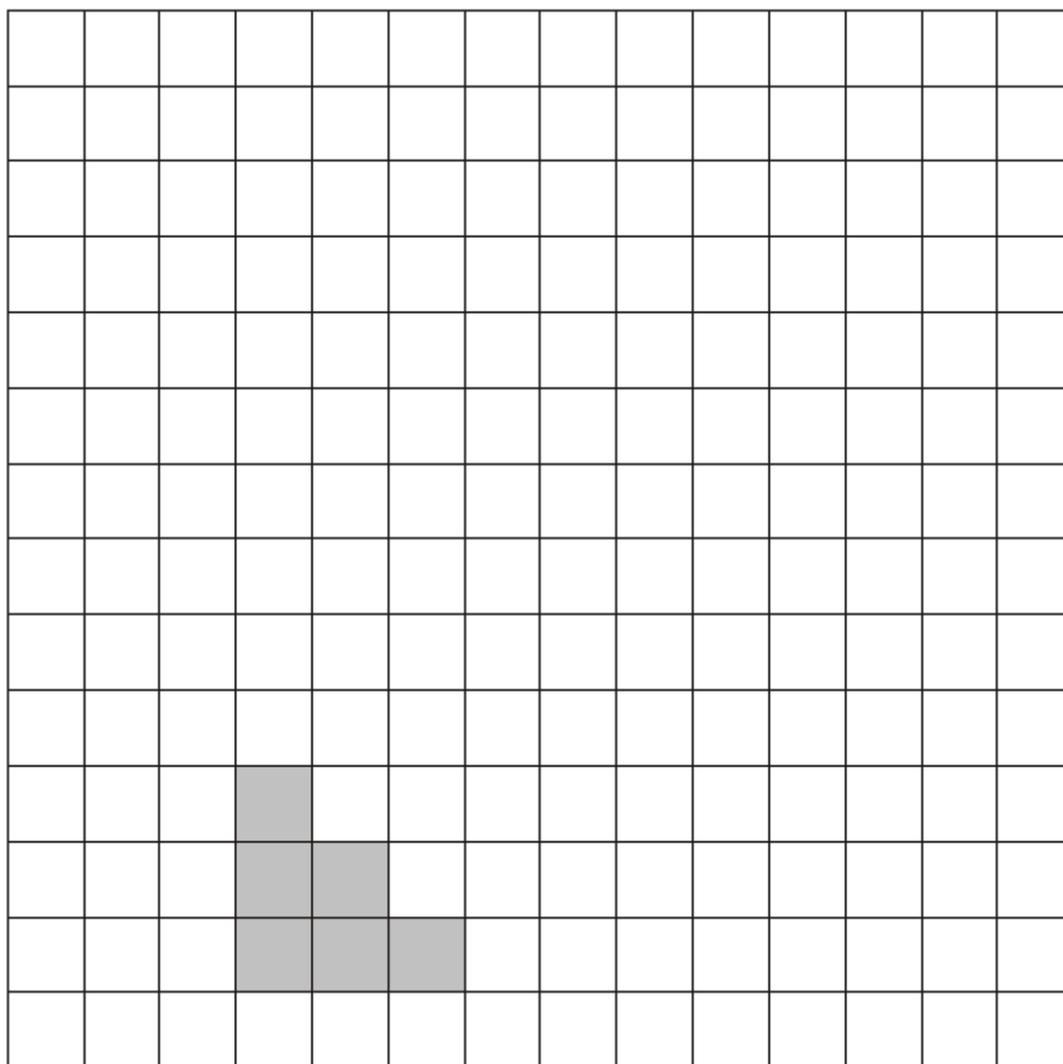
(b) Describe fully the **single** transformation which takes shape **A** to shape **B**.

.....

(3)

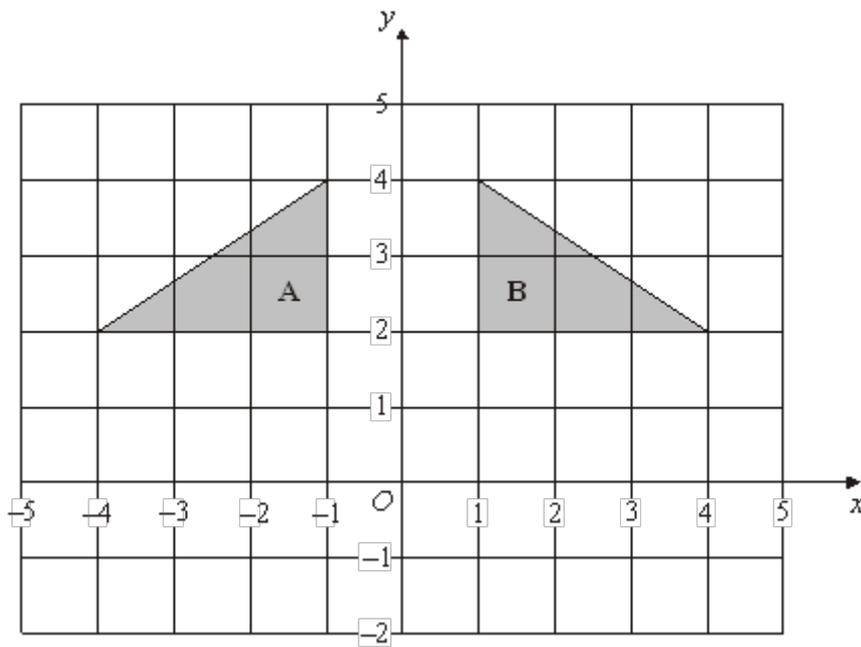
(Total 5 marks)

Q9.



(a) On the grid, draw an enlargement, scale factor 2, of the shaded shape.

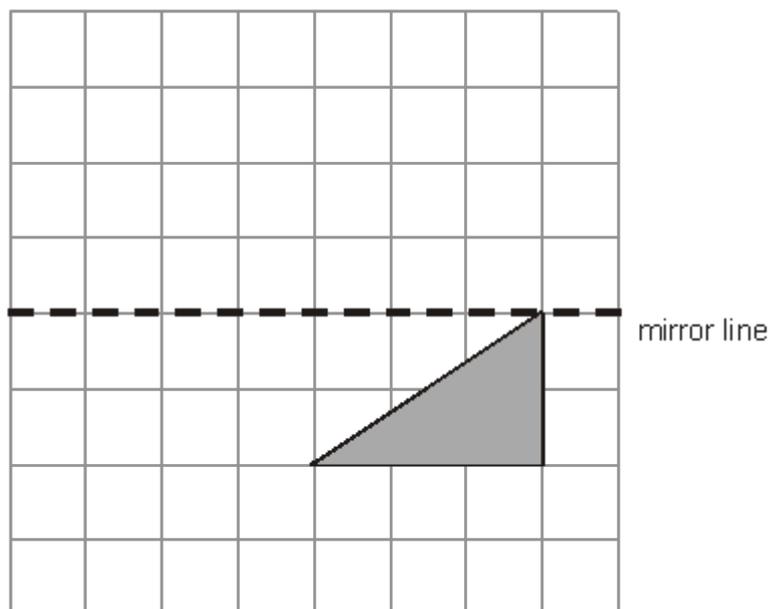
(2)



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

.....

(2)
(Total 4 marks)

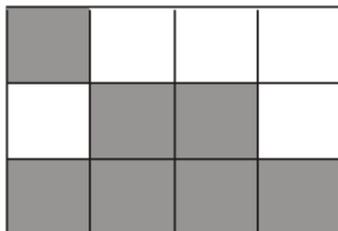


Q10.

- (a) Reflect the shaded shape in the mirror line.

(1)

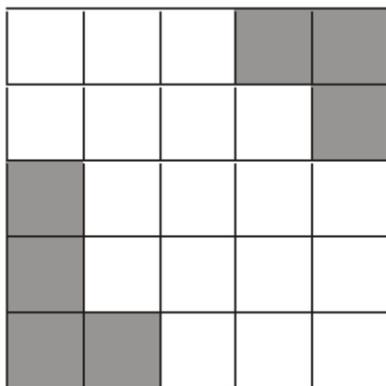
Here is a pattern made with squares.



- (b) Shade one square to make a black and white pattern with only **one** line of symmetry.

(1)

Here is another pattern made with squares.



- (c) Shade **three** more squares to make a pattern with rotational symmetry of order 2.

(1)

(Total 3 marks)

M1.

Answer	Mark	Additional Guidance
Reflection	1	B1 cao
Total for Question: 1 marks		

M2.

	Working	Answer	Mark	Additional Guidance
(a)		Correct reflection	1	B1 cao
(b)		Rotation 180° centre $(-0.5, 1)$	2	B2 for all 3 attributes B1 for any two of the three attributes
Total for Question: 3 marks				

M3.

	Working	Answer	Mark	Additional Guidance
(a)		Vertical and horizontal lines of symmetry only	1	B1 cao (-1 for extra lines drawn)

(b)		B	1	B1 cao
(c)		Eg. Equilateral triangle	2	B2 for any shape satisfying both criteria [B1 for a shape with rotational symmetry of order 3 with no line symmetry]
Total for Question: 4 marks				

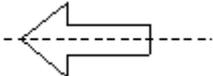
M4.

Working	Answer	Mark	Additional Guidance
B at $(-2, -1)$, $(-4, -1)$, $(-2, -4)$ C at $(4, -1)$, $(6, -1)$, $(4, -4)$	Rotation 180° about $(1, 0)$	3	B1 for rotation B1 for 180° B1 for centre $(1,0)$ OR B1 Enlargement B1 Scale Factor -1 Accept -1 on its own if it is clear candidate is describing an enlargement B1 Centre $(1,0)$ Ignore diagram unless no marks scored, in which case SC B1 for showing both B and C correctly NB Award no marks for the description if more than one transformation is given
Total for Question: 3 marks			

M5.

	Working	Answer	Mark	Additional Guidance
(a)	Triangle A	Triangle with vertices (-1,5), (-1, 3), (3, 3)	2	B2 for triangle with vertices (-1, 5), (-1, 3), (3, 3) (B1 for triangle with correct orientation or for triangle rotated $\pm 90^\circ$ centre (-1, 1))
(b)	Triangle B	Triangle with vertices (1, -2), (5, -2), (5, -4)	1	B1 for triangle with vertices (1, -2), (5, -2), (5, -4)
(c)	Triangle C	Triangle with vertices (1, 1.5), (1, 4), (2, 4)	2	B2 for triangle with vertices (1, 1.5), (1, 4), (2, 4) (B1 for the triangle with correct orientation or for any two of the vertices (1, 1.5), (1, 4), (2, 4)) SC: B1 for a triangle with vertices (1, 1.5), (1, k), (2, k)
Total for Question: 5 marks				

M6.

	Answer	Mark	Additional Guidance
(a)		1	B1 for completed shape cao
(b)		1	B1 for line of symmetry drawn
Total for Question: 2 marks			

M7.

	Answer	Mark	Additional Guidance
(a)	14	1	B1 cao
(b)	6	1	B1 cao
(c)	(Reflection)	1	B1 cao
(d)	12	1	B1 cao
Total for Question: 4 marks			

M8.

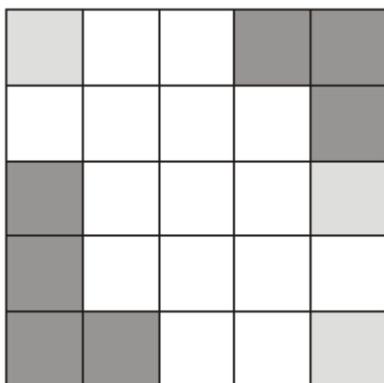
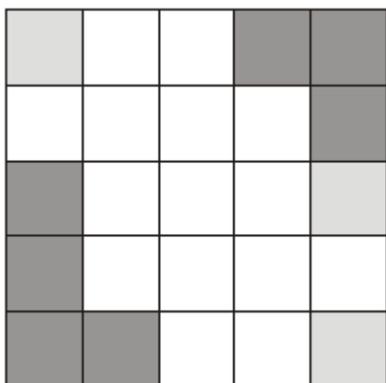
	Answer	Mark	Additional Guidance
(a)		2	B2 correct reflection (B1 correct reflection in the line $x = k$, $k \neq 0$)
(b)	Rotation 90° about the centre (0,0)	3	B1 for rotation B1 for 90° (anticlockwise) or 270 clockwise or $\frac{1}{4}$ turn (anticlockwise) or $\frac{3}{4}$ turn clockwise B1 for (0,0) or O or origin NB: a combination of transformations gets B0
Total for Question: 5 marks			

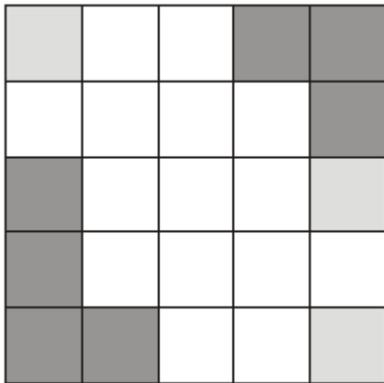
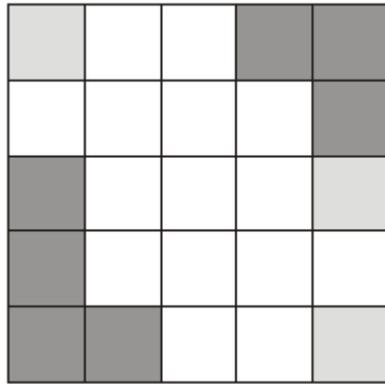
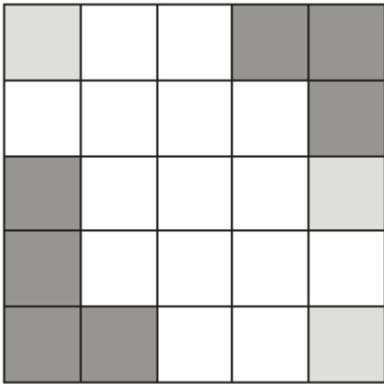
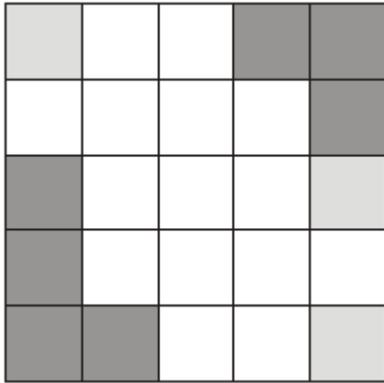
M9.

	Answer	Mark	Additional Guidance
(a)	Correct shape	2	B2 for correct shape; any orientation. (B1 for any two sides correct or all correct for scale factor other than 1 or 2), tolerance to within half square
(b)	Reflection in line $x = 0$	2	B1 for reflection, reflect, reflected. B1 for line $x = 0$ or y -axis NB: more than one transformation should be awarded 0 marks.
Total for Question: 4 marks			

M10.

	Working	Answer	Mark	Additional Guidance
(a)		Correct reflection	1	B1 cao
(b)		Correct square	1	B1 cao
(c)	See pattern at end	Correct square	1	B1 cao
Total for Question: 3 marks				





E1. This was a well answered question with most candidates scoring full marks.

E4. Many candidates could not carry out the transformations correctly. The main error was to reflect the triangle in the y axis followed by a reflection in the line $x = 1$. A different error was to identify the correct axis but to carry out the reflection incorrectly with the image being 2 squares below the x axis instead of the correct 1 unit. A few candidates gave two transformations and consequently gained no marks for the description. Some gave the centre as $(0, 1)$ rather than the correct $(1, 0)$

E5. Foundation

In part (a) most candidates were able to rotate triangle P but frequently this was not about the point $(-1, 1)$. The triangle was often drawn in the correct orientation with one vertex at the centre of rotation. Many candidates rotated by 90° , rather than 180° . Part (b) was answered very poorly indeed. Many candidates could not cope with the vector and the triangle was often moved to the right with one vertex at $(6, -1)$. A significant number of reflections were also seen. Almost half of the candidates reflected the triangle correctly in part (c). A few candidates achieved this by drawing lines perpendicular to the line $y = x$ but most did not show any such lines. Where just one mark was awarded this was usually for drawing the triangle in the correct orientation but in the wrong position. A common error was a reflection in a horizontal line.

Higher

In part (a), about half the candidates were able to score both marks for this question. Common incorrect answers here were based on rotating the triangle about the wrong point, typically $(-1, -1)$ or $(0, 0)$. A smaller number of candidates reflected the triangle in the x -axis or rotated it by only $\pm 90^\circ$. In part (b), a significant number of candidates

did not understand how to interpret the translation vector $\begin{pmatrix} 6 \\ -1 \end{pmatrix}$. Common errors here

were based on incorrect translations, typically $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} -1 \\ 6 \end{pmatrix}$. A small number of candidates reflected the triangle in the y -axis.

E6. Only a few candidates failed to reflect the shaded shape correctly in part (a) and most drew the correct line of symmetry in part (b). Occasionally this line was drawn very carelessly and the mark could not be awarded.

E7. There were many correct responses but a significant number of candidates confused perimeter with area and vice versa, scoring no marks. Around two thirds of the candidates got part (a) correct and/or part (b) correct.

In part (c) nearly all candidates got this correct with a few adding an extra square to give 4 squares in the top row.

In part (d) just under 60% got the correct volume. By far the most common error was to attempt to find the volume by multiplying a height by a width by a length, reaching 18 ($3 \times 3 \times 2$) or even 8 ($2 \times 2 \times 2$).

E8. Foundation

Most candidates (85%) accurately reflected shape A in the y axis. A small proportion attempted rotations or translations instead. Fully correct descriptions of a single transformation in part (b) were rarely seen with only 4% of candidates gaining all 3 marks. Many answers were spoiled by candidates giving a combination of transformations. Where candidates did give a single transformation it was usually a rotation and the angle was often given correctly. Few candidates gave the centre of rotation. Almost 60% of candidates were awarded at least 1 mark for their answer to part (b) of this question. Again, it proved to be a good discriminator.

Higher

Most candidates were able to reflect the given shape correctly in the y -axis in part (a).

In part (b) many candidates failed to score full marks as a result of the omission of one piece of information; usually the centre of rotation.

A significant number of candidates failed to score any marks at all by offering a combination of transformations; usually a rotation followed by a translation.

E9. Specification A**Foundation**

In part (a) there were many correct diagrams drawn and the vast majority of candidates scored at least one mark for drawing a diagram which shows at least two of the sides enlarged correctly. Some gave an enlargement that was scale factor 3. In part (b) performance was much worse. Some recognised this as a reflection, but few stated the line of symmetry. Many appeared to think this was a rotation. Others use common language such as “flipped” or “mirrored” rather than the correct description of “reflection”.

Higher

Part (a) was extremely well answered by candidates, with most scoring full marks. The few mistakes included using a scale factor of 3 instead of 2, or doubling the number of steps rather than increasing their length. Most candidates clearly knew what the transformation was in part (b) and gained the first mark for reflection, but many lacked the skill to describe adequately, using words such as flipped and mirrored. However the second mark was not so readily achieved.

Although the correct answer was probably the most common, some confused the y -axis with the line $y = 0$ or merely called it the y line and a few quoted $y = x$ as their mirror line.

Specification B**Foundation**

Drawing an enlargement using a scale factor of 2 in part (a) produced many all correct diagrams (75%) with a good degree of accuracy, often drawn using a ruler. Some used a scale factor of 3 and this was partially rewarded as was a diagram with two lengths correct using the intended scale factor of 2. The unsure just continued with a step diagram failing to appreciate what was being asked of them.

Part (b) requiring a description of the transformation produced some weird and wonderful ideas. The word 'flip' seemed to dominate despite the fact that it is not a mathematical name used to describe a transformation. The phrase 'mirror image' was ever present along with variations on the same theme. In reality it was a simple 'reflection in the y -axis', both parts being required to obtain full marks. It was extremely disappointing to note how many candidates were not familiar with the term 'reflection' or even related terms such as 'reflect', 'reflected' etc. Over 75% of the candidates failed to score on this question.

Higher

- (a) This was a straightforward question for this tier and consequently very well done.
- (b) It was surprising and disappointing to see so many wrong responses from candidates for this transformations question. Not all candidates could use the vocabulary for the type of transformation correctly, so that 'flip' appeared far too often. Of those that knew the transformation was a reflection the detailed description was often incorrect. This mainly involved an incorrect description of the y -axis as $y = 0$ or referring to the origin so that 'a reflection in O ' or 'reflection by 90° in O ' were often seen so the transformation was being described as a rotation -which of course it could be when referring to 3D.