

Transformations 1 IGCSE Answers

1)	(a)	Triangle drawn with co-ords at (1, 4), (4, 2), (4, 4)	2	SC1 for 2 correct vertices or an enlargement sf $\frac{1}{2}$ with wrong centre
	(b) (i)	$\begin{pmatrix} -8 & -8 & -2 \\ 4 & 8 & 8 \end{pmatrix}$	2	B1 each row
	(ii)	Triangle drawn at (-8, 4), (-8, 8), (-2, 8) ft (i)	2ft	SC1 for 2 correct ft vertices. Can also be correct regardless of (i)
	(iii)	Reflection cao y -axis or $x = 0$ cao	2	B1 Independent of (i) or (ii) Extra transformations lose all marks
	(c) (i)	Translation $\begin{pmatrix} -10 \\ -10 \end{pmatrix}$ o.e.	2	B1 Independent of (i) or (ii) B1 Extra transformations lose all marks
	(ii)	Rotation (0, 0) 90° clockwise oe	3	B1 Extra transformations lose all marks B1 Allow word origin for (0, 0) B1 Allow -90° or 270° (anti-clockwise)
	(d)	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	2	B1 each column
2)	(a) (i)	Triangle with vertices (-4, 4), (-1, 4), (-1, 6)	2	SC1 for translation $\begin{pmatrix} -7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$
	(ii)	Triangle with vertices (1, -3), (1, -6), (3, -6)	2	SC1 two correct vertices or 90° anticlockwise about (0, 0)
	(b) (i)	Reflection only $y = -x$ oe	1	Marks independent but must be single transformation to score any marks
	(ii)	Stretch only x -axis oe invariant (factor) 3	1	Marks independent but must be single transformation to score any marks
	(c) (i)	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$	2	B1 each column
3)	(a)	Triangle drawn , vertices (6, 10), (10, 10), (10, 8)	2	SC1 reflects correctly in $x = 6$
	(b)	Triangle drawn , vertices (2, 8), (6, 8), (6, 10)	2	SC1 for translation $\begin{pmatrix} -4 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$
	(c)	Translation $\begin{pmatrix} 4 \\ -6 \end{pmatrix}$ o.e.	2	B1 All part marks spoiled if extra transformation B1 Indep. Allow other clear forms or words
	(d) (i)	Enlargement (centre) (4, 6) (factor) 0.5	3	B1 All part marks spoiled if extra transformation B1 Indep. B1 Indep.
	(ii)	$\frac{1}{4}$ or 0.25 oe	1	

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4)	(a) (i) Correct translation (see diagram)	2	SC1 for translation by $\begin{pmatrix} -3 \\ k \end{pmatrix}$ or by $\begin{pmatrix} k \\ -2 \end{pmatrix}$
	(ii) Correct reflection (see diagram)	2	SC1 for reflection in $y = -1$
	(b)		
	(ii) Rotation 90° clockwise (1, -1)	1 1 1	Accept -90°
4)	(c)		
	(ii) Rotation, 180° Origin	1 1 1	Accept O or (0,0)
5)	(a) (i) Image at (4, -4), (6, -4), (6, -6), (2, -6)	2	SC1 for reflection in y -axis
	(ii) Image at (-4, -4), (-4, -6), (-6, -6), (-6, -2)	2 ft	SC1 ft if rotated 90° anti-clockwise about (0, 0)
	(iii) Reflection $y = -x$	1 ft 1 ft	ft their Z (name of transformation) independent (full details)
	(b) (i) Image at (2, 2), (3, 2), (3, 3), (1, 3)	2	SC1 for enlargement s.f. 0.5 with correct orientation, different centre or sf - 0.5, centre (0, 0)
(ii) $\begin{pmatrix} 0.5 & 0 \\ 0 & 0.5 \end{pmatrix}$ cao	2	B1 B1 each column	
6)	In any part of part (a) all marks are independent but mention of a second transformation scores 0 out of 3		
(a) (i)	Rotation (centre/about) origin (O) (0,0) 180°	1 1 1	accept R SC3 for all of enlargement, sf - 1, (0, 0)
(ii)	Enlargement (centre/about) (0, -3) SF - 3	1 1 1	accept E
(iii)	Enlargement (centre/about) (0, 6) SF $\frac{1}{3}$	1 1 1	accept E
(b) (i)	image at (-4, -2) (-2, -2) and (-1, 0)	2	SC1 for translation by $\begin{pmatrix} -4 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -5 \end{pmatrix}$, $k \neq 0$
(ii)	image at (-2, 3) (-4, 3) and (-5, 5)	2	SC1 for reflection in $y = -1$

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<p>(a) (i) Correct reflection (1, -1) (4, -1) (4, -3)</p> <p>(ii) Correct rotation (-1, 1) (-1, 4) (-3, 4)</p> <p>(iii) Reflection only</p> <p style="margin-left: 40px;">$y = x$ oe or $y = -x$ oe</p>	<p>2</p> <p>2</p> <p>1dep</p> <p>1</p>	<p>SC1 for reflection in y-axis or vertices only of correct triangle</p> <p>SC1 for rotation 90° clockwise about O or vertices only of correct triangle</p> <p>Two transformations scores 0 Dependent on at least SC1 scored in both (i) and (ii)</p> <p>Only from 2 and 2 or SC1 and SC1 scored Only from 2 and SC1 or SC1 and 2 scored</p>
<p>(b) (i) $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ oe</p> <p>(ii) Rotation, 90° clockwise, origin oe</p>	<p>2</p> <p>2</p>	<p>B1 for either column correct or determinant = 1</p> <p>B1 for rotation and origin B1 for 90° clockwise oe</p>