

Topical Worksheets for Cambridge O LEVEL Mathematics D (4024)

Transformations

Mark Scheme

1st edition, for examination until 2025

- Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	Kite	1			
1(b)(i)	Translation $\begin{pmatrix} 4\\ 9 \end{pmatrix}$	2		B1 for each	
1(b)(ii)	Reflection $x = 0.5$ oe	2		B1 for each	
1(b)(iii)	Rotation 90° clockwise oe [centre] (0, 0) oe	3		B1 for each	
1(c)(i)	(-5, -6)	1	9		
1(c)(ii)	Image at (-5, 0), (-2, 3), (7, 0),(-2, -3)	200		B1 for correct size, wrong position or correct shape with incorrect scale factor	
2(a)	Triangle at $(-4, -4)(-1, -3)(-4, -3)$	2		B1 for correct points not joined or for reflection in any $y = k$ or for reflection in $x = -1$	

Answer	Marks	AO Element	Notes	Guidance
Triangle at (1, 1) (1, 4) (2, 4)	2		B1 for correct points not joined or rotation 90° clockwise around any point or rotation 90° anticlockwise around (0, 0)	
Translation $\begin{pmatrix} 5\\ -6 \end{pmatrix}$	2		B1 for translation or correct vector oe	
Translation $ \begin{pmatrix} -1 \\ -5 \end{pmatrix} $	2		B1 for each	
Correct reflection at (6, 2), (6, 6), (7, 6), (7, 3)	2		B1 for three correct vertices	
Rotation 90° clockwise oe [centre] (0, 0) oe	300		B1 for each	
Enlargement [sf] 0.5 oe [centre] (1, 2)	3		B1 for each	
	Triangle at $(1, 1)$ $(1, 4)$ $(2, 4)$ Triangle at $(1, 1)$ $(1, 4)$ $(2, 4)$ Translation $\begin{pmatrix} 5\\-6 \end{pmatrix}$ Translation $\begin{pmatrix} -1\\-5 \end{pmatrix}$ Correct reflection at $(6, 2), (6, 6), (7, 6), (7, 3)$ Rotation90° clockwise oe[centre] $(0, 0)$ oeEnlargement[sf] 0.5 oe	Triangle at (1, 1) (1, 4) (2, 4) 2 Translation $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ 2 Translation $\begin{pmatrix} -1 \\ -5 \end{pmatrix}$ 2 Correct reflection at (6, 2), (6, 6), (7, 6), (7, 3) 2 Rotation 90° clockwise oe [centre] (0, 0) oe 3 Enlargement [sf] 0.5 oe 3	Triangle at $(1, 1)$ $(1, 4)$ $(2, 4)$ 2Translation $\begin{pmatrix} 5\\ -6 \end{pmatrix}$ 2Translation $\begin{pmatrix} -1\\ -5 \end{pmatrix}$ 2Correct reflection at $(6, 2), (6, 6), (7, 6), (7, 3)$ 2Rotation 90° clockwise oe [centre] (0, 0) oe3Enlargement [sf] 0.5 oe3	Triangle at (1, 1) (1, 4) (2, 4)2B1 for correct points not joined or rotation 90° clockwise around my point or rotation 90° anticlockwise around (0, 0)Translation $\begin{pmatrix} 5\\-6 \end{pmatrix}$ 2B1 for translation or correct vector ocTranslation $\begin{pmatrix} -1\\-5 \end{pmatrix}$ 2B1 for translation or correct vector ocCorrect reflection at (6, 2), (6, 6), (7, 6), (7, 3)2B1 for three correct verticesRotation 90° clockwise oe [centre] (0, 0) oc33Enlargement [sf] 0.5 oc3B1 for each

Question	Answer	Marks	AO Element	Notes	Guidance
4(b)(i)	Triangle at (3, 2) (1, 5) (1, 2)	2		B1 for translation of $\begin{pmatrix} 6 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$	
4(b)(ii)	Triangle at $(-3, -2)(-5, -2)$ (-5, -5)	2		B1 for reflection in $y = k$ or $x = 1$	
5(a)	Rotation 90° clockwise oe (1, 0)	3		B1 for each	
5(b)	Enlargement -2 (0, 2)	3	31	B1 for each	
6(a)	Trapezium	1			
6(b)(i)	16 or 15.8 to 16.2	G			
6(b)(ii)	14	0,1			
6(c)(i)	Translation $ \begin{pmatrix} -9 \\ -8 \end{pmatrix} $	2		B1 for each	
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Question	Answer	Marks	AO Element	Notes	Guidance
6(c)(ii)	Rotation 90° clockwise oe [about] (0, 0) oe	3		B1 for each	
6(d)(i)	Correct shape Vertices (-1, 4), (-1, 6), (-5, 6), (-5, 1)	2		B1 for reflection in $x = k$ or $y = 1$	
6(d)(ii)	Correct shape Vertices (3, 0.5), (3, 3), (1, 3), (1, 2)	2		B1 for any enlargement, SF $\frac{1}{2}$ with different centre	
7(a)	Rotation [centre] (0, 0) oe 90[°] clockwise oe	3	0	B1 for each	
7(b)	Enlargement [centre] (5, -7) [sf =] 3	3		B1 for each	
7(c)	Correct shape plotted with points $(6, -1) (8, -1) (6, -3) (8, -3)$ (6, -5)	2		B1 for a correct translation of $\begin{pmatrix} 3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$	
7(d)	Correct shape plotted with points (-2, 5) (-6, 5) (-2, 7) (-4, 5) (-4, 7)	2		B1 for reflection in $y = k$ or $x = 1$	

8(a)(i) 16 1 Image: constraint of the stress of the	Question	Answer	Marks	AO Element	Notes	Guidance
$8(b)(i)$ $(5,2)$ 1 $(-5,2)$ 1 $8(b)(ii)A$ $(-5,2)$ 1 $(-5,2)$ $(-5,2)$ $8(b)(ii)B$ $(5,10)$ 2 $(-5,k) \text{ or } (7,2)$ $8(b)(iii)$ $\begin{pmatrix} 44\\ -14 \end{pmatrix}$ 2 $(-14)^{-14}$ $(-14)^{-14}$ $(-14)^{-14}$ $(-14)^{-14}$ $(-14)^{-14}$ $(-14)^{-14}$ $(-14)^{-14}$ $(-12)^{-1}$ $(-12)^{-$	8(a)(i)	16	1			
8(b)(ii)A(-5, 2)18(b)(ii)B(5, 10)2B1 for $(5, k)$ or $(7, 2)$ 8(b)(iii) $\begin{pmatrix} 44 \\ -14 \end{pmatrix}$ 2FT their (b)(i)8(b)(iii) $\begin{pmatrix} 44 \\ -14 \end{pmatrix}$ 00 $r \begin{pmatrix} 49 - their5 \\ k \end{pmatrix}$ 00 $r \begin{pmatrix} k \\ -14 \end{pmatrix}$ 008(c)(i)Enlargement3B1 for each	8(a)(ii)	12	1		0	
8(b)(ii)B(5, 10)2B1 for $(5, k)$ or $(7, 2)$ 8(b)(iii) $\begin{pmatrix} 44 \\ -14 \end{pmatrix}$ 2FT their (b)(i)B1 for $\begin{pmatrix} 44 \\ k \end{pmatrix}$ B1 for $\begin{pmatrix} 44 \\ k \end{pmatrix}$ or $\begin{pmatrix} 49 - their5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -14 \end{pmatrix}$ 8(c)(i)Enlargement3B1 for each	8(b)(i)	(5, 2)	1		0	
8(b)(iii) $\begin{pmatrix} 44\\ -14 \end{pmatrix}$ 2FT their (b)(i)B1 for $\begin{pmatrix} 44\\ k \end{pmatrix}$ or $\begin{pmatrix} 49 - their5\\ k \end{pmatrix}$ or $\begin{pmatrix} 49 - their5\\ k \end{pmatrix}$ or $\begin{pmatrix} k\\ -14 \end{pmatrix}$ or $\begin{pmatrix} k\\ -14 \end{pmatrix}$ or $\begin{pmatrix} k\\ -12 - their2 \end{pmatrix}$ 8(c)(i)Enlargement3B1 for each	8(b)(ii)A	(-5, 2)	1			
$\begin{pmatrix} 1 \\ -14 \end{pmatrix}$ $B1 \text{ for } \begin{pmatrix} 44 \\ k \end{pmatrix}$ $or \begin{pmatrix} 49 - their5 \\ k \end{pmatrix}$ $or \begin{pmatrix} k \\ -14 \end{pmatrix}$ $or \begin{pmatrix} k \\ -12 - their2 \end{pmatrix}$ $8(c)(i)$ Enlargement 3 $B1 \text{ for each}$	8(b)(ii)B	(5, 10)	2		B1 for (5, <i>k</i>) or (7, 2)	
	8(b)(iii)	$\begin{pmatrix} 44\\ -14 \end{pmatrix}$	2		B1 for $\begin{pmatrix} 44\\k \end{pmatrix}$ or $\begin{pmatrix} 49-their5\\k \end{pmatrix}$ or $\begin{pmatrix} k\\-14 \end{pmatrix}$	
(SF) 0.5 0e (centre) (-3, 1)	8(c)(i)	(SF) 0.5 oe	3		B1 for each	

Question	Answer	Marks	AO Element	Notes	Guidance
8(c)(ii)	Rotation	3		B1 for each	
	180°				
	(centre) (4, 8)			LO .	
9(a)	Image at (1, 7), (4, 7), (4, 9), (3, 9)	2	5	B1 for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$	
9(b)	Image at (5, 3), (6, 3), (8, 5), (5, 5)	2	10	B1 for 180° rotation with wrong centre	
9(c)	Rotation 180° (4.5, 6) OR	3	an	B1 for rotation B1 for 180° B1FT for centre from <i>their</i> (a)	
	Enlargement [factor] –1 (4.5, 6)	00		B1 for enlargement B1 for -1 B1FT for centre from <i>their</i> (a)	
10	Image at (1, 2), (1, 5), (3, 5), (3, 4)	2		B1 for $y = x$ drawn or for 3 correct points	
					[Total: 82]
