



THIRD SPACE
LEARNING

Diagnostic Questions

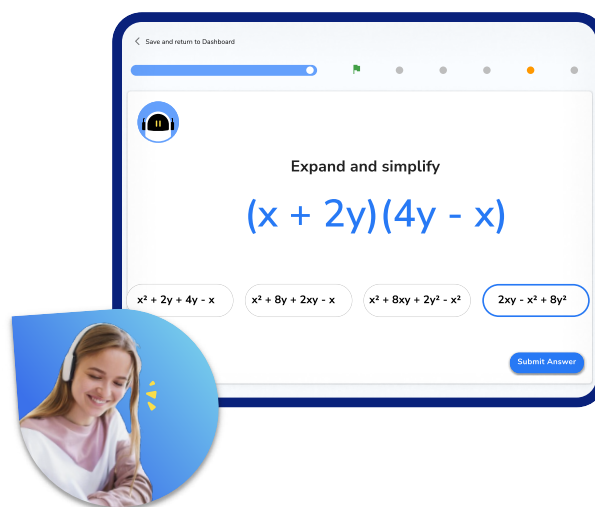
Transformations | Geometry & Measure

This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **transformations** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

How to use the questions in this resource

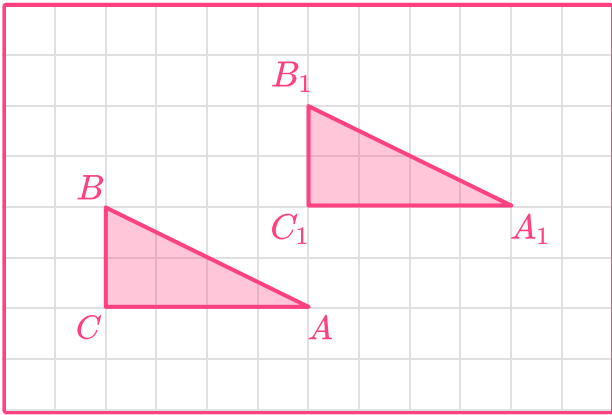
There are 20 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Horizontal and vertical components of vectors**, **Enlargement in a single direction**, **Orientation**, and **Use of negatives**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

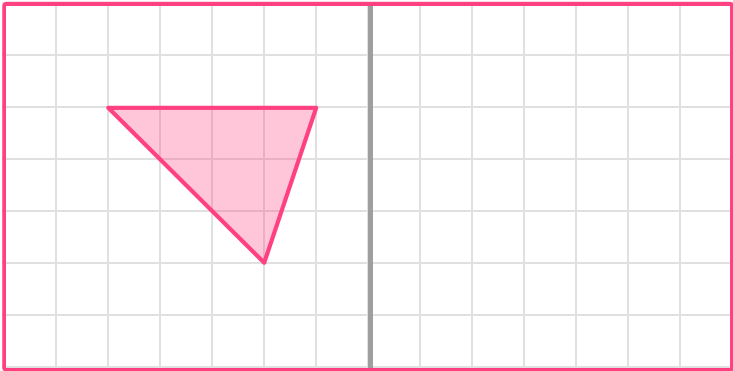
Diagnostic Questions: Transformations

1. What type of transformation maps ABC to $A_1B_1C_1$?



A) Reflection	B) Rotation
C) Translation	D) Enlargement

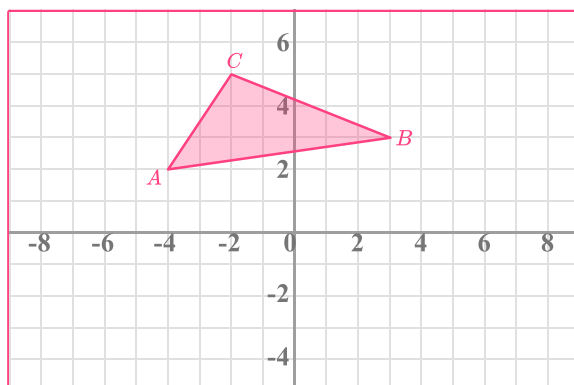
2. Select the correct reflection across the mirror line:



A)	B)
C)	D)

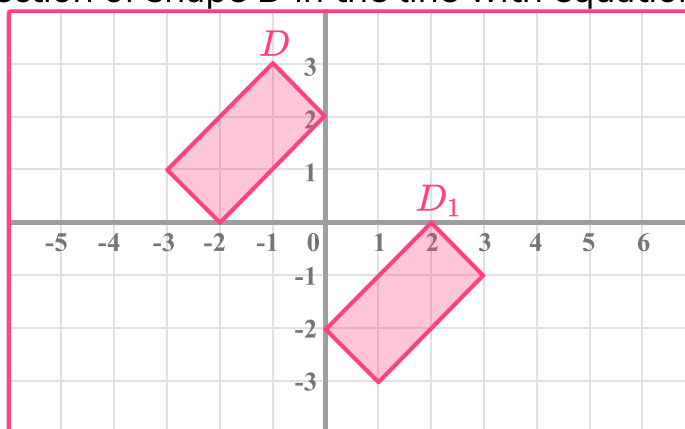
Diagnostic Questions: Transformations

3. Shape ABC is reflected in the line $y = 1$ to produce the image A'B'C'. What are the coordinates of C'?



A) (-2, -3)	B) (-2, -5)
C) (4, 5)	D) (-3, -2)

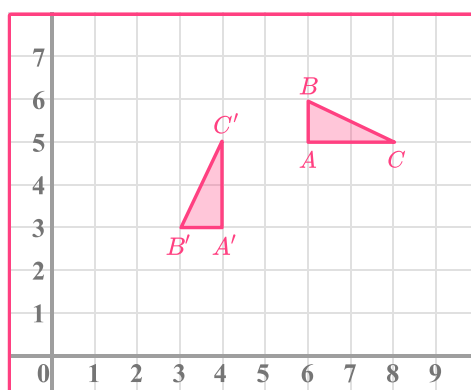
4. Shape D_1 is a reflection of shape D in the line with equation...



A) $y = -x$	B) $y = 0$
C) $y = 2x$	D) $y = x$

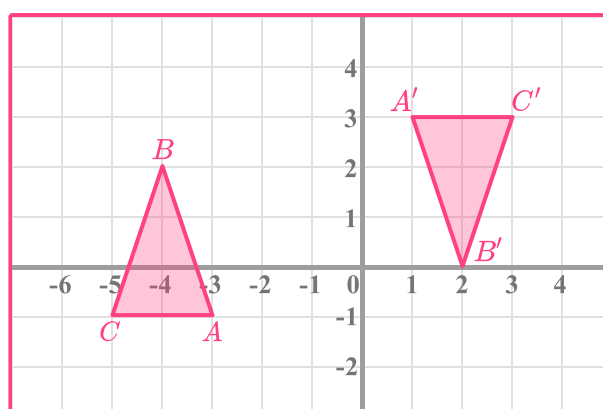
Diagnostic Questions: Transformations

5. The transformation that takes ABC to $A'B'C'$ is a clockwise rotation about the point $(6, 3)$. What is the angle of rotation?



A) 90°	B) 270°
C) 300°	D) 180°

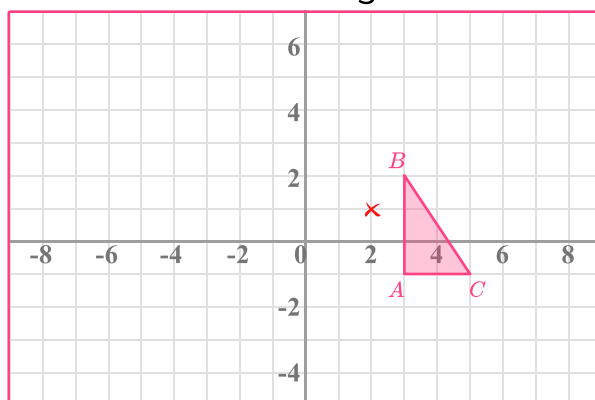
6. The transformation that maps ABC to $A'B'C'$ is a 180° rotation. Where is the centre of rotation?



A) $(-1, 1)$	B) $(1, 1)$
C) $(-1, -1)$	D) $(0, 0)$

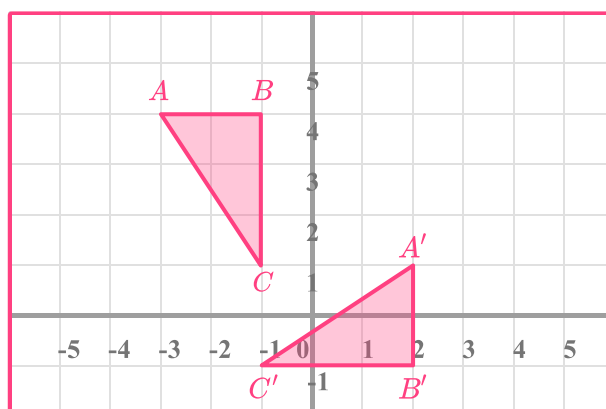
Diagnostic Questions: Transformations

7. Shape ABC is transformed by a 90° anti-clockwise rotation about the point (2, 1). Determine the coordinates of A' of the image:



A) (5, 2)	B) (0, 0)
C) (4, 2)	D) (4, 4)

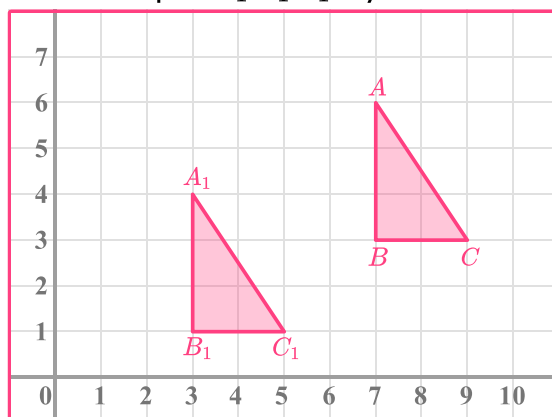
8. Triangle ABC is transformed to A'B'C' by a 90° clockwise rotation. Where is the centre of rotation?



A) (-1, 0)	B) (-2, 0)
C) (0, 0)	D) (-1, 1)

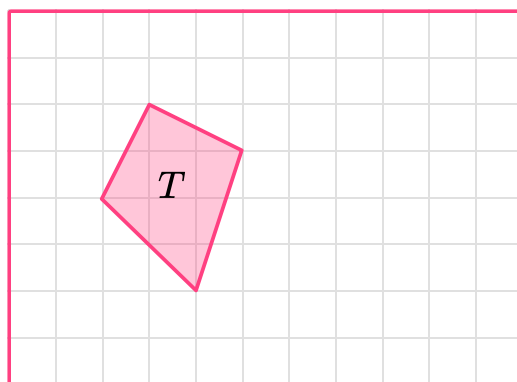
Diagnostic Questions: Transformations

9. Shape ABC is translated to shape $A_1B_1C_1$ by which vector?



A) $\begin{pmatrix} -6 \\ -5 \end{pmatrix}$	B) $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$
C) $\begin{pmatrix} -4 \\ -2 \end{pmatrix}$	D) $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$

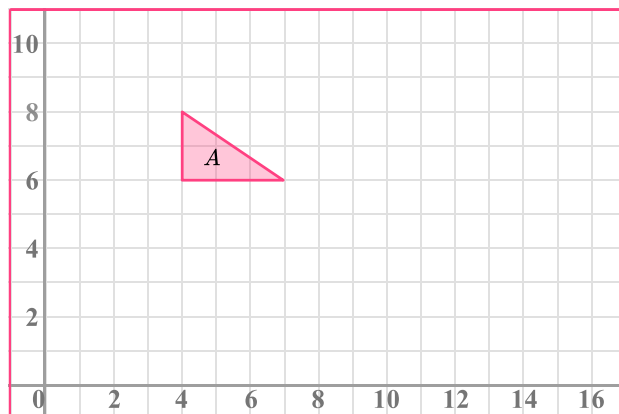
10. Shape T is translated by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ to produce the image T'. Which vector translates T' onto T?



A) $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$	B) $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$
C) $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$	D) $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$

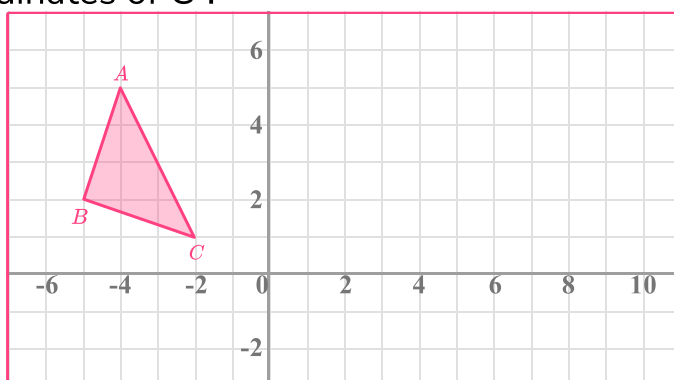
Diagnostic Questions: Transformations

11. Shape A is translated to shape B using vector $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$; shape B is translated to shape C using vector $\begin{pmatrix} -6 \\ -5 \end{pmatrix}$. What vector maps A to C?



A) $\begin{pmatrix} -1 \\ -4 \end{pmatrix}$	B) $\begin{pmatrix} 11 \\ 6 \end{pmatrix}$
C) $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$	D) $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$

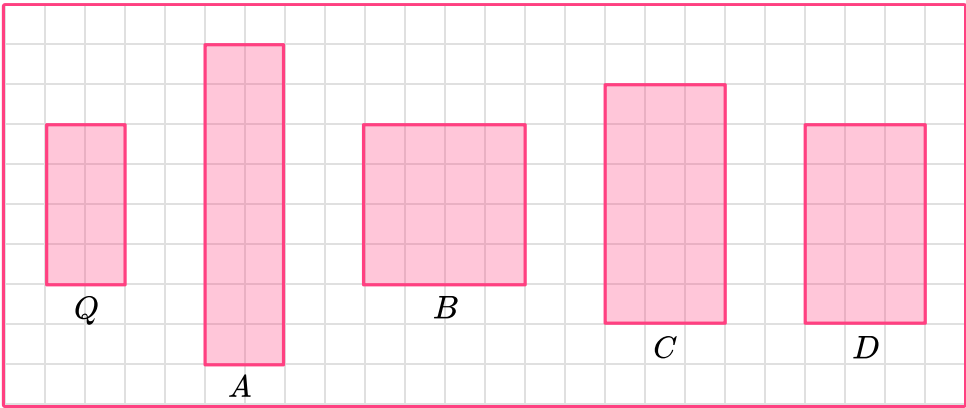
12. Triangle ABC is translated by the vector $\begin{pmatrix} 7 \\ -3 \end{pmatrix}$ to produce the image A'B'C'. What are the coordinates of C'?



A) (8, -6)	B) (5, 4)
C) (5, -2)	D) (4, -2)

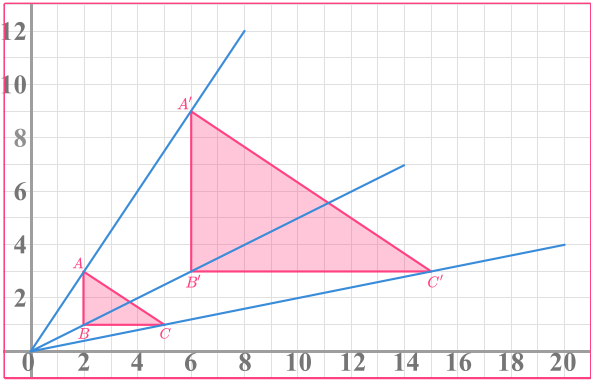
Diagnostic Questions: Transformations

13. Which shape is a correct enlargement of shape Q?



A) A	B) B
C) C	D) D

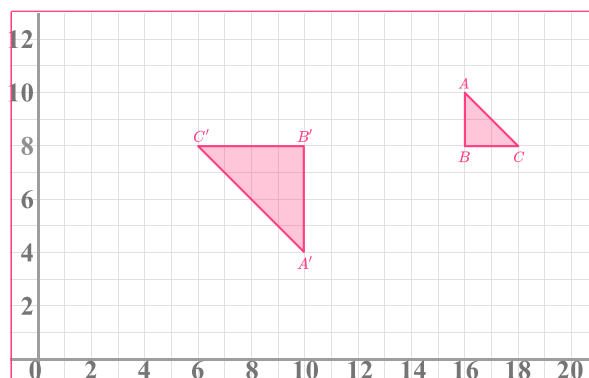
14. Shape A'B'C' is the image of a transformation on ABC. The transformation is an enlargement with centre (0, 0). What is the scale factor of the enlargement?



A) 2	B) 3
C) 9	D) 2.5

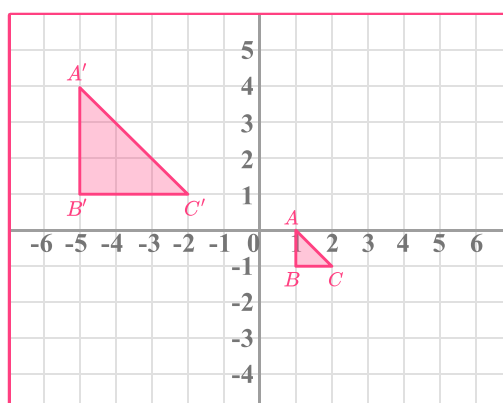
Diagnostic Questions: Transformations

15. For the following transformation, determine the scale factor and centre of enlargement that takes ABC to A'B'C':



A) SF = -2, Centre (14, 8)	B) SF = -3, Centre (14, 8)
C) SF = -2, Centre (26, 11)	D) SF = 2, Centre (14, 8)

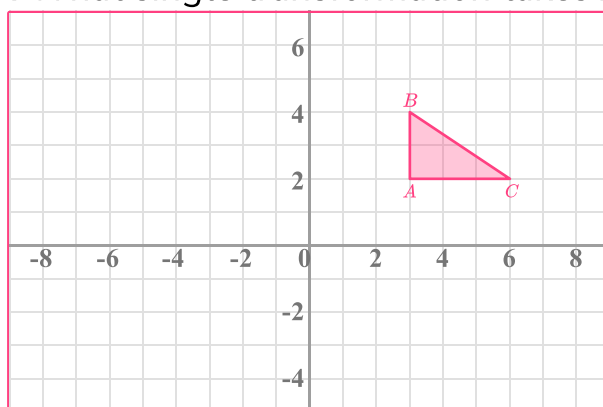
16. Triangle A'B'C' is an enlargement of triangle ABC. What is the coordinate of the centre of enlargement?



A) (4, 2)	B) (-1.5, -0.5)
C) (2, -1)	D) (4, -2)

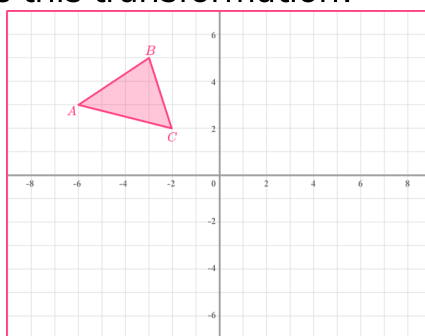
Diagnostic Questions: Transformations

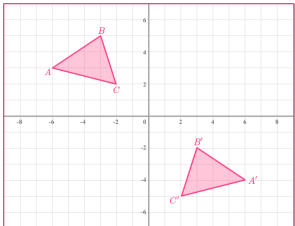
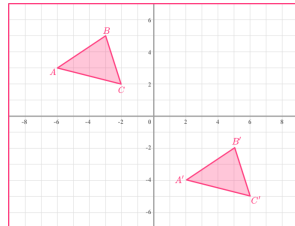
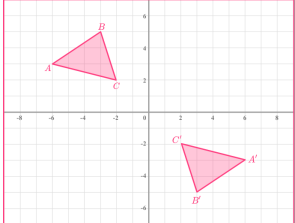
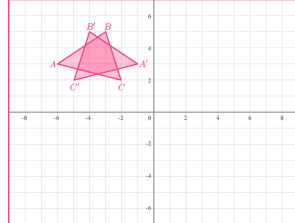
17. Triangle ABC is rotated 180° about the origin, then reflected in the x -axis to produce image $A'B'C'$. What single transformation takes ABC to $A'B'C'$?



A) 180° rotation about (0, 3)	B) Reflection in x - axis
C) Reflection in y - axis	D) Identity

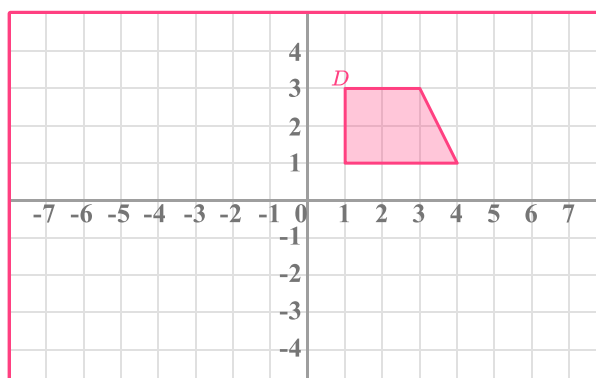
18. Triangle ABC is reflected in the y - axis and then translated by the vector $\begin{pmatrix} 0 \\ -7 \end{pmatrix}$. Which diagram represents this transformation?



<p>A)</p> 	<p>B)</p> 
<p>C)</p> 	<p>D)</p> 

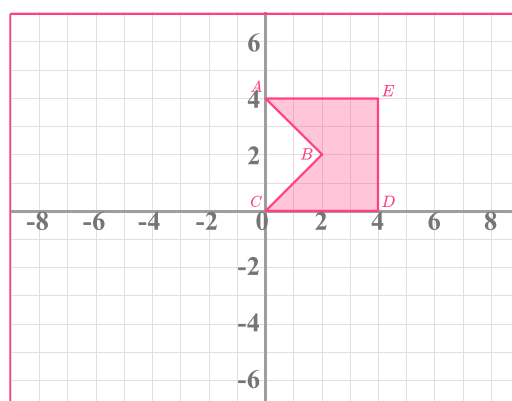
Diagnostic Questions: Transformations

19. Shape D is transformed so that exactly one point is invariant.
Which transformation could have been used?



A) Reflection in the line $y = x$	B) Enlargement by scale factor 3, centre (1, 1)
C) Rotation of 180° about the origin	D) Reflection in the line $x = 1$

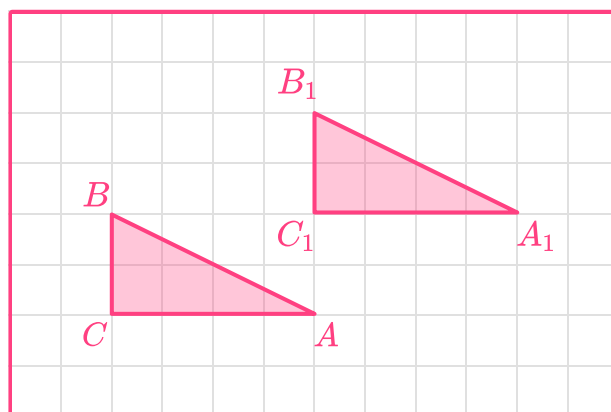
20. Shape ABCDE is transformed such that a line of points is invariant.
Which transformation could have been used?



A) Reflection in the y - axis	B) 180° rotation about the origin
C) Reflection in the x - axis	D) Enlargement, SF 2, Centre (2, 2)

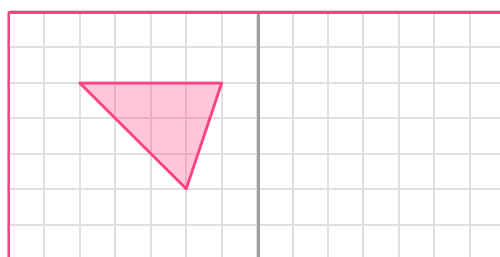
Diagnostic Questions: Transformations Answers

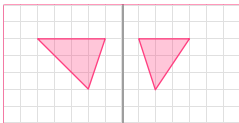
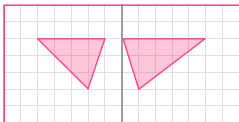
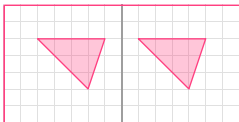
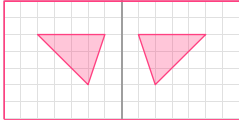
1. What type of transformation maps ABC to $A_1B_1C_1$?



- A) Reflection Student does not understand that reflection can change the orientation of a triangle
- B) Rotation Student does not understand that rotation can change the orientation of a triangle
- C) Translation **Correct answer**
- D) Enlargement Student does not understand that an enlargement changes the size of an object

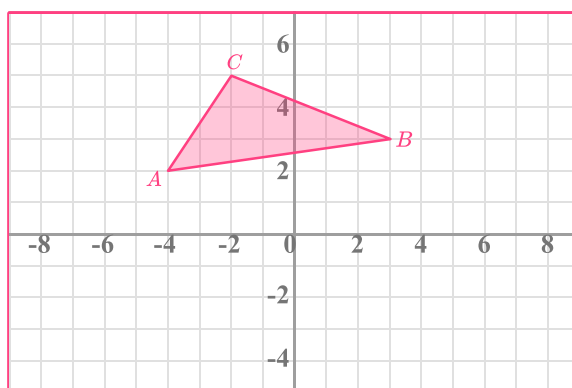
2. Select the correct reflection across the mirror line:



- A)  Student did not measure the perpendicular distance of one point correctly from the line of reflection
- B)  Student does not understand that vertices must be the same perpendicular distance away from the line of reflection
- C)  Student incorrectly performed a translation
- D)  **Correct answer**

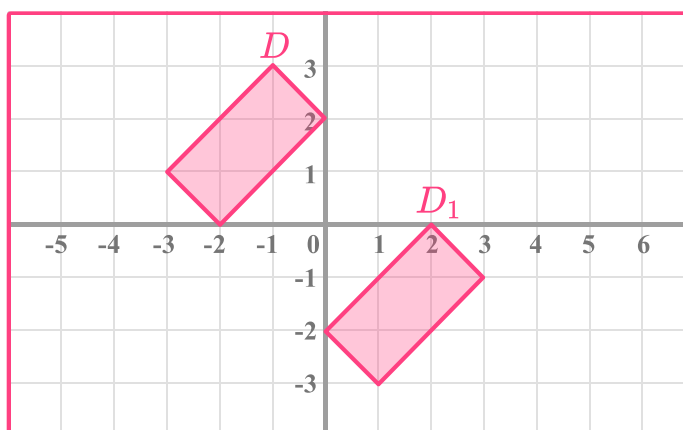
Diagnostic Questions: Transformations Answers

3. Shape ABC is reflected in the line $y = 1$ to produce the image A'B'C'. What are the coordinates of C'?



- A) (-2, -3) Correct answer
 B) (-2, -5) Student reflected across the x -axis
 C) (4, 5) Student reflected across the line $x = 1$
 D) (-3, -2) Student confused ordering of values of the coordinates

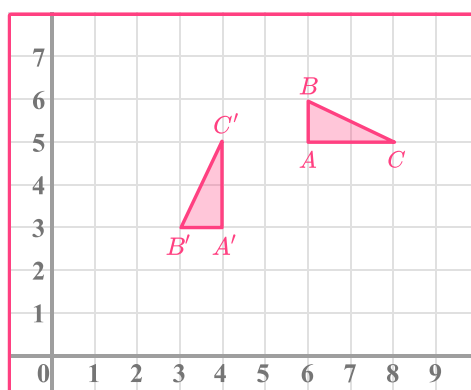
4. Shape D_1 is a reflection of shape D in the line with equation...



- A) $y = -x$ Student chose line creating reflection symmetry in each shape
 B) $y = 0$ Student only considered points on the x -axis
 C) $y = 2x$ Student assumed x - and y -intercepts gave equation of line
 D) $y = x$ Correct answer

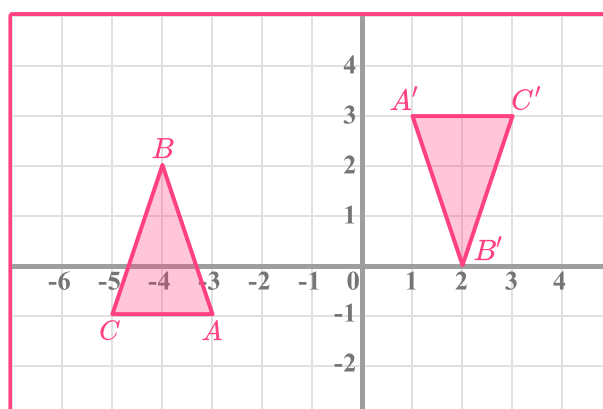
Diagnostic Questions: Transformations Answers

5. The transformation that takes ABC to A'B'C' is a clockwise rotation about the point (6, 3). What is the angle of rotation?



- A) 90° Student considered the anti-clockwise rotation
 B) 270° Correct answer
 C) 300° Student thought there were 100° in a quarter turn
 D) 180° Student did not fully consider the orientation of the shape

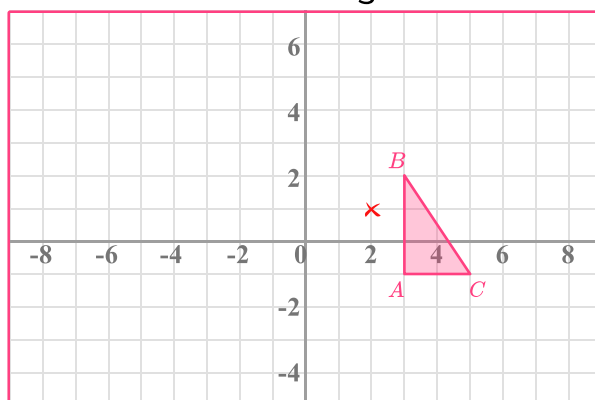
6. The transformation that maps ABC to A'B'C' is a 180° rotation. Where is the centre of rotation?



- A) (-1, 1) Correct answer
 B) (1, 1) Student forgot the negative sign for the x -value
 C) (-1, -1) Student placed the centre of rotation in the wrong quadrant
 D) (0, 0) Student assumed the rotation was about the origin

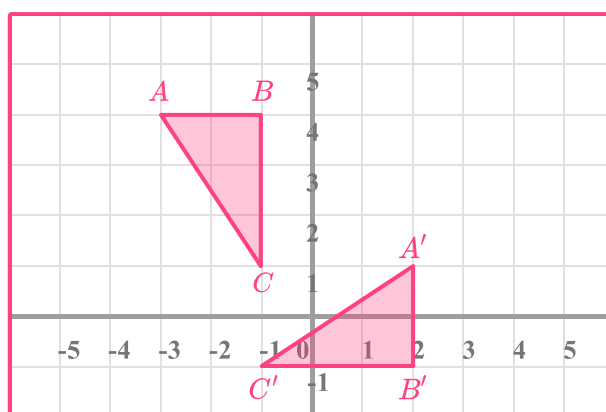
Diagnostic Questions: Transformations Answers

7. Shape ABC is transformed by a 90° anti-clockwise rotation about the point (2, 1). Determine the coordinates of A' of the image:



- A) (5, 2) Student did not centre the rotation correctly
- B) (0, 0) Student performed clockwise rotation
- C) (4, 2) Correct answer
- D) (4, 4) Student gave coordinates of C'

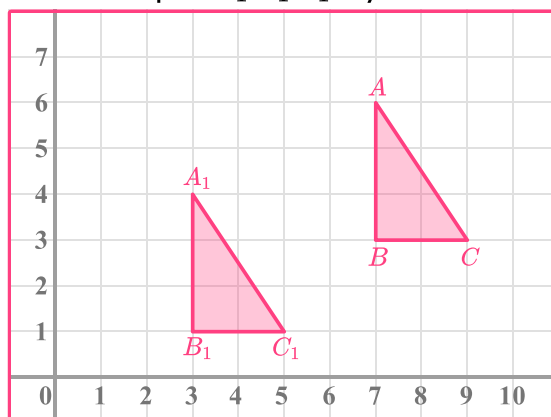
8. Triangle ABC is transformed to A'B'C' by a 90° clockwise rotation. Where is the centre of rotation?



- A) (-1, 0) Student chose the point equidistant from C and C'
- B) (-2, 0) Correct answer
- C) (0, 0) Student assumed all rotations are about the origin
- D) (-1, 1) Student considered orientation but not location

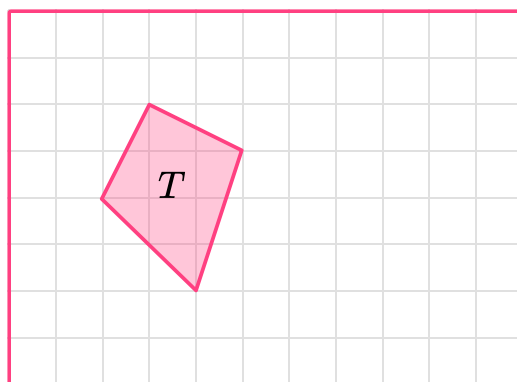
Diagnostic Questions: Transformations Answers

9. Shape ABC is translated to shape $A_1B_1C_1$ by which vector?



- A) $\begin{pmatrix} -6 \\ -5 \end{pmatrix}$ Student considered the extremities of each shape, not corresponding points
- B) $\begin{pmatrix} -2 \\ -4 \end{pmatrix}$ Student confused horizontal and vertical components
- C) $\begin{pmatrix} -4 \\ -2 \end{pmatrix}$ Correct answer
- D) $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$ Student translated $A_1B_1C_1$ to ABC

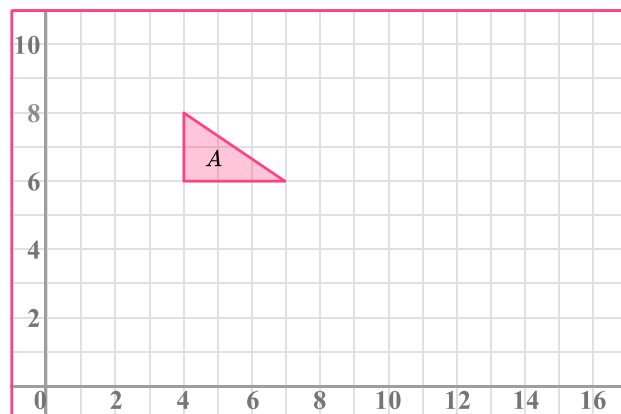
10. Shape T is translated by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ to produce the image T'. Which vector translates T' onto T?



- A) $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ Student interchanged horizontal and vertical components
- B) $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ Student restated the vector translating T to T'
- C) $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ Student reversed only the horizontal component
- D) $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ Correct answer

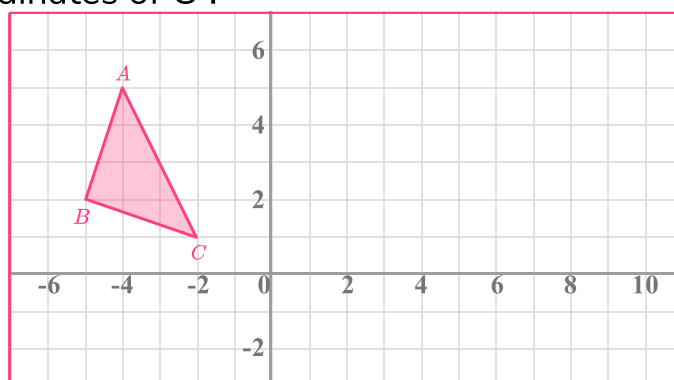
Diagnostic Questions: Transformations Answers

Shape A is translated to shape B using vector $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$; shape B is translated to shape C using vector $\begin{pmatrix} -6 \\ -5 \end{pmatrix}$. What vector maps A to C?



- A) $\begin{pmatrix} -1 \\ -4 \end{pmatrix}$ Correct answer
- B) $\begin{pmatrix} 11 \\ 6 \end{pmatrix}$ Student made errors adding negative numbers
- C) $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$ Student gave the vector translating C to A
- D) $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$ Student made errors adding negative numbers

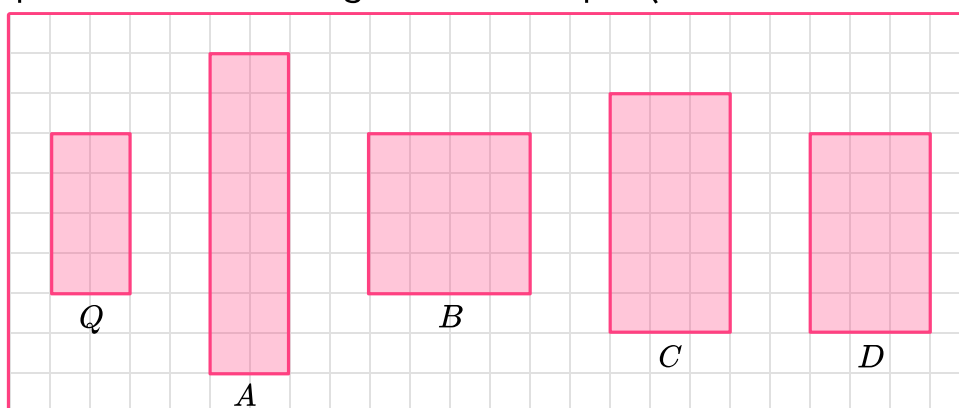
12. Triangle ABC is translated by the vector $\begin{pmatrix} 7 \\ -3 \end{pmatrix}$ to produce the image A'B'C'. What are the coordinates of C'?



- A) (8, -6) Student did not translate using corresponding vertices
- B) (5, 4) Student translated “up” rather than “down”
- C) (5, -2) Correct answer
- D) (4, -2) Student miscounted the horizontal translation

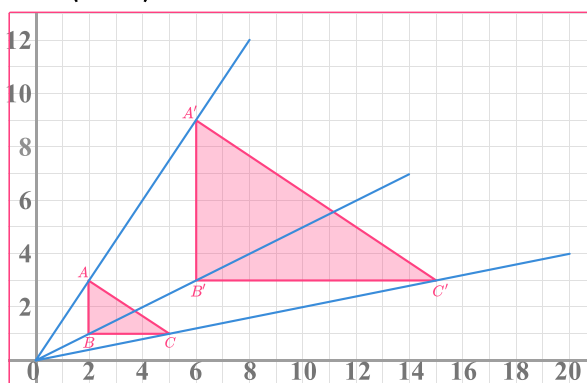
Diagnostic Questions: Transformations Answers

13. Which shape is a correct enlargement of shape Q?



- A) A Student doubled vertical dimension only
- B) B Student doubled horizontal dimension only
- C) C Correct answer
- D) D Student did not increase the length and width in same proportion

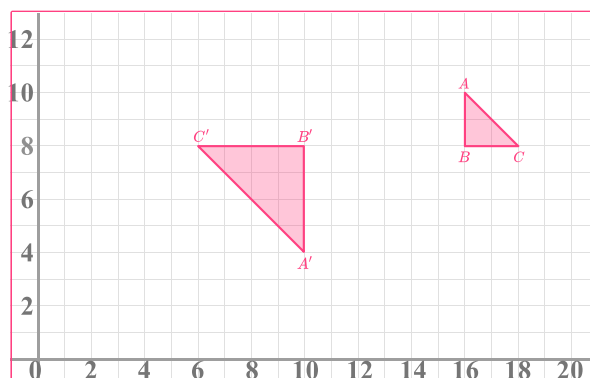
14. Shape A'B'C' is the image of a transformation on ABC. The transformation is an enlargement with centre (0, 0). What is the scale factor of the enlargement?



- A) 2 Student compared distance (0,0) to A with A to A'
- B) 3 Correct answer
- C) 9 Student gave area scale factor, not linear scale factor
- D) 2.5 Student made an error performing division

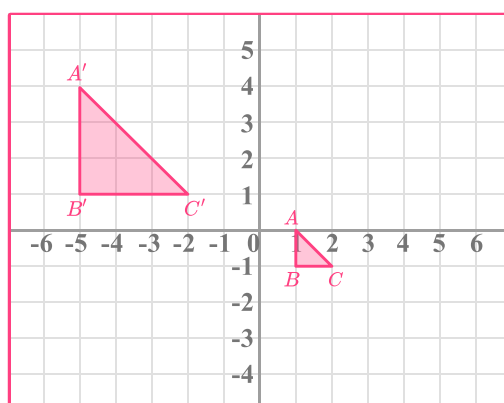
Diagnostic Questions: Transformations Answers

15. For the following transformation, determine the scale factor and centre of enlargement that takes ABC to A'B'C':



- A) SF = -2, Centre (14, 8) **Correct answer**
 B) SF = -3, Centre (14, 8) Student worked out SF incorrectly
 C) SF = -2, Centre (26, 11) Student did not use corresponding vertices to determine the CoE
 D) SF = 2, Centre (14, 8) Student forgot to include the negative sign of the SF

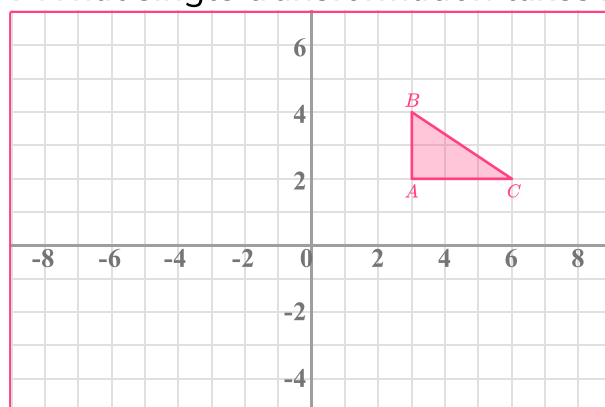
16. Triangle A'B'C' is an enlargement of triangle ABC. What is the coordinate of the centre of enlargement?



- A) (4, 2) Student forgot to include the sign of the y -value
 B) (-1.5, -0.5) Student attempted to use a point inside ABC
 C) (2, -1) Student assumed centre of enlargement was a vertex of ABC
 D) (4, -2) **Correct answer**

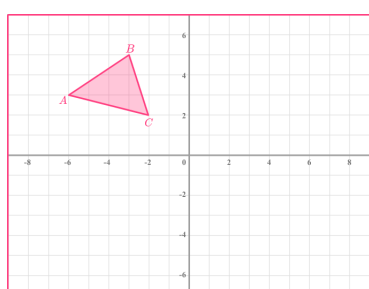
Diagnostic Questions: Transformations Answers

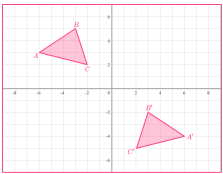
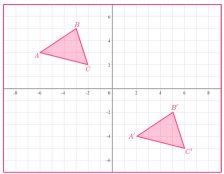
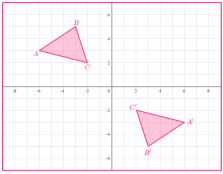
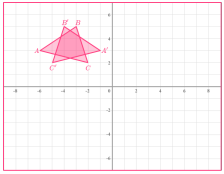
17. Triangle ABC is rotated 180° about the origin, then reflected in the x -axis to produce image $A'B'C'$. What single transformation takes ABC to $A'B'C'$?



- A) 180° rotation about (0, 3) Student has image in wrong orientation
 B) Reflection in x – *axis* Student reflected in wrong axis after rotating
 C) Reflection in y – *axis* Correct answer
 D) Identity Student performed 180° rotation twice to map image back onto object

18. Triangle ABC is reflected in the y – *axis* and then translated by the vector $\begin{pmatrix} 0 \\ -7 \end{pmatrix}$. Which diagram represents this transformation?

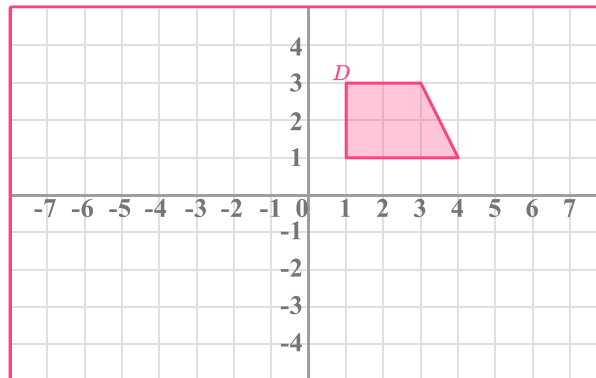


<p>A)</p> 	<p>B)</p> 
<p>C)</p> 	<p>D)</p> 

- A) Correct answer
 B) Student translated (rather than reflected) across y – *axis*
 C) Student reflected in y – *axis* then reflected in x – *axis*
 D) Student confused horizontal and vertical translation

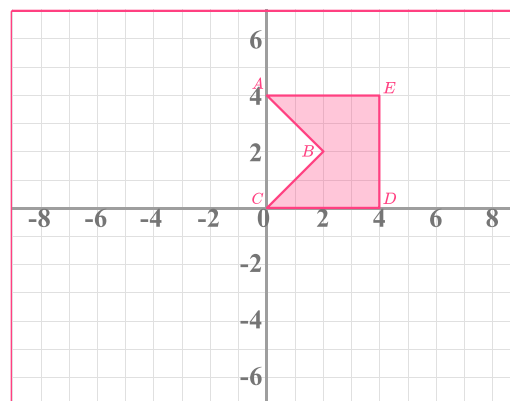
Diagnostic Questions: Transformations Answers

19. Shape D is transformed so that exactly one point is invariant.
Which transformation could have been used?



- A) Reflection in the line $y = x$ Student does not recognise points on $y = x$
 B) Enlargement by scale factor 3, centre (1, 1) Correct answer
 C) Rotation of 180° about the origin Student does not understand the centre of rotation
 D) Reflection in the line $x = 1$ Student does not recognise points on $x = 1$

20. Shape ABCDE is transformed such that a line of points is invariant.
Which transformation could have been used?



- A) Reflection in the y - axis Student confused the x - axis and the y - axis
 B) 180° rotation about the origin Student only kept one point invariant
 C) Reflection in the x - axis Correct answer
 D) Enlargement, SF 2, Centre (2, 2) Student only kept one point invariant

Where to go next?

For more ^x diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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