

Y7 Mastery: Unit 12 – Transforming 2D Figures

Translations

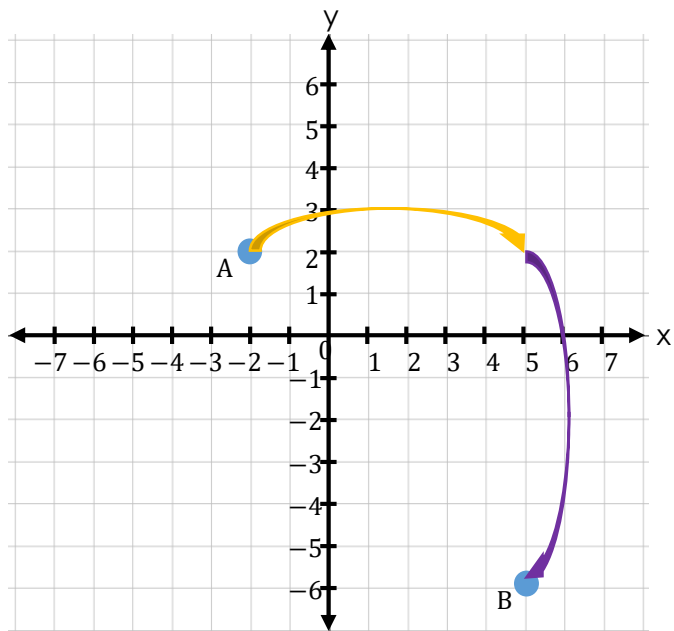
Translations are movements in a direction.
Column vectors can be used to describe translations.

7 units in the positive x -direction

From point A to point B
 the translation is:

$$\begin{pmatrix} 7 \\ -8 \end{pmatrix}$$

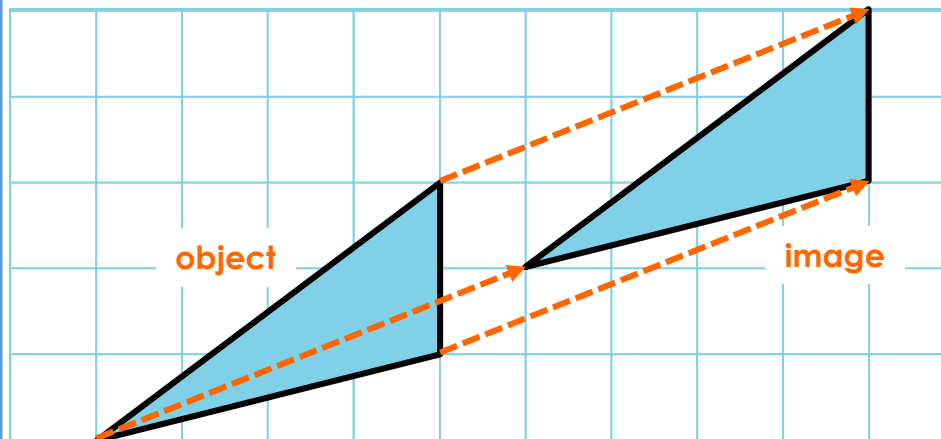
8 units in the negative y -direction



First count the number of squares moved in the x -direction and then count the number of squares moved in the y -direction.

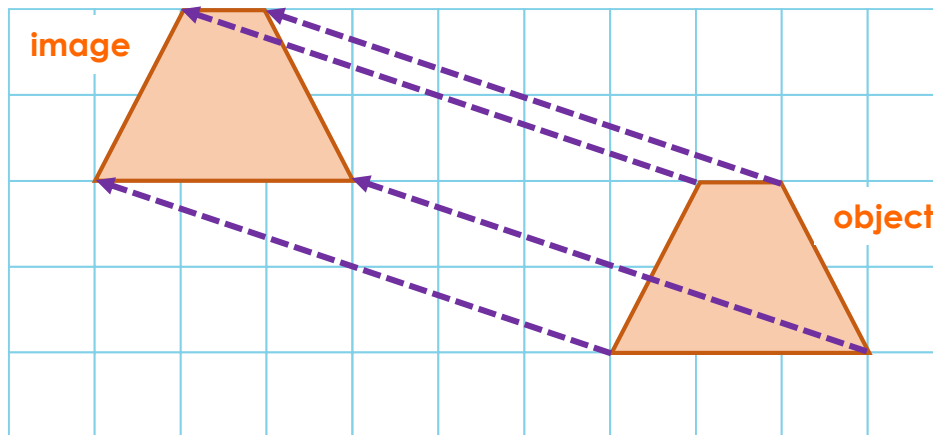
When a whole shape is translated, every vertex moves by the **same** translation vector.

Translating a shape



The translation vector from this object to its image is $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

Every vertex (corner) has moved by exactly the same column vector.



The translation vector from this object to its image is $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$

Other Topics/Units this could appear in:

Year 9/10:

Unit 46 - Congruence/Similar Shapes

Unit 47 - Transformations

Keyword/Skill	Definition/Tips
Polygon	2-D shape with straight sides and no curved sides.
Regular polygon	All the sides are exactly the same length, all the interior angles are exactly the same size.
Origin	The centre of the axes, where the x -axis and y -axis cross at the point with coordinates (0,0)
Similar	Shapes that are have the same angles, but the side lengths on one have been enlarged by a scale factor.
Congruent	Shapes that are exactly the same, but may be rotated (turned around) or reflected (flipped over).
Invariant point	A point on the original object which has not been affected by the transformation, so is in the same place on the image.
Object	The shape you start with when performing transformations.
Image	The finished shape you have after you have performed any transformations.
Describe	State exactly what single transformation has been performed on a shape.

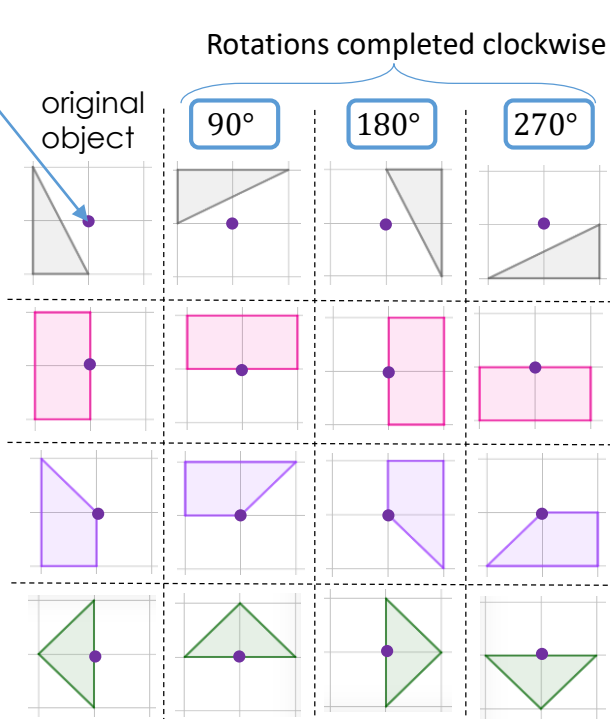
Y7 Mastery: Unit 12 – Transforming 2D Figures

Rotations

Rotations are turns around a point, which is called the **centre of rotation**.

Each **object** has been **rotated** by 90° , 180° and 270° **clockwise** about the purple **centre of rotation** to form these **images**.

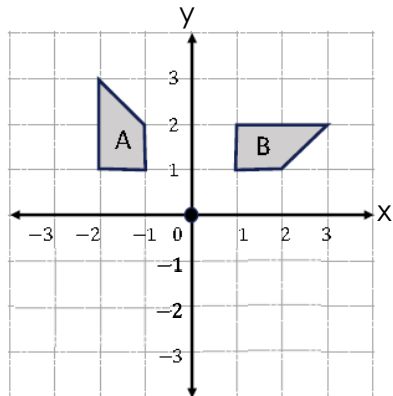
A rotation of 90° **anti-clockwise** would give the same image as a rotation of 270° clockwise about the same centre.



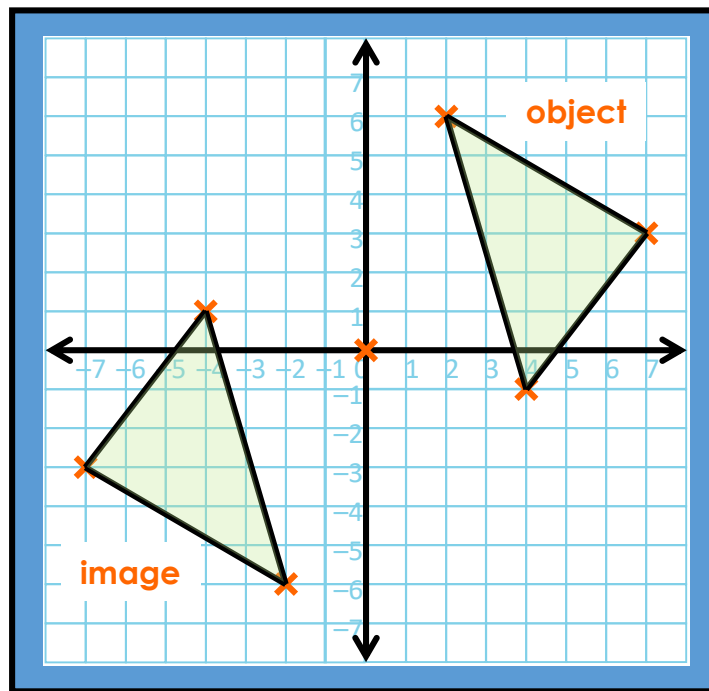
When we describe this type of transformation, we state that from A to B is:

- A rotation
- From centre (0,0)
- By 90° clockwise

We must always give all three pieces of information to fully describe a rotation.



This object has been rotated about the origin by 180° . The direction does not matter because 180° is a half turn, and a half turn clockwise has the same effect as a half turn anti-clockwise.

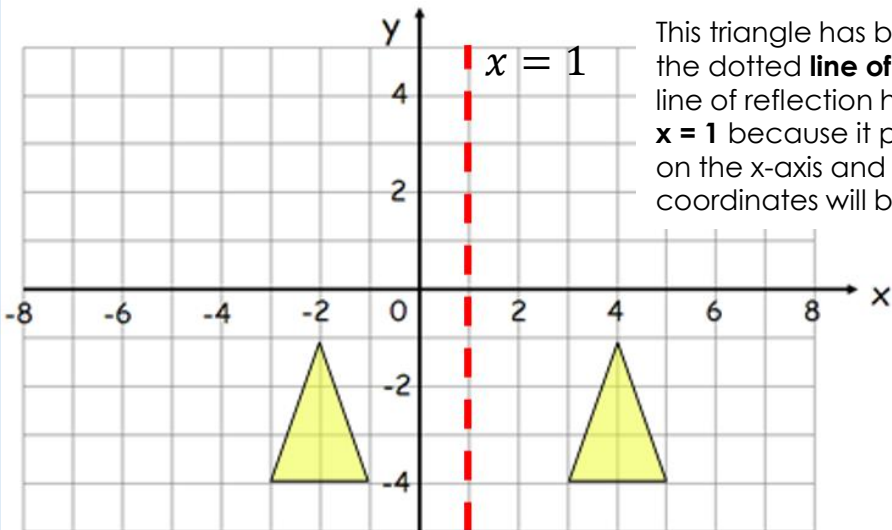


Other Topics/Units this could appear in:
 Year 9/10: Unit 46 - Congruence/Similar Shapes
 Unit 47 - Transformations

Keyword/Skill	Definition/Tips
Polygon	2-D shape with straight sides and no curved sides.
Regular polygon	All the sides are exactly the same length, all the interior angles are exactly the same size.
Origin	The centre of the axes, where the x-axis and y-axis cross at the point with coordinates (0,0)
Similar	Shapes that are have the same angles, but the side lengths on one have been enlarged by a scale factor.
Congruent	Shapes that are exactly the same, but may be rotated (turned around) or reflected (flipped over).
Invariant point	A point on the original object which has not been affected by the transformation, so is in the same place on the image.
Object	The shape you start with when performing transformations.
Image	The finished shape you have after you have performed any transformations.
Describe	State exactly what <u>single</u> transformation has been performed on a shape.

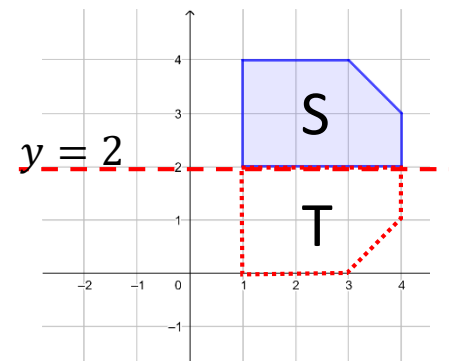
Y7 Mastery: Unit 12 – Transforming 2D Figures

Reflections flip an object, but its size and shape remain the same. The mirror line is called the **line of reflection**.



This triangle has been **reflected** in the dotted **line of reflection**. The line of reflection has the equation $x = 1$ because it passes through 1 on the x-axis and all its x-coordinates will be 1.

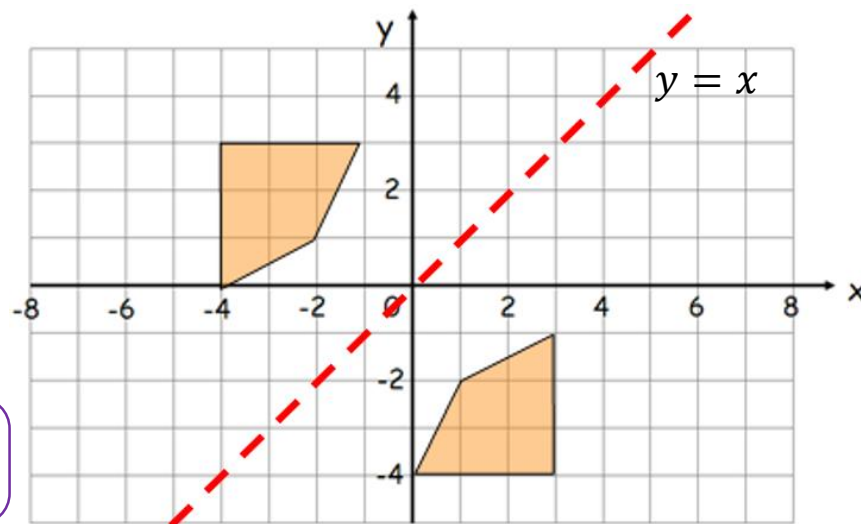
Reflections



This shape has been **reflected** in the dotted **line of reflection**. The line of reflection has the equation $y = 2$ because it passes through 2 on the y-axis and all its y-coordinates will be 2.

Diagonal lines of reflection

This shape has been **reflected** in the dotted **line of reflection**. The line of reflection has the equation $y = x$ because it passes through the origin and all its pairs of coordinates will have matching x and y values, such as (1,1), (2,2), (-4,-4)...



There are two diagonal lines you need to know. They are:
 $y=x$ (shown on the diagram)
 and $y = -x$ (slopes the opposite direction)

Other Topics/Units this could appear in:
 Year 9/10: Unit 46 - Congruence/Similar Shapes
 Unit 47 - Transformations

Keyword/Skill	Definition/Tips
Polygon	2-D shape with straight sides and no curved sides.
Regular polygon	All the sides are exactly the same length, all the interior angles are exactly the same size.
Origin	The centre of the axes, where the x-axis and y-axis cross at the point with coordinates (0,0)
Similar	Shapes that are have the same angles, but the side lengths on one have been enlarged by a scale factor.
Congruent	Shapes that are exactly the same, but may be rotated (turned around) or reflected (flipped over).
Invariant point	A point on the original object which has not been affected by the transformation, so is in the same place on the image.
Object	The shape you start with when performing transformations.
Image	The finished shape you have after you have performed any transformations.
Equidistant	Two points are the same distance away from the line of reflection.

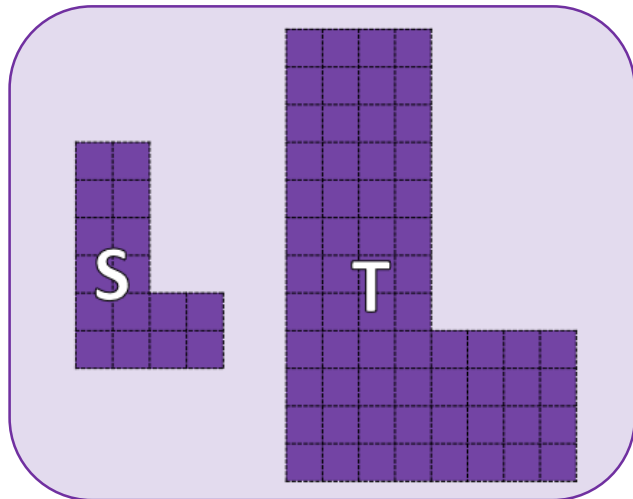
Y7 Mastery: Unit 12 – Transforming 2D Figures

Enlargements

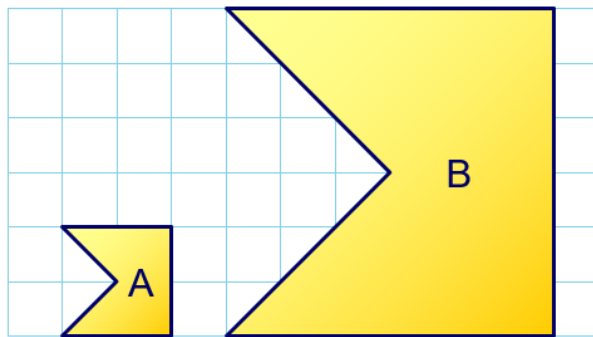
Enlargements make the object bigger or smaller.
Scale factors tell us how much bigger or smaller.

S is an enlargement of T
 by scale factor $\frac{1}{2}$

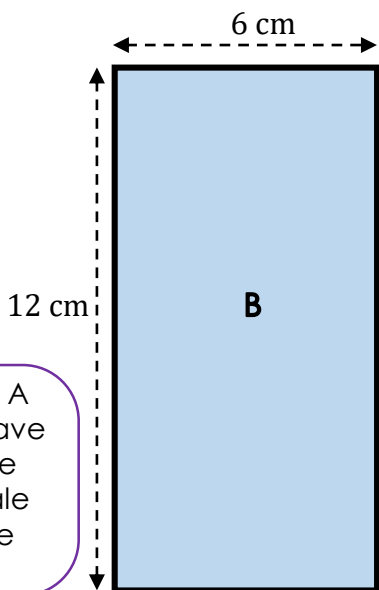
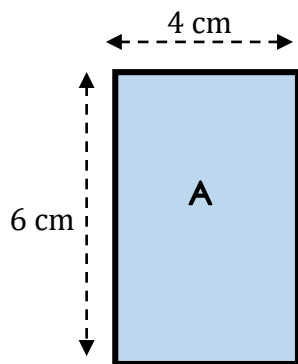
T is an enlargement of S
 by scale factor 2



A is an enlargement of
 B by scale factor $\frac{1}{3}$



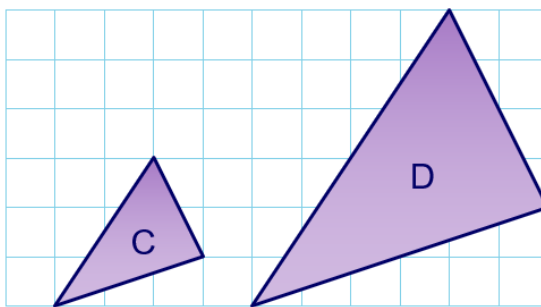
B is an enlargement of A
 by scale factor 3



B is not an enlargement of A because the side lengths have not been increased by the same scale factor. The scale factor must be exactly the same for all lengths.

C is an enlargement of
 D by scale factor $\frac{1}{2}$

Even when the scale factor makes a shape smaller, the transformation is still called an enlargement.



D is an enlargement of C
 by scale factor 2

Other Topics/Units this could appear in:
 Year 9/10: Unit 46 - Congruence/Similar Shapes
 Unit 47 - Transformations

Keyword/Skill	Definition/Tips
Polygon	2-D shape with straight sides and no curved sides.
Regular polygon	All the sides are exactly the same length, all the interior angles are exactly the same size.
Origin	The centre of the axes, where the x-axis and y-axis cross at the point with coordinates (0,0)
Similar	Shapes that are have the same angles, but the side lengths on one have been enlarged by a scale factor.
Congruent	Shapes that are exactly the same, but may be rotated (turned around) or reflected (flipped over).
Invariant point	A point on the original object which has not been affected by the transformation, so is in the same place on the image.
Object	The shape you start with when performing transformations.
Image	The finished shape you have after you have performed any transformations.
Equidistant	Two points are the same distance away from the line of reflection.