

HOME LEARNING

Year 11	Maths - Transformations	Home Learning 9
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Introduction:

This week's home learning is revising transformations:

- Rotation (turning shapes)
- Translation (moving shapes)
- Reflection (reflecting shapes in a line of symmetry)
- Enlargement (making shapes bigger or smaller)

Other words you might see:

- Congruence (the same shape and the same size)
- Similar (the same shape that has been enlarged)

Start by reading the explanations and then have a go at the activities.

Learning Objective	Worksheet Title
To know the four types of transformation	Transformations
To rotate shapes	Rotations
To translate shapes given a vector	Translations
To reflect shapes across a mirror line	Reflections
To enlarge shapes by a scale factor of 2, 3 or $\frac{1}{2}$	Enlargement

Other Activities:

- Aim to spend 10 minutes a day on Times Table Rock Star; Sumdog or Numbots
- Aim to complete 1-2 MyMaths tasks a week (keep retrying until you get a green)
- Learn to play a new game or get better at playing a game you already know (e.g. Monopoly; Chess; draughts; cards; dominoes; etc....)
- Practise one of the times-tables
- Have a go at today's 5-a-day Maths questions: <https://corbettmaths.com/5-a-day/gcse/>

Transformations

There are four types of transformation that we will revise this week:

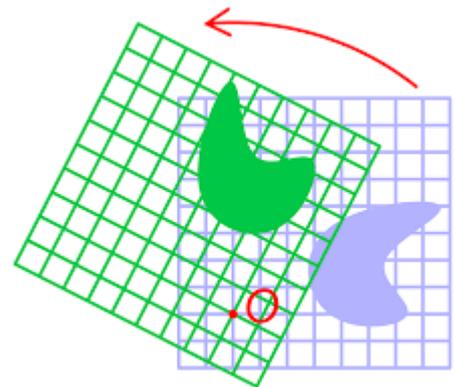
- Rotation (turning shapes)
- Translation (moving shapes)
- Reflection (reflecting shapes in a line of symmetry)
- Enlargement (making shapes bigger or smaller)

The images below revise each transformation. Look through each one and then write a definition of each transformation (in your own words) in worksheet 1.

Rotation:

To rotate a shape:

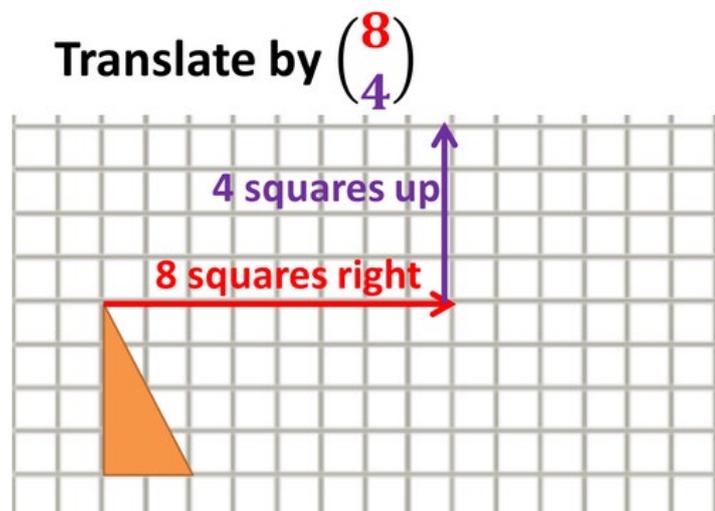
1. Copy the shape and the centre of rotation onto tracing paper or baking paper.
2. Put your pencil onto the centre of rotation
3. Turn your paper as stated (e.g. 90° clockwise)
4. Copy the new shape onto the original paper



Translation

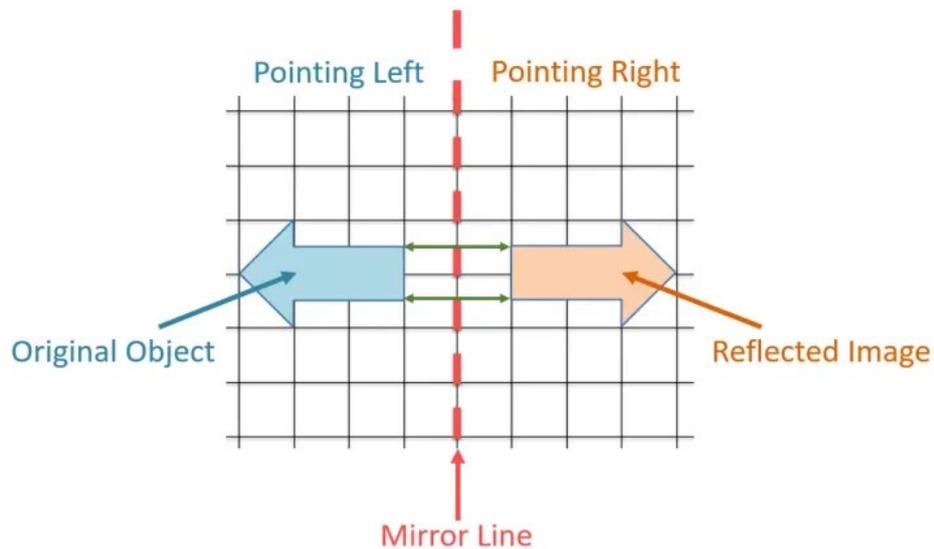
Translation means moving a shape. Sometimes we are told to move a shape by a number of spaces left/right and up/down. Often this is written as a vector. The diagram shows a translation using the vector $\begin{pmatrix} 8 \\ 4 \end{pmatrix}$. This means 8 squares right and 4 squares up.

A negative number tells us that we should move the shape in the opposite direction, for example the vector $\begin{pmatrix} -3 \\ -5 \end{pmatrix}$ means 3 squares to the left and 5 squares down.



Reflection

Reflection means to draw the mirror image of a shape across a mirror line.

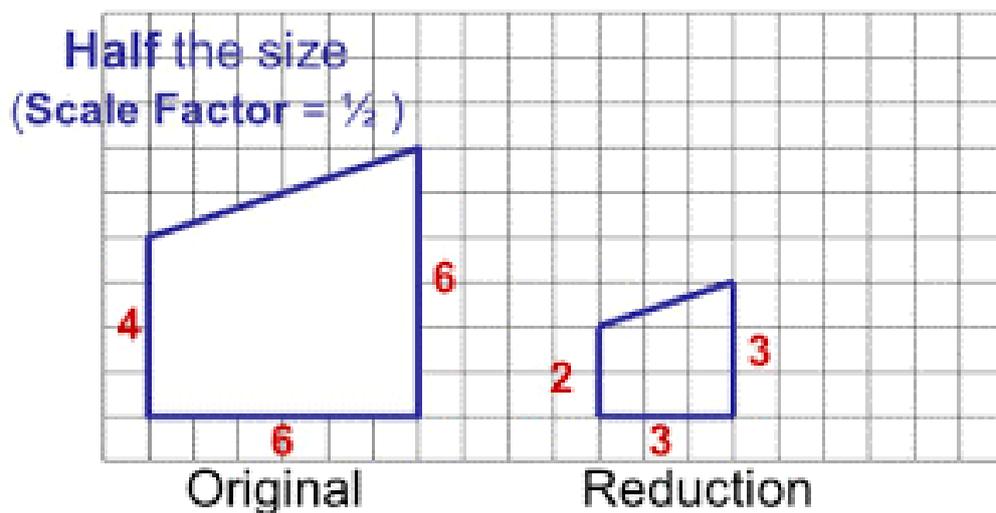


Both shapes are the same distance from the mirror line

Enlargement by a scale factor

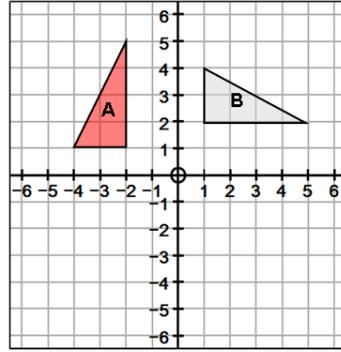
A scale factor of 2 doubles the size of each side of a shape. A scale factor of a half, halves the length of each side of a shape.

Investigation: Investigate what happens to the area and a perimeter of a square when you enlarge a square by a factor of 2 (the perimeter doubles, and the area quadruples!).



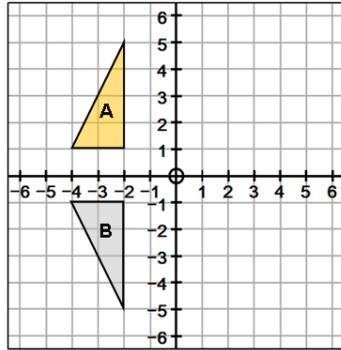
Rotations

Object A and image B remain congruent



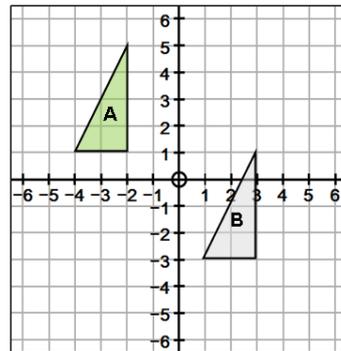
Reflections

Object A and image B remain congruent



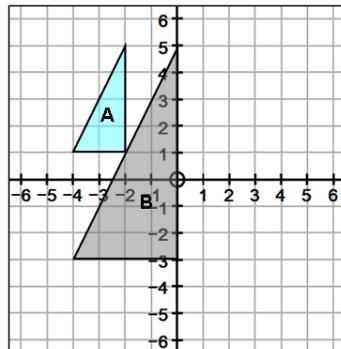
Translations

Object A and image B remain congruent



Enlargements

Object A and image B are similar



Worksheet 1: Transformations

Using your own words or pictures, describe each type of transformation. For bonus points, think of a real-life use for each transformation.

Rotation

Reflection

Translation

Enlargement

Worksheet 2: Rotations

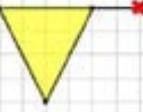
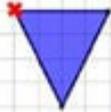
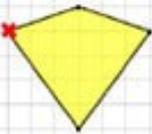
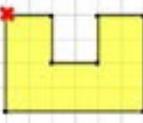
Use tracing paper (or baking paper) to copy and rotate the shape

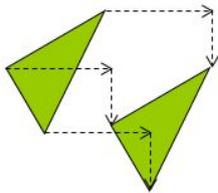
L4
Progression: Medium

Rotation (A)

Section A: Rotate the following objects about the point marked *



<p>1)</p>  <p>90° clockwise</p>	<p>2)</p>  <p>90° clockwise</p>	<p>3)</p>  <p>90° clockwise</p>
<p>4)</p>  <p>90° anti-clockwise</p>	<p>5)</p>  <p>90° anti-clockwise</p>	<p>6)</p>  <p>90° anti-clockwise</p>
<p>7)</p>  <p>180° anti-clockwise</p>	<p>8)</p>  <p>180° clockwise</p>	<p>9)</p>  <p>180° anti-clockwise</p>
<p>10)</p>  <p>90° anti-clockwise</p>	<p>11)</p>  <p>90° clockwise</p>	<p>12)</p>  <p>90° anti-clockwise</p>



Translation

Translations are usually given in vector form:

$\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ means 3 units to the right and 1 unit down.

So what does $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$ mean?

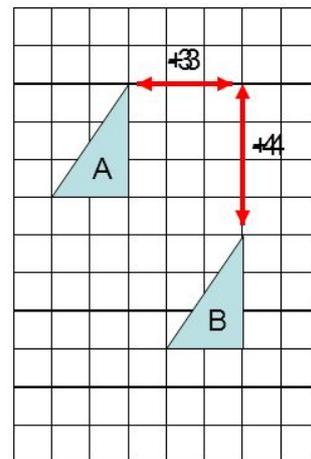
What is the vector translating A to B?

What about B to A?

A to B: $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ B to A: $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$

After translation, a shape will be

- the same shape and size
- the same way round (orientation)
- in a different position



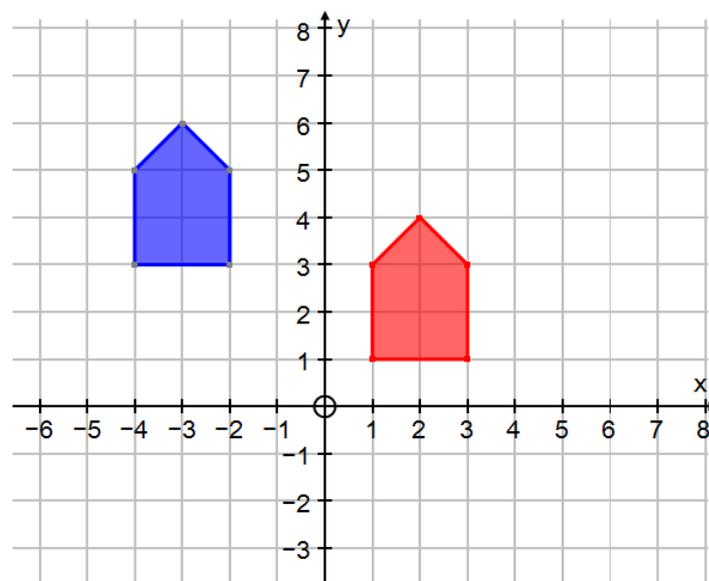
The blue object has been translated by what vector to produce the red image?

A. $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$

B. $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

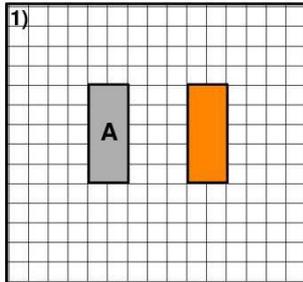
C. $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

D. $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$

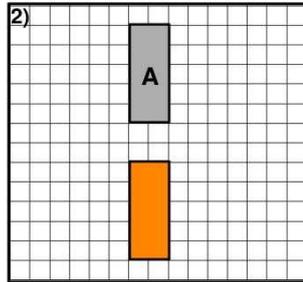


Worksheet 3: Translations 2

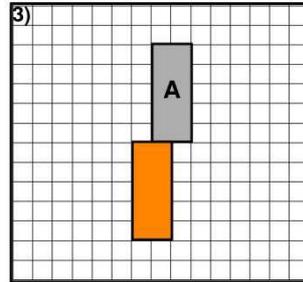
Shape A is the original object. The shaded shape is the translation. Write the translation as a vector in the space provided below.



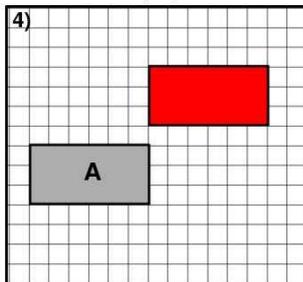
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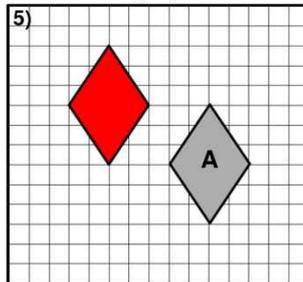
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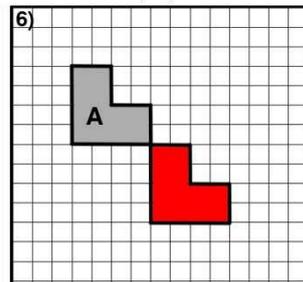
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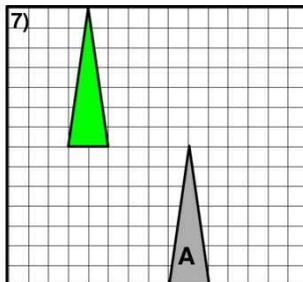
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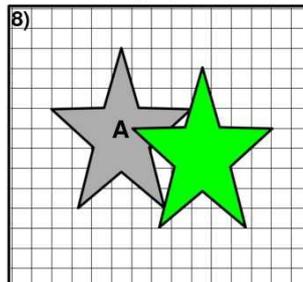
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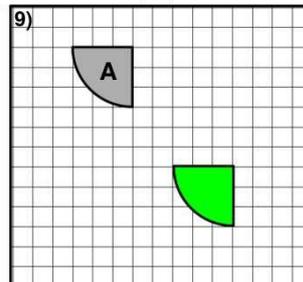
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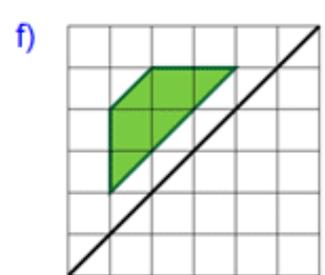
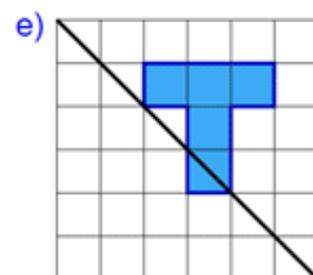
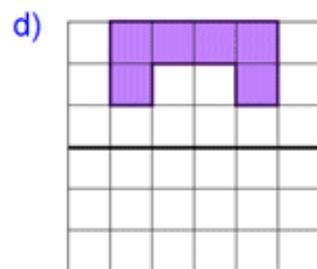
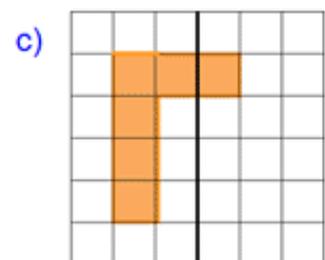
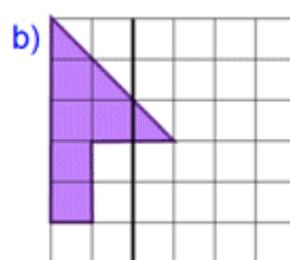
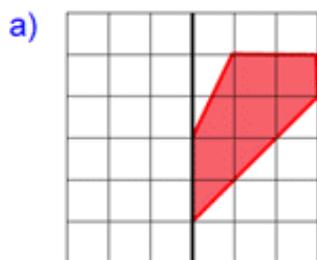
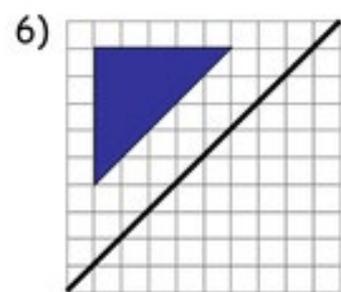
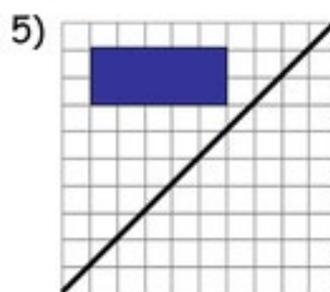
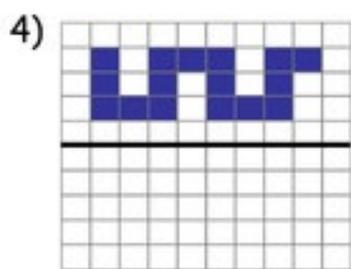
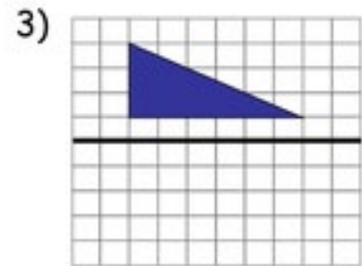
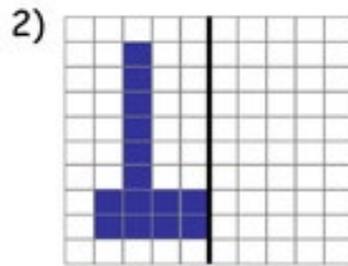
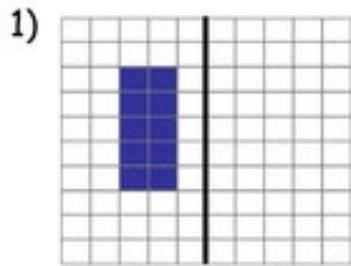
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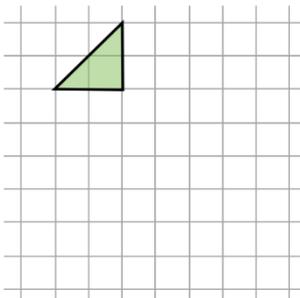
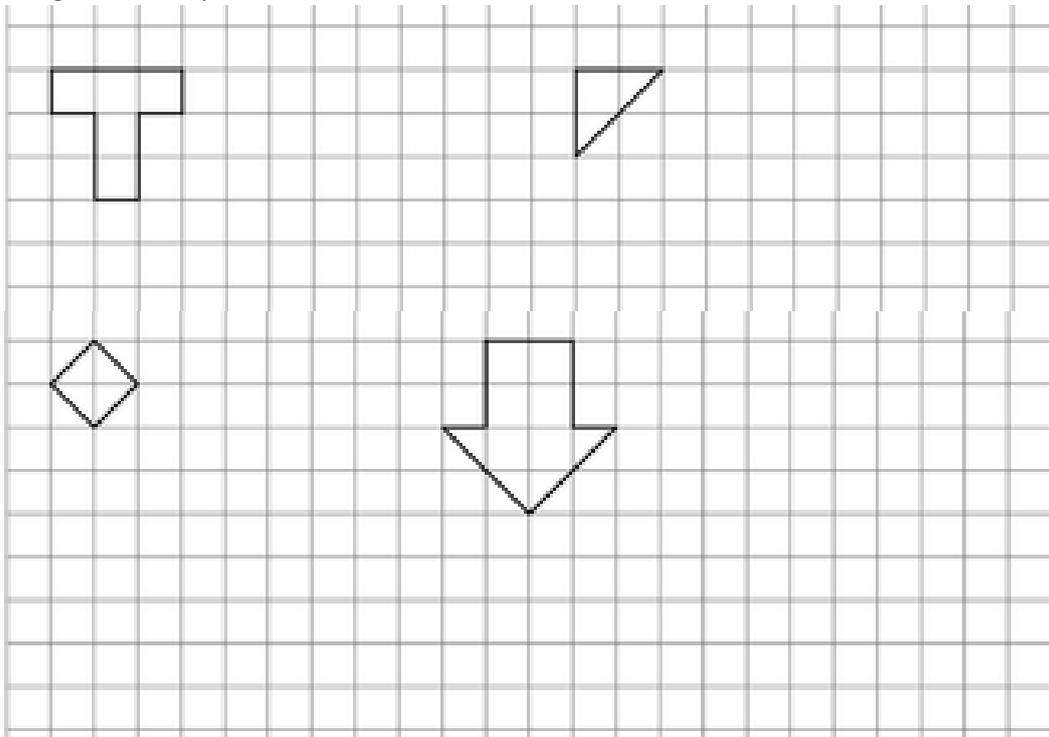
Worksheet 4: Reflection

Reflect the following shapes into the mirror line

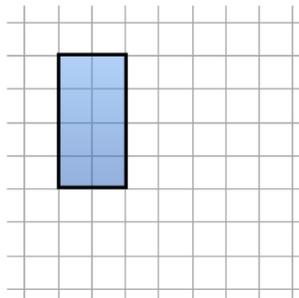


Worksheet 5: Enlargement

1) Enlarge these shapes with a scale factor of 2



Scale factor 3



Scale factor $\frac{1}{2}$