Unit 10 - Foundation Mathematics Knowledge Organiser

Transformations – Translation, Reflection, Rotation, Enlargement

Translation

Key point 1

You can use a **column vector** to describe a translation.
The top number describes the movement to the left or right, and the bottom number describes the movement up or down. For example:

$\begin{pmatrix}3\\2\end{pmatrix}$ means 3 right, 2 up $\begin{pmatrix}-4\\-5\end{pmatrix}$ means 4 left, 5 down.

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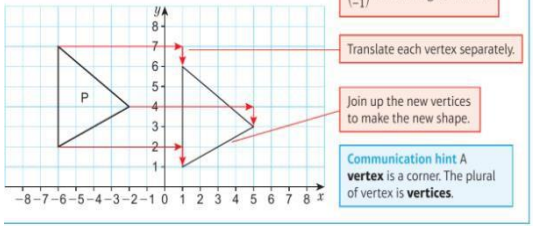
Example 1

Translate shape P by the column vector $\begin{pmatrix}7\\-1\end{pmatrix}$.



$\begin{pmatrix}7\\-1\end{pmatrix}$ means 7 right, 1 down.

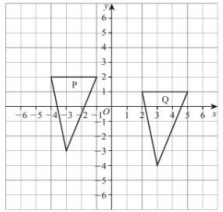
Translate each vertex separately.

Join up the new vertices to make the new shape.

Communication hint A **vertex** is a corner. The plural of vertex is **vertices**.

Exam-style question

Describe fully the single transformation that maps triangle P onto triangle Q.



(2 marks)

March 2013, Q10, 1MA0/2H

Reflection

Key point 2

To describe a reflection on a coordinate grid you need to give the equation of the **mirror line**.

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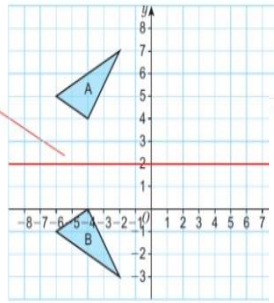
Example 2

Describe fully the transformation that maps shape A onto shape B.

Find the mirror line halfway between the vertices of the image (B) and the original (A).

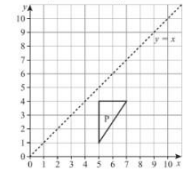
Write down the type of transformation (reflection) and the equation of the mirror line.

Reflection in the line $y = 2$.



Exam-style question

Reflect shape P in the line $y = x$.



(2 marks)

Nov 2012, Q2a, 1MA0/2H

Rotation

Key point 3

You rotate a shape by turning it around a point called the **centre of rotation**.

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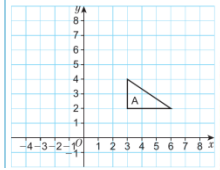
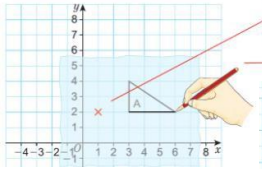
Example 3

Rotate the shape 90° anticlockwise about the point (1, 2).

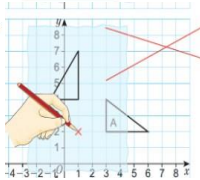


(1, 2) is the centre of rotation.



Mark the point (1, 2) with a cross.

Trace the shape.



Rotate the tracing paper 90° anticlockwise about (1, 2).

Lift up the tracing paper and draw the image on the grid.

Enlargement

Key point 5

When you enlarge a shape using a **centre of enlargement**, you multiply the distance from the centre to each vertex by the scale factor.

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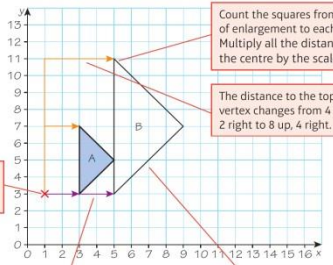
Example 4

Enlarge shape A by scale factor 2, using centre of enlargement (1, 3). Label the image B.



Count the squares from the centre of enlargement to each vertex. Multiply all the distances from the centre by the scale factor.

The distance to the top vertex changes from 4 up, 2 right to 8 up, 4 right.

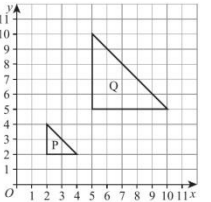
Mark the centre of enlargement.

The distance to the bottom vertex changes from 2 right to 4 right.

Check that the lengths of the image are twice as long as the original.

Exam-style question

Describe fully the single transformation that maps shape P onto shape Q.



(3 marks)

Nov 2012, Q6, 1MA0/1H