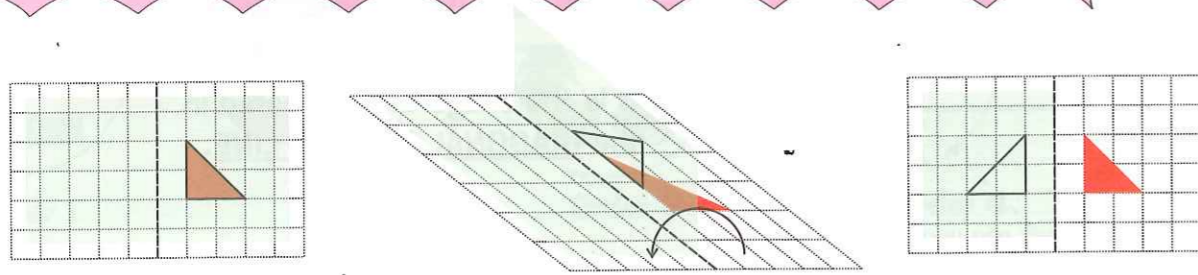


## Reflection, Translation and Rotation

Yet again, you can use **tracing paper** to help, in case you don't have a mirror handy.

### Reflections Using Tracing Paper

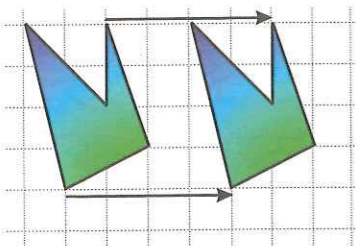
- 1) Trace the shape and the **mirror line** onto the tracing paper.
- 2) Fold the paper over, along the mirror line.
- 3) You now have a **reflection** in the mirror line of the original shape.



### Translation is Sliding

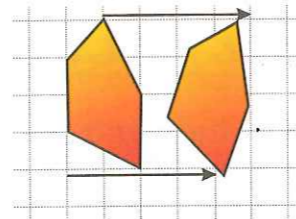
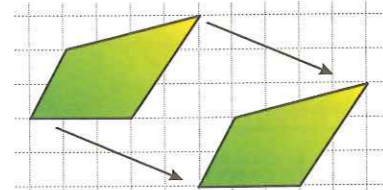
**Translation** is one of those fancy maths words that sounds hard, but is **really easy**. It's when a shape **slides** from one place to another, **without** rotating or flipping over.

#### EXAMPLES:



This is a translation, 4 squares to the right.

This is a translation, 5 squares to the right and 2 squares down.



This is not a translation, because as well as sliding, the shape has turned.

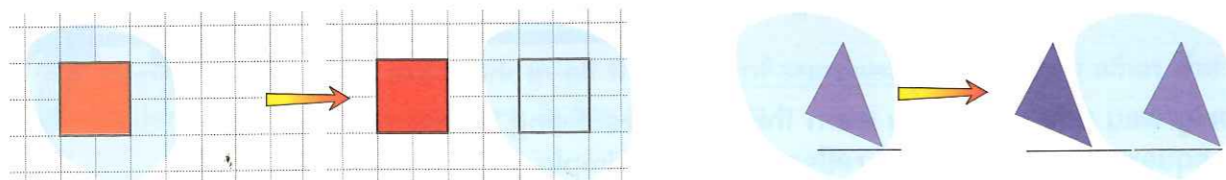
### To Do Translations Easily, Use Tracing Paper

Put the tracing paper **over** the shape, **trace** it, and **slide** the tracing paper. There you go, one translation.

If you've got a **grid**, you can trace some of that, too. In fact, if you **haven't** got a grid, it's a good idea to draw a **line** across on the original and the tracing paper anyway, so you can make sure you don't turn it at all.

#### EXAMPLES:

Both of these are translations. In the second one, I drew in a **line** so I didn't accidentally turn it when I slid the tracing paper.



## Reflection, Translation and Rotation

### Rotating a Shape About a Point

Shapes can be rotated clockwise or anticlockwise **about a point**, called the **centre of rotation**. It is so easy, but if you forget about the centre of rotation, you'll lose out.

### Rotating Through 90° or 180°

- 1) Trace the shape **and** the point of rotation (the point you're rotating about).
- 2) Press a pencil on the **point of rotation** to hold the tracing paper in place.
- 3) THE IMPORTANT BIT: Look at one of the **horizontal** lines.
  - a) **If it's a 90° turn**, turn the paper round until the line becomes vertical.
  - b) **If it's a 180° turn**, turn the paper round until the line is horizontal again.
- 4) If there aren't any horizontal lines, use a vertical one and turn it to horizontal for **90°** or vertical for **180°**.

The distance of **any point** on the shape from the **rotation point** always **stays the same**.

Watch out — make sure you rotate in the right direction. Clockwise is the same way clock hands turn. Guess what... anticlockwise is the other way.

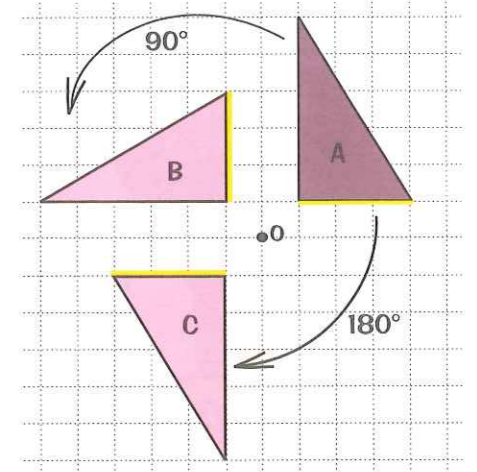


#### EXAMPLE:

We get shape B by rotating shape A **anticlockwise** through 90° about point O.

Shape C is made by rotating shape A **through 180°** about point O.

If you're a bit confused by all this angle stuff, have a look at page 58.



Watch out, it really does make a difference where you rotate about. Try rotating triangle A about some other point to see it in action.

### Well there's plenty here for you to reflect upon...

- 1) Copy this diagram onto squared paper.
- 2) How can we get shape B from shape A?
- 3) Draw a **reflection** of A in the mirror line shown.
- 4) Draw shape B after it has been **translated** 7 squares to the left.

