# 3 Combining Transformations

Transformations

A change to a shape is called a transformation. Transformations include translations (slides), reflections (flips), and rotations (turns).

Performing Translations

- A translation of a shape is a slide. A translation moves every point on the shape in the same direction and the same distance.

- A translation arrow connects a point on the original shape to where the shape moves. The translation arrow is the same for every point on the shape.
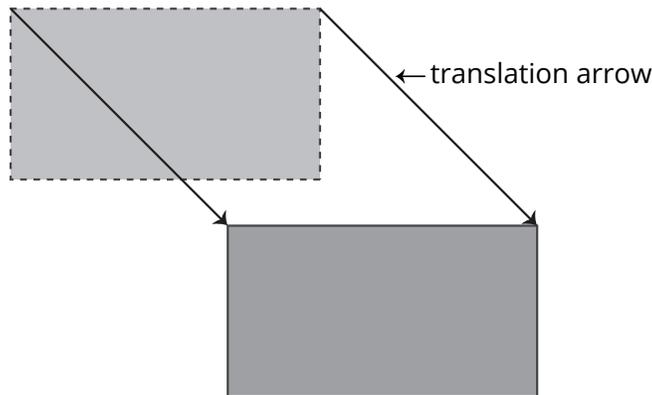

Translation arrows are the same for every point on a shape.

- A shape does not change in size, shape, or orientation when it is translated. Therefore, if you move the corners of a shape using the same translation arrow, you can draw lines joining the new positions to move the rest of the shape.

Performing Reflections

- A reflection of a shape creates a mirror image of the shape. You can reflect a shape using a transparent mirror (such as a Mira) or another reflecting device.

  The line joining any point on the original shape to its final location is at right angles to the line of reflection. Also, matching points are just as far away from the line of reflection on one side as they are on the other side.
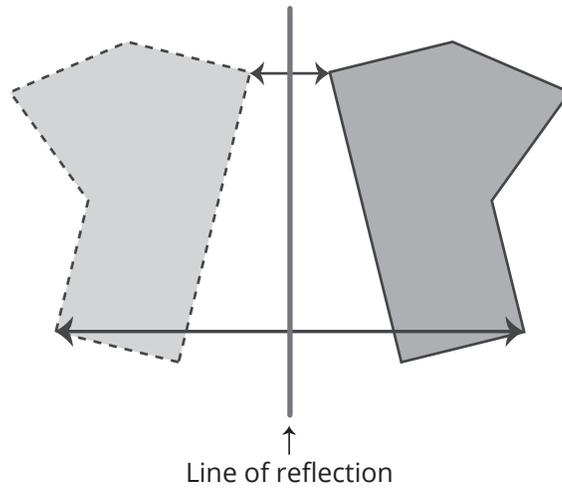
Line of reflection

- The line of reflection can be outside the shape, as above, or inside the shape. If it is inside, you have to be careful to reflect both sides of the shape.
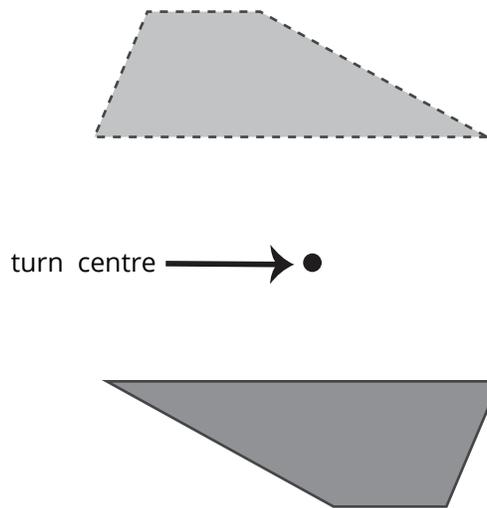
← Line of reflection
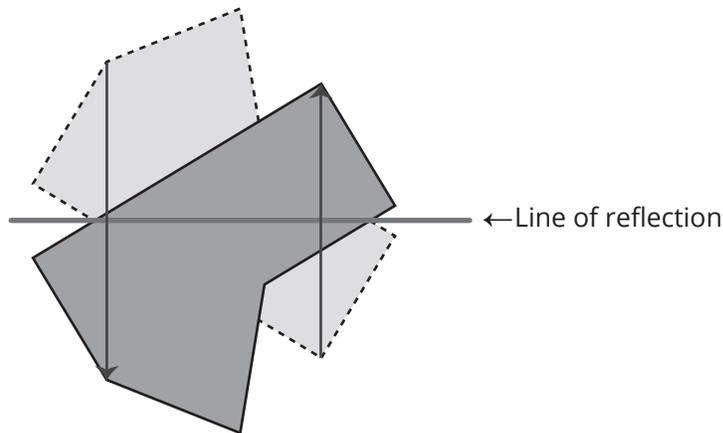
Performing Rotations

- A rotation turns a shape either clockwise or counterclockwise around a point called a turn centre. The turn centre can be inside or outside the shape.

- In Grade 6, students perform rotations of 90° and 180°, but nothing beyond that.
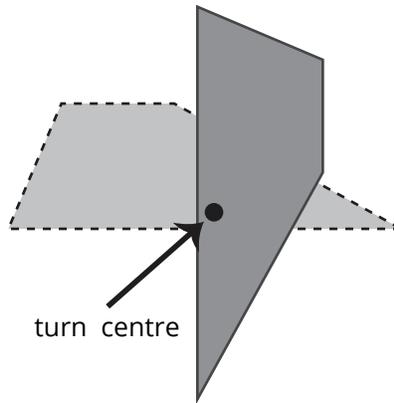
turn centre

This trapezoid was rotated 90° clockwise about a turn centre inside the shape.

turn centre

This trapezoid was rotated 180° about a turn centre outside the shape.

Moving From One Shape to a Congruent Shape

- You can use a combination of translations, reflections, and/or rotations to move from any 2-D shape to an identical, congruent shape.
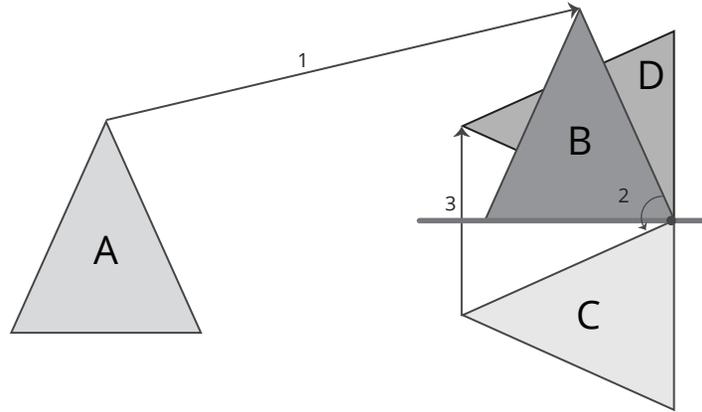
To move from **A** to **D**, you could:
1. translate to get to **B**,
2. rotate 90° counterclockwise to get to **C**, and then
3. reflect to get to **D**.

Definitions

clockwise: the direction a clock's hands move

congruent: identical in shape and size

counterclockwise: the direction opposite to the way a clock's hands move

line of reflection: the line across which a shape is reflected or flipped

reflection: a transformation in which a shape is flipped across a line of reflection to form a mirror image without changing size or shape but with a change in orientation

Line of Reflection

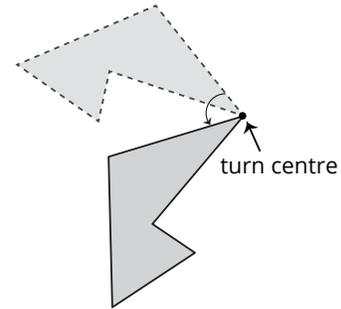Reflection
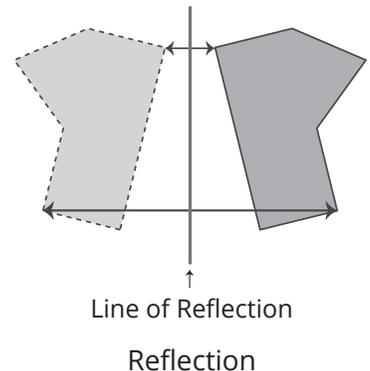
Definitions (continued)

rotation: a transformation in which a shape turns about a stationary turn centre without changing size, shape, or orientation

transformation: a process that changes the position or orientation of a shape; for example, translation, reflection, rotation
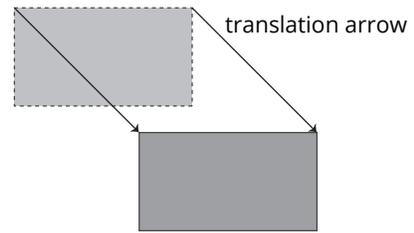
translation: a transformation in which a shape slides to a new position without changing size, shape, or orientation

translation arrow: an arrow connecting a point on a shape to where that point moves in a translation

turn centre: a stationary point that a shape is rotated about; the turn centre can be inside the shape, outside the shape, or on a vertex or side of the shape

turn centre

Rotation

translation arrow

Translation