



Making Composite Shapes

Curriculum connections

Australian:

Year 4

- Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies (ACMMG088)

Year 5

- Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries (ACMMG114)
 - identifying and describing the line and rotational symmetry of a range of two-dimensional shapes, by manually cutting, folding and turning shapes and by using digital technologies
 - identifying the effects of transformations by manually flipping, sliding and turning two-dimensional shapes and by using digital technologies

Year 6

- Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies (ACMMG142)
 - understanding that translations, rotations and reflections can change the position and orientation but not shape or size

USA Common Core:

Grade 4

- CCSS.MATH.CONTENT.1.G.A.2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

Grade 8

- CCSS.MATH.CONTENT.8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations:
 - CCSS.MATH.CONTENT.8.G.A.1.A. Lines are taken to lines, and line segments to line segments of the same length.
 - CCSS.MATH.CONTENT.8.G.A.1.B. Angles are taken to angles of the same measure.

- CCSS.MATH.CONTENT.8.G.A.1.C. Parallel lines are taken to parallel lines.

Lesson Overview

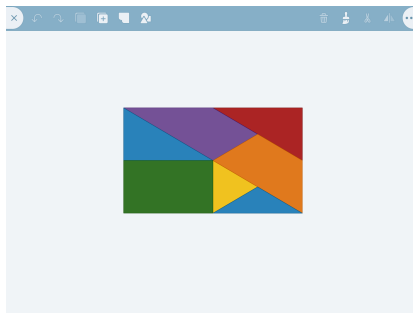
Students use van Hiele's 7-piece puzzle to experiment with flipping, sliding and rotating. They use these to explore the characteristics of 2D shapes, including creating composite shapes and exploring how they relate to each other (similarity, congruence, equality in side length, angles and area).

Lesson Objectives

1. Prepare the 7-piece puzzle in shape lab using the instructions provided (approx. time, 2min).
 - The starting rectangle must be 5cm × 8.5cm or larger with the same ratio (1:1.7).
 - You can create the rectangle using the cm background grid and adjusting each corner to the correct measurement.
 - It is helpful to make all the shapes different colours if you have the time. Otherwise, the class can customise their own puzzles in the lesson.
 - Once completed, save the document and distribute it to the class via email.

OR

- The class can make their own puzzle following live instructions and demonstration in the class.
2. Ask the class to open the 7-piece puzzle Shape Lab file.



- Make the shapes in the puzzle different colours if not already done.
3. Ask the class to name the shapes.
 - If they get stuck, try to avoid giving them the answer. Assist by asking them to describe any properties they see, such as number of sides and vertices, parallel sides, angle sizes and symmetry.

- Write the properties down on the board and work out the name of the shape together.
 - The shapes are:
 - Two right scalene triangles
 - One rectangle
 - One equilateral triangle
 - One obtuse isosceles triangle
 - One isosceles trapezoid
 - One scalene trapezoid.
4. Find all the shapes that can be composed using two other shapes.
 - Only the small equilateral and isosceles triangles cannot be made by composing other shapes.
 - What do they notice about the shapes as they rotate, flip or slide them? Do some shapes look the same regardless of their orientation?
 - How many shapes can you make that are different to the shapes in the puzzle?
 5. Find the one shape that can be composed using three of the remaining shapes.
 6. What other shapes can be made using the puzzle pieces?
 - Can students make pictures or designs?
 - Can they make a new rectangle or recreate the original rectangle?
 - Allow some free play to observe how the students talk and reason about the shapes.
 - Encourage language like symmetry, equal, angle, rotate, flip, slide and composite.

Resources

- Pre-prepared 7-piece puzzle Shape Lab document.
- iPads with Shape Lab installed.