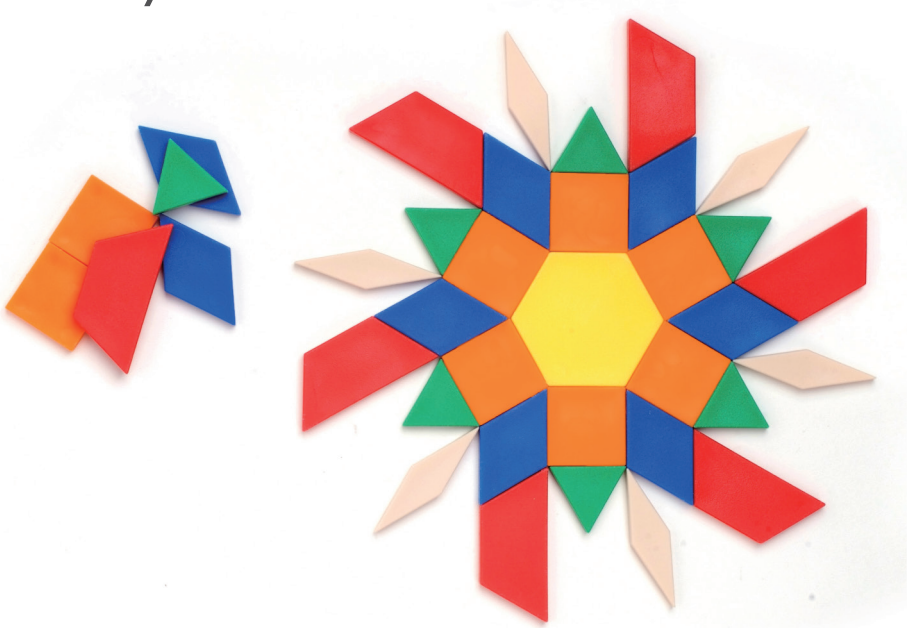Mathematics

Pattern Blocks

Activity Guide

Use the Pattern Blocks to develop understanding of:

- Geometry - shape, symmetry, tessellation, angle
- Measurement - area, perimeter
- Number - fractions

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Introduction

Pattern Blocks are an extremely versatile manipulative that may be used to develop a range of mathematics concepts. They come in a variety of forms - plastic, wood and foam.

Support materials may be used to extend the uses of Pattern Blocks in the classroom:
- Reflecting mirrors
- Hinged mirrors
- Pattern Block Spinners
- Giant Foam Pattern Blocks and
- Fraction Pattern Blocks

Mathematical Language
It is important that the Pattern Blocks pieces are named correctly.
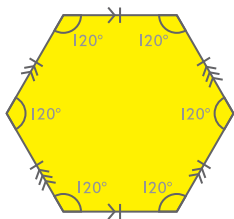
Yellow Hexagon : This is an example of a regular hexagon, that is all the sides AND angles are congruent (the same size). The angles are 120 degrees.
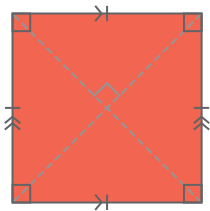
Orange Square : The square is a quadrilateral (four sides) where all the sides are the same length and all the angles are the same size (90 degrees, sometimes referred to as right angles)
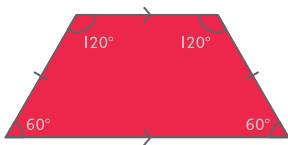
Red Trapezium (Trapezoid) : A quadrilateral. The definitions vary in different parts of the world. Note that the base of the trapezium is twice the length of the standard side length.
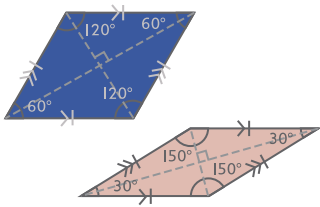
Blue Rhombus/Tan Rhombus : A quadrilateral that has four sides of equal length. Opposite sides of a rhombus are parallel. Some people refer to this as a diamond, which is NOT the correct mathematical name for this shape.
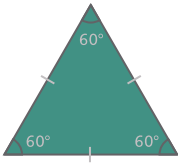
Green Triangle : This triangle is equilateral, that is, all the sides are the same length and the angles are 60 degrees. Remember the sum of the angles in a triangle is 180 degrees.

Becoming Familiar with Pattern Blocks

• Learn geometry concepts reflection (flip) and rotation (turn) by filling spaces.
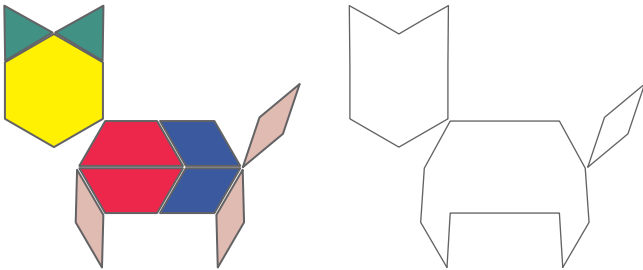
• Pieces may be dropped into a drawstring bag and the children determine the name of the piece by 'feeling' each piece.

• Make the same shape using different blocks.
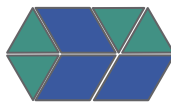
- Develop tessellating (tiling) patterns. Tessellation is about covering without gaps. Covering is the basis of area.
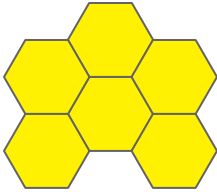
- Students may play barrier games where one student builds a shape behind a barrier so another student cannot see what is built. The first student then describes what has been build and the other student(s) have to build the shape according to the instructions that are provided. At the end of the game the barrier is lifted and comparisons between the original and built shapes are made.

Understanding Shapes

Many students believe that shapes are all regular. Pattern blocks will help students appreciate that shapes can be irregular. For example, asking students to join two pattern block pieces along an edge to form a hexagon will help highlight the differences between regular and irregular shapes.
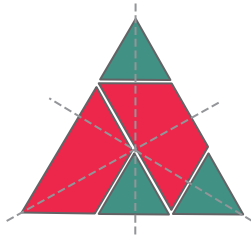

regular
hexagon

irregular
hexagons
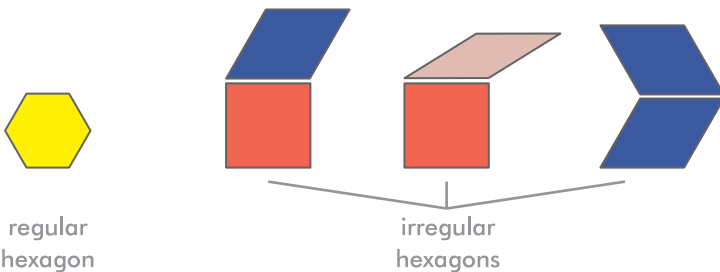
Symmetry

Pattern Blocks may be used to develop understanding of various types of symmetry.

Line Symmetry
• Ask students to identify the lines of symmetry for the Pattern Block pieces
• Build shapes with one line of symmetry, two lines of symmetry …
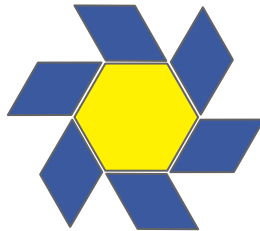• Use a geomirror to check symmetry

Rotational Symmetry
• Pattern Block pieces may be turned around a pivot point (generally the centre of the shape) to determine the order of rotational symmetry.
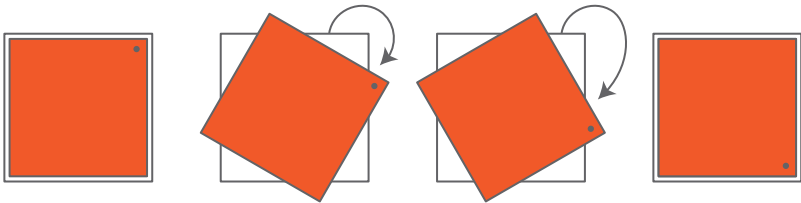
• Students can be set the challenge to make shapes with rotational symmetry.

Note : The point of rotation does NOT have to be in the center of the shape.

Measurement

Introduction to area and the relationships between the pieces

Area is about covering. A surface may be covered in different ways.

• How many different ways can you cover a yellow hexagon using the pattern block pieces?
• How will you know when you have found them all?

Students will need to work systematically in order to decide whether they have found them all. For example, a students might start by using two red trapeziums to cover the yellow hexagon and then one red trapezium and a blue rhombus and a green triangle and so on. Eventually they will find the following:
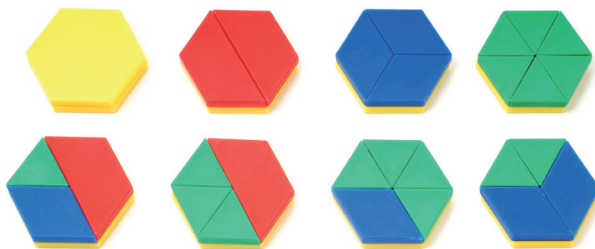
Students may use the Pattern Blocks to design various shapes and then calculate the perimeter and the area.
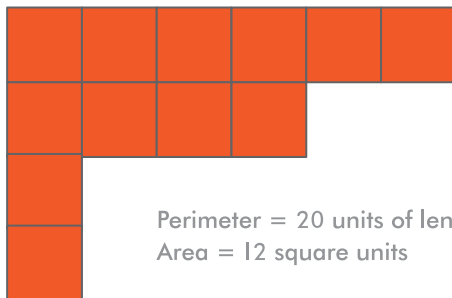
Perimeter = 20 units of length
Area = 12 square units

Fractions

The relationship between the various Pattern Block pieces and the yellow hexagon (refer page 5) may be used to develop early fraction concepts. Students should be alerted to the following features:

- A trapezium is half the area of the yellow hexagon
- A blue rhombus is one-third of the area of a yellow hexagon
- A green triangle is one-sixth of the area of a yellow hexagon

Later links may be made between equivalences such as the red trapezium (1/2) covering the same area as 3 green triangles (3/6).
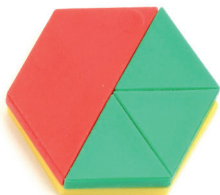
Fraction Pattern Block pieces may be added to existing sets of Pattern Blocks to extend their use in teaching fraction concepts.

Additional pieces

A mirror can be used to assist with determining line symmetry. Joining two mirrors to create a hinged mirror will help students determine the angle sizes of the various Pattern Block Pieces.
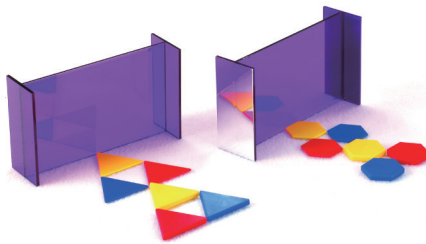
Mathematics

22292 Pattern Block Activity Cards-Advanced

39180 Geomirror

22070 Giant Foam Pattern Blocks

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