Pattern Blocks

Product code 015289, 015214, 090340

An Introduction to Manipulatives

A manipulative is any object that aids children in visualising mathematical processes. Our range of manipulatives includes Tangrams, Geoboards, Fraction Pieces, Fraction Circles, Fraction Bars, Linking Cubes, Pentominoes and Pattern Blocks. However, a manipulative can be as simple as a piece of string or a tin can.

Manipulatives are invaluable in the classroom because, as modern research tells us, children retain information gained from hands-on experiences better than information they gain from memorisation. They learn in a physical way - with their hands as well as their minds. As a physical learning aid, manipulatives encourage this natural learning process by adding a concrete element to ordinarily abstract concepts.

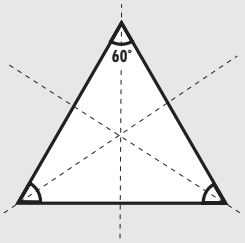
Above all else, children enjoy working with concrete materials - in the hands of young children, manipulatives will excite their natural curiosity and motivate them to take responsibility for their own learning. Children will become flexible thinkers with a knowledge of mathematics that can be applied to a wide variety of situations - instead of being taught seemingly unrelated rules, they will learn to be problem solvers.

Pattern Blocks

Pattern blocks include the following shapes: green triangle, blue rhombus, tan rhombus, orange square, red trapezium and yellow hexagon. The shapes are designed so that the sides are all the same length, except the trapezium which has one side twice as long. The activities that can be attempted using pattern blocks help students learn geometric concepts, spatial relationships and pattern awareness. As students use pattern blocks, they develop a geometric sense and a set of strategies for solving geometric problems.

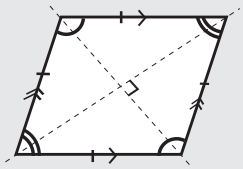
Shapes

Here is a short description of the properties of each of the shapes in pattern blocks. Introduce these concepts according to the level of understanding of the students.



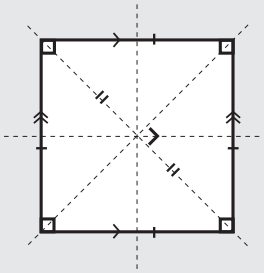
EQUILATERAL TRIANGLE

An equilateral triangle is a triangle with all three sides of the same length. This also means that all three angles of the triangle will be equal to 60 degrees. An equilateral triangle has three lines of symmetry.



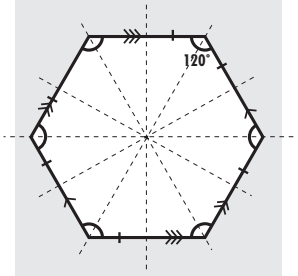
RHOMBUS

A rhombus is a quadrilateral with four equal sides. It has two lines of symmetry, opposite sides parallel, opposite angles equal and diagonals bisecting each other at right-angles. Pose students a quick question. What is the plural of rhombus? Answer: Rhombi.



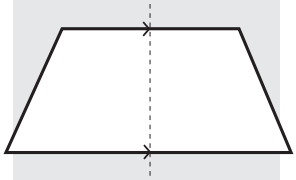
SQUARE

A square is a regular quadrilateral. It has four equal sides, four lines of symmetry, opposite sides parallel, all four angles equal to 90 degrees and diagonals equal and bisecting each other at right-angles.



HEXAGON

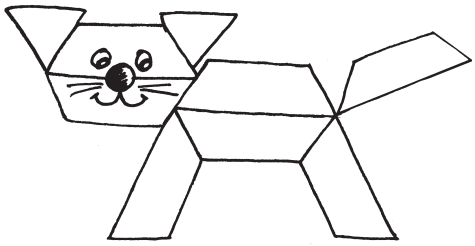
A regular hexagon has six equal sides and six angles each measuring 120 degrees. It has six lines of symmetry and opposite sides parallel.



TRAPEZIUM

A trapezium is a quadrilateral with one pair of sides parallel. It has one line of symmetry.

Introductory Activities



- To familiarise children with pattern blocks, and to avoid the universal "Maths? Yuk!" reaction, allow the children to engage in free play with the pieces. Ask them to make pictures. Perhaps ask them to make something beginning with "C". After playing, ask them what relationships they discovered between the blocks.
- Ask students to close their eyes, delve into the pattern blocks container and pull out a shape.

  Keeping their eyes closed, ask them to determine which shape they have picked up.

  Can they pick up and identify more than one shape in one hand?
- Build a pattern in front of the class. Have the children copy it at their desks and continue the pattern.

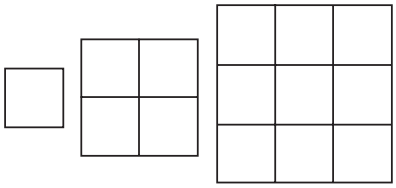
Patterns

- Have students make a pattern and then describe it in 3 sentences.
- Show students a simple pattern with pattern blocks that has an error. Ask the students to describe the pattern and notice if the error is discovered. Ask them what needs to be changed to correct the problem.
- Working in pairs and separated by a visual barrier, ask one partner to create a pattern concealed by the barrier.

  Ask the student to verbally direct their partner to replicate the pattern. Ask the partner to then continue the pattern.

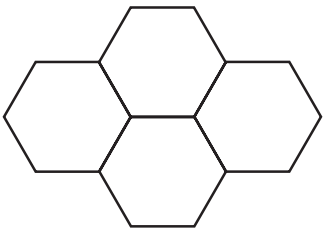
  Encourage students to give instructions without colour names.

Similar Shapes

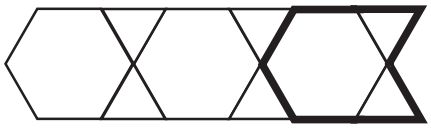


- Two objects are similar if they are the same shape but a different size. This means that all the corresponding angles are equal and all the lengths of one shape are in proportion to the corresponding lengths of the other shape. If two objects are the same shape and size they are congruent.
- Ask the children to investigate which of the pattern blocks they can use to build shapes that are larger but similar - such as four or nine squares to make a larger square.
- Challenge the children to make shapes with the pattern blocks that are congruent to other pattern blocks.

Tessellation



- Identical shapes are said to tessellate if they fit together without gaps or overlaps.
- Ask the students to investigate which of the pattern block shapes can be used to make a tessellation. They should find that all of the shapes tessellate.
- Ask them what kinds of shapes won't tessellate. For example, circles or pentagons.
- Challenge the students to find two shapes that fit together to make a shape that will tessellate. For example a hexagon and two triangles.
  What about a shape made from three shapes?



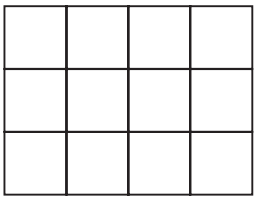
Area

- Hand out a sheet to each student with various shapes on it. Ask students to predict how many of a particular shape will be needed to cover the shape. Ask them to record their predictions and then try covering the shape. Ask them to predict the number of a different shape that would be needed to cover the drawing. For example a blue rhombus has the same area as two green triangles so it will take half as many blue rhombi to cover the same area.

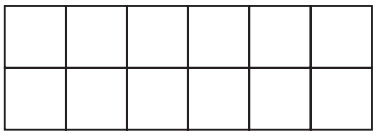
Area

- Distribute a set of square tiles to each student. Ask the students to describe different ways that a rectangle could be made using 12 squares.

  As the students use the square tiles and respond, draw a picture on the board to illustrate each rectangle. Point out that each of these rectangles has the same area.



- Challenge students to find all the ways to cover a blue rhombus with other pieces (there are two ways - two triangles and one rhombus). Use a similar procedure for the red trapezium and the yellow hexagon.



Trapezium

1 Trapezium
1 Rhombus, 1 Triangle
3 Triangles

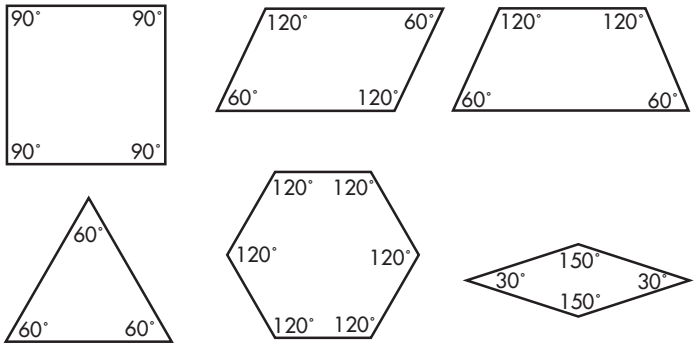
Hexagon

1 Hexagon
2 Trapeziums
1 Trapezium, 1 Rhombus, 1 Triangle
1 Trapezium, 3 Triangles
2 Rhombi, 2 Triangles
1 Rhombus, 4 Triangles
6 Triangles

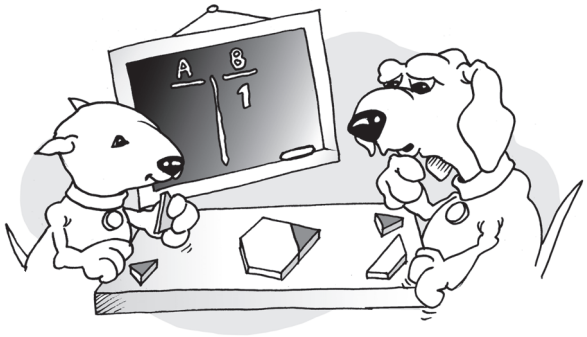
- For advanced students have the children record all their results using fractions, with the yellow hexagon assigned the value of 1. For example, if they build the hexagon with one red trapezium and three green triangles, they'll write: 1/2 + 1/6 + 1/6 + 1/6 = 1. Show students how to shorten that to 1/2 + 3/6 = 1.

Angles

- Have the students determine the angles of the various pattern block shapes using the right angle of the orange square as a reference. Get the children to record their results. Once finished, ask them to check their answers by measuring the angles.



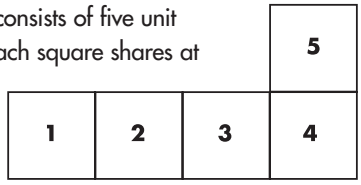
Shaping Up



1 Ask the students to form pairs and select three each of the following shapes: green triangle, blue rhombus, red trapezoid, yellow hexagon. Assign points for each shape. For example, green = 1, blue = 2, red = 3, yellow = 6.
2 Place a yellow hexagon in the centre of the playing area. This shape does not belong to either player.
3 The youngest player goes first by placing one of their blocks onto the playing area so that one side of the block is completely touching one side of the block(s) in play. The player scores their go by adding the values of the block placed and each of those that it touches on a side.
4 Play continues until both players have used all of their pieces and the winner is the player with the most points. For variation try changing the shapes, number of pieces or the number of points assigned to each piece.

Pattern Block Pentominoes

- Explain to the class what a pentomino is. A pentomino may be defined as a shape that consists of five unit squares joined together so that each square shares at least one whole side with another square. Draw an example on the board such as the diagram on the right.



- Have the children work in small groups. Give each group 5 square tiles and ask them to make as many different shapes as they can based on the definition given above - there are 12 possibilities. Remind them that the edges of each square must match exactly. Also explain rotation and flipping so that the children recognise that a shape they create may be the same as another except that it has been flipped or rotated. As a new shape is discovered, it is traced on graph paper. When one group has discovered all 12, share them with the class.