Geometry Cut-Out Puzzles ✂
Introduction

In his book: A mathematician's Delight, the renowned mathematician W.W. Sawyer wrote:

"The best way to learn geometry is to follow the road which the human race originally followed:

- Do things,
- Arrange things,
- Make things,
- And only then,
- Reason about things."

The activities contained in Geometry Cut Out Puzzles have been designed with the above principles in mind.

Spatial puzzles can at times be frustrating as there are less logical steps to follow than when completing a problem-solving task. Often students employ a 'trial and error' approach, pushing around the pieces until some shape or image falls into place. There are some things to look for such as 90 degree or right angles forming corners, much in the same way that you might tackle a jigsaw. Students can look at how two triangles might be joined to form a square or how folding a square in half along a diagonal forms two isosceles triangles. Some students will experience difficulty explaining how they solved a spatial puzzle as they may not possess the appropriate language or spatial visualisation. Students might draw or use gestures to explain how they moved the pieces around. Spatial awareness tends to develop over time as a result of completing puzzles such as those found in this booklet.

As students complete the Cut and Re-form Activities in this booklet they will be learning about:

Shape

- Names of common 2D shapes, and shape families.
- **Triangles**

    - Scalene, isosceles, equilateral and angles: acute, right and obtuse.

- **Quadrilaterals**

    - Square, rectangle (oblongs – rectangles that are not square), rhombus, trapezium,parallelogram, kite, etc.

- **Polygons**

Transformation

- Flip, slide and turn, that is, reflecting and rotating pieces as they form various shapes.
- 2D Shapes and 3D objects.

Mathematical Language

As students participate in these activities they will be improving their mathematical language and learning not just about shape names, but using words like parallel, perpendicular, similar and congruent.

Geometry and Measurement

At times students will be required to use their measurement skills to complete certain tasks, which makes sense as typically you need to work out the perimeter and area of standard shapes such as squares, rectangles and triangles.

Approaching the Puzzles

Often, when joining shapes they need to be joined along their **edge** as shown in diagram one. However, we have noted on the applicable cards the exceptions where the answer requires shapes to be joined **offset** to one another as shown in diagram two and joined by the **points** as shown in diagram three.
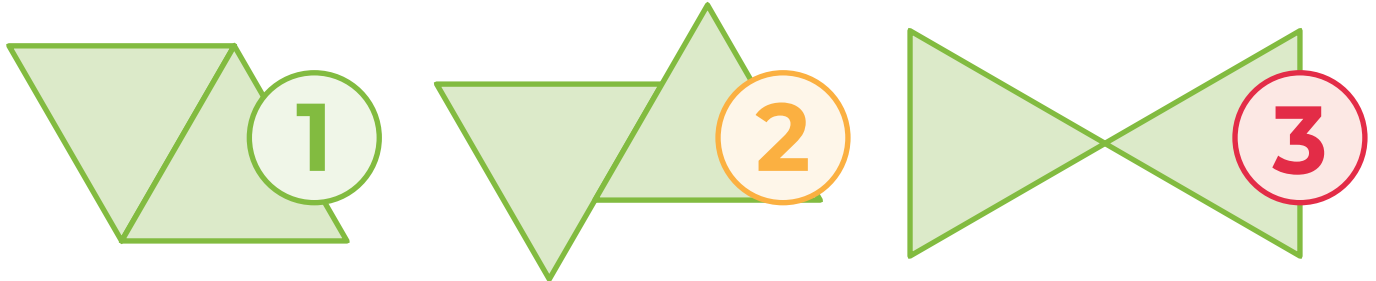
Cut Outs

We have included two sets of cut-outs at the back of the book that may be photocopied for students to cut up to solve the puzzles. This means that only one or two copies of the set of Puzzle Cards need to be printed as they can be shared among the class. We appreciate that some students may find small pieces hard to manipulate so we have provided a small and large version of the cut-outs. It may also help to enlarge or print these cut-outs on card.

A student can select a card to try, find the appropriate cut out in their own pack and use scissors to cut this shape out. Most pieces have also been numbered according to the puzzle number so once cut out they may be placed into a sealed bag and re-used.

Answers

A set of answers has been provided, however with spatial problems students may have placed the pieces in a different orientation or placed a piece in a slightly different position so there may be variations or alternative answers.

Other Geometric Reasoning Puzzles

For other geometric reasoning puzzles see '**Toying with Tangrams**', '**Pattern Blocks**', '**Geometry Stick Puzzles**' **ebook** and **'Geometry with Pentominoes' ebook** for further ideas.
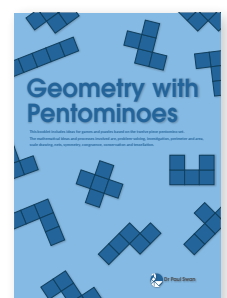
Greek Cross 1

1

Cut out the four pieces and re-arrange them into a square.

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Greek Cross 2

2

Cut out the pieces and re-arrange them into a square.

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