

Curriculum Links

Year 2: Describe and draw two-dimensional shapes, with and without digital technologies (VCMMG120)

Investigate the effect of one-step slides and flips with and without digital technologies (VCMMG123)

Big Mathematical Idea

There is a specific geometric language we use to describe two-dimensional shapes. Objects can be moved but changing position does not alter an object's size or features.

Materials

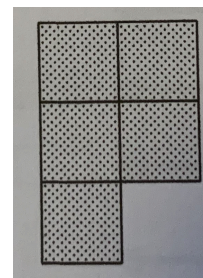
5 square tiles per student

1 whiteboard and marker per student

Launch

Warm up: Back-to-back drawing. Put students in pairs with 4 tiles, a whiteboard and a marker. Student A creates a tetromino (a 2D shape made from four identical square units) and describes what it looks like to their partner. Student B attempts to draw it based on the description. Check it and swap roles. Bring the group back together and reflect on the helpful language/terms used (i.e. beside, right, above, next to, between).

- Define polyominoes as **shapes made from identical unit squares joined edge to edge**. The students will be interested to learn that the name of the polyomino changes depending on how many square units it is made from.
- **1 square unit = monimo, 2 square units = domino, 3 = triomino, 4 = tetromino, etc**
- A shape with 5 square units is called a pentomino. I call this one (pictured) the 'P' pentomino as it looks like the letter 'P'. There are 11 more pentominoes to find. See if you can find them all.



Teaching Notes:

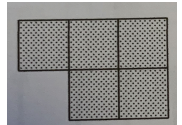
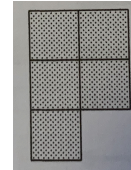
1. Ensure students understand that each square unit must be joined to the shape by one or more adjacent edges.



- Record and refer to the geometric language that the students use on the whiteboard throughout the investigation.

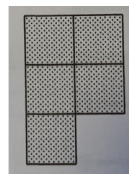
Explore

- Give students time to manipulate the tiles to find solutions. When they find a solution, get them to draw it on their mini-whiteboard).
- After 6-8 minutes of exploration, bring the class back together and explore the idea of shape conservation - changing position does not alter an object's size or features.



Are these the same shape? Ask students to justify and convince their peers?

What about these?



- Once you have established the idea of conservation of shape, allow 5-8 more exploration time.
- During this time, invite individual students to draw one solution of the whiteboard. For each example, ask the student to give that pentomino a name (i.e. the 'P' pentomino) and write it next to their example.

Enabling Prompts

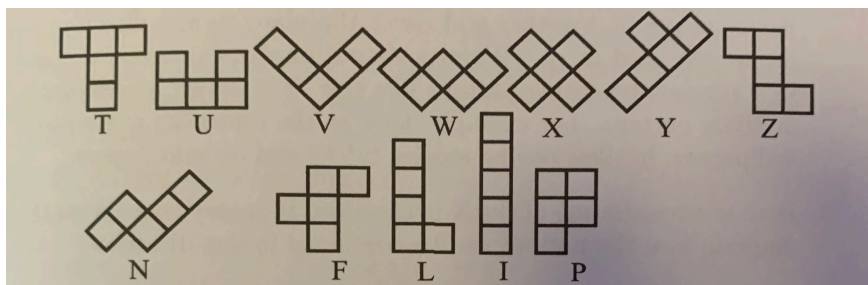
- Explore the problem with tetrominoes (4-tiled shapes).

Extending Prompts

- Can you find a systematic way to find all of the pentominoes?

Summarise

- Explore the range of solutions and work with the students to eradicate any non-examples on the whiteboard.
- You may make mention of the fact that each of the 12 pentominoes can be turned around to look like a letter of the alphabet.



Exit Ticket

- Ask the students to choose a word from the list of geometric words used and explain what it means to a partner.

Key Questions

- Can you convince me that this is a unique solution?

Key Terms

- Polyomino, pentomino, flip, turn, rotate, mirror, next to, beside, between, above, below, right, left,

Follow up Investigations

- Investigate hexominoes.
- Find and interpret different ways to sort the pentominoes.
- Which pentominoes tessellate?

Understanding Geometric Properties Growth Points

Understanding geometric properties	
This sub-element describes how a student becomes increasingly able to identify the attributes of shapes and objects and how they can be combined or transformed. Being able to use spatial reasoning and geometric properties to solve problems is important for a range of tasks. For example, dissection and rearrangement combined with basic geometric properties underpins surveying and building design, as well as interpreting plans. Some students will communicate using augmentative and alternative communication strategies to demonstrate their numeracy skills. This may include digital technologies, sign language, braille, real objects, photographs and pictographs.	
Level	Indicators
Each sub-element level has been identified by upper-case initials of the sub-element name followed by ascending numbers. The abbreviation for this sub-element is UGP. The listing of indicators within each level is non-hierarchical. Subheadings have been included to group related indicators. Where appropriate, examples have been provided in brackets following an indicator.	
UGP1	Familiar shapes and objects • uses everyday language to describe and compare shapes and objects • finds similar shapes or objects in the environment
UGP2	Features of shapes and objects • identifies and describes features of shapes and objects • describes what an object may look like from a different perspective • recognises features of shapes of different sizes and in different orientations following flips, slides and turns • sorts objects based on their features Angles • identifies angles as greater than, less than or equal to a right angle

UGP3	Properties of shapes and objects • relates the faces of a three-dimensional object to two-dimensional shapes • aligns the corresponding faces of an object and its net • identifies the relationship between the number of edges of a shape and the number of corners (if the shape has 4 edges, it has 4 corners) • represents shapes and objects (sketching, model building, digital drawing packages)
UGP4	Symmetry • recognises that shapes can have lines of symmetry (by folding shapes or using mirrors) • identifies the different shapes that enable the creation of symmetrical designs
UGP5	Angles and lines • recognises the angles at a point add to 360° • estimates and identifies measures of angles in degrees up to one revolution • uses angle properties to identify perpendicular and parallel lines
UGP6	Geometric properties • uses relevant properties of geometrical figures to find unknown lengths and angles

Pentomino pieces (for follow-up investigations)

