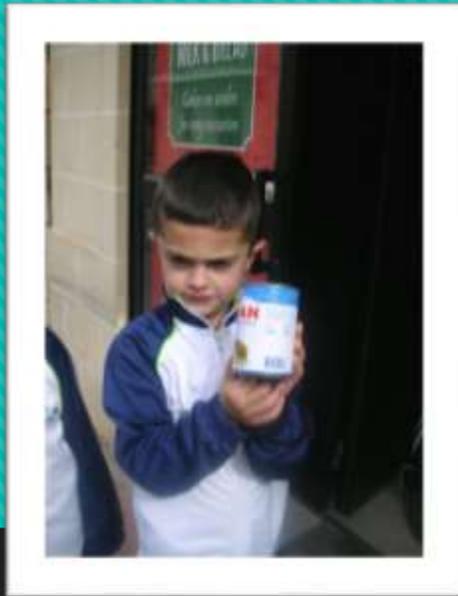


Shape and Space



Year 1 Inset 2018

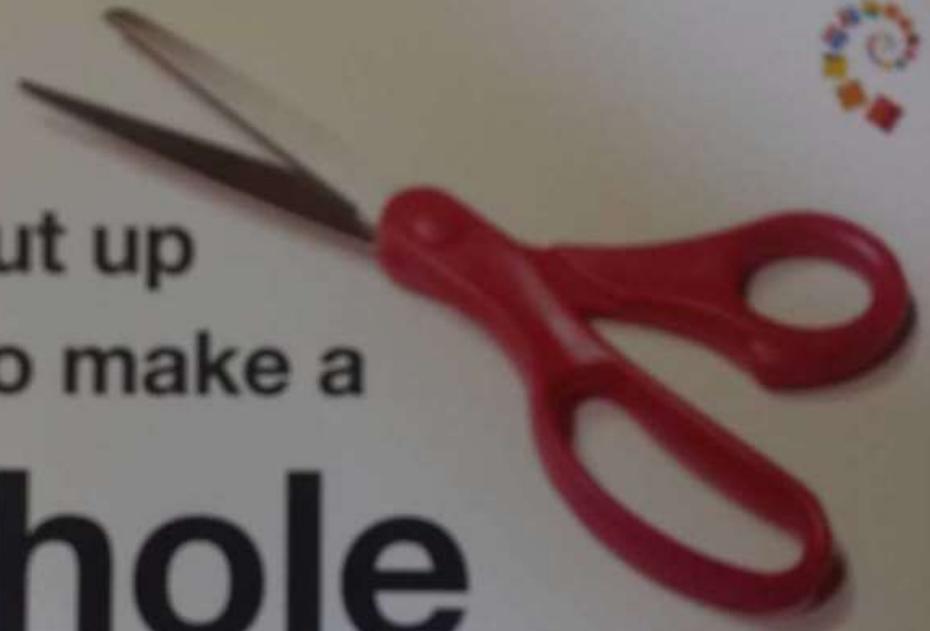
Warmer

Can you cut up
this card to make a

hole

big enough to walk through?

wild.maths.org



Syllabus Reference

Space and Shapes	J. Shapes and Symmetry	p. 82 – p. 87
	K. Position, Direction and Angles	p. 88 – p. 91

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.1.1	name (begin to) 3-D (solid) shapes and 2-D (flat) shapes.	Shape square circle triangle rectangle side corner straight cube cuboid cylinder cone pyramid face	<ul style="list-style-type: none"> handling common 2D and 3D shapes and find corresponding shapes in the surrounding environments through fun activities such as shape hunts. explaining the differences and similarities between two given shapes in response to questions such as, “Why is this a square?” using vocabulary related to properties of shapes. predicting if 3D shapes will roll or slide on an elevated surface, justifying the reason/s why, then confirming through practical activities. using a variety of shapes to make models, pictures and patterns, and describe them. recognising shapes in different orientations as in <i>Figure 1</i> and sizes. e.g. while being partly revealed from an envelope or using the hide and reveal technique on the interactive whiteboard.
J.1.2.	put sets of objects and shapes in order of size.		
J.1.3	talk about, recognise and recreate patterns.		
J.1.4	identify symmetrical objects in the environment.		

Syllabus Reference

YEAR 2			
LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.2.1	name and talk about 2-D (flat) shapes and their properties such as the number and type of sides and the number of corners.	Shape square circle triangle rectangle side corner straight cube cuboid cylinder cone	<ul style="list-style-type: none"> handling common 2D and 3D shapes and find corresponding shapes in the surrounding environments through fun activities such as shape hunts. explaining the differences and similarities between two given shapes in response to questions such as, "Why is this a square?" using vocabulary related to properties of shapes. comparing and contrasting 2D and 3D shapes by stating their properties. making models using various 3D shapes from real-life and describe them. making patterns and pictures with 2D shapes using construction kits,
J.2.2	name and talk about 3-D (solid) shapes and their properties such as the number and shape of faces, edges and corners.		
J.2.3	recognise and draw the line of symmetry of familiar objects and shapes around them.		
J.2.4	recognise line symmetry.	pyramid face flat solid curved half line of symmetry	<ul style="list-style-type: none"> geoboards, playdough and other materials and describe them. relating solid shapes to pictures of them. exploring the line of symmetry of different pictures or shapes using folding and mirrors. completing the missing half of a symmetrical shape, picture or pattern using mirrors, shape construction kits, drawing. exploring symmetrical patterns through interactive whiteboard activities

Syllabus Reference

YEAR 3			
LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.3.1	use the mathematical names for common 3-D (solid) and 2-D (flat) shapes.	pyramid cylinder pentagon hexagon octagon faces edges corners line of symmetry symmetrical shape symmetrical pattern	<ul style="list-style-type: none"> handling common 2-D (flat) and 3-D (solid) shapes and finding corresponding shapes in the surrounding environments through fun activities such as shape hunts. taking photographs of (or draw) various objects around them showing various 2-D (flat) and 3-D (solid) shapes. explaining the differences and similarities between two given shapes in response to questions such as, "How is a hexagon different from a pentagon?", using vocabulary related to properties of shapes. comparing and contrasting 2-D (flat) and 3-D (solid) shapes by stating their properties. using solid shapes, templates, geoboards and elastic bands, squared paper and interactive onscreen activities to make pictures and models. Extend this activity by presenting the data of shapes needed for each model using graphs and / or tables. relating 3-D (solid) shapes to pictures of them. exploring the line/s of symmetry of different pictures or shapes by folding and by using mirrors (include flags, traffic signs, alphabet letters and numbers). completing the missing half of a symmetrical shape, picture or pattern using mirrors, shape construction kits or drawing. creating symmetrical patterns through cooking, crafts and science related activities (observe leaves and carry out leaf rubbing, decorate
J.3.2	sort shapes according to their properties and describe some of their features, such as the number of sides and corners, symmetry (2-D [flat] shapes), or the shapes of faces and number of faces, edges and corners (3-D [solid] shapes).		
J.3.3	make and describe shapes, pictures and patterns.		
J.3.4	recognise line symmetry and continue the other half of a simple symmetrical shape or picture..		

Syllabus Reference

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.1.1	follow instructions about positions, directions and movement.	above below beside next to before after up down left right between	<ul style="list-style-type: none"> • following instructions about positions, directions and movements in PE and other activities (e.g. clearing up and scavenger hunts). • following instructions and/or describe positions, direction and movements on grids (e.g. bee-bot). • giving instructions to each other during games and other activities.
K.1.2	recognise and use the language of movement.		
K.1.3	recognise and use the language of position.		
K.1.4	recognise and use the language of direction.		

Syllabus Reference

YEAR 2			
LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.2.1	follow instructions related to positions, direction and movement.	before after in front of	<ul style="list-style-type: none"> following a sequence of instructions, use and experience positional vocabulary in different contexts (e.g. PE, games, online activities, maths trails). programming instructions using a roamer (e.g. bee-bot). combining two movements into one (e.g. forward 3 and forward 4 is forward 7, forward 5 and backwards 2 is forward 3). using task cards to create models and/or drawing using positional vocabulary. recognising opposites in everyday language related to position, direction and movement. talking about things that turn (e.g. clock hands, roamers, cars, themselves) identifying the difference between left and right through practical situations (may also include games like <i>Twister</i>). comparing whole and half turns with the movement of the clock hands and other similar activities. (e.g. physical movements, drawings).
K.2.2	use everyday language to describe position, direction and movement.	between up down	
K.2.3	recognise right and left.	left right	
K.2.4	recognise whole and half turns.	forward backwards sideways opposites whole half turn	

Syllabus Reference

YEAR 3			
LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.3.1	use mathematical vocabulary to describe position, direction and movement.	clockwise anticlockwise turn forwards backwards towards straight line half corner angle right angle	<ul style="list-style-type: none"> describing, placing, ticking, drawing or visualising objects in given positions. giving instructions for moving along a route in straight lines and round right-angled corners (e.g. to pass through a simple maze). drawing and following a path on a grid to show a route followed. practising clockwise and anticlockwise for half turns and quarter turns on paper, by rotating themselves and/or by using roamer. understanding the term angle as the meeting point of two edges or sides and /or part of a turn. identifying right angles as quarter turns. recognising right angles in squares and rectangles. identifying right angles in different environments using a template (e.g. angle eater) making a right angle measure. using mazes, whether it is walking through mazes, or pen and paper
K.3.2	consolidate whole and half turns and recognise quarter turns.		
K.3.3	recognise clockwise and anticlockwise turns		
K.3.4	recognise angles and identify a right angle.		

Difficulties and Misconceptions

- Shape Properties
- Shape Orientation and Rotation
- Confusing 3D and 2D Shapes
- Symmetry is not halving
- Left and Right

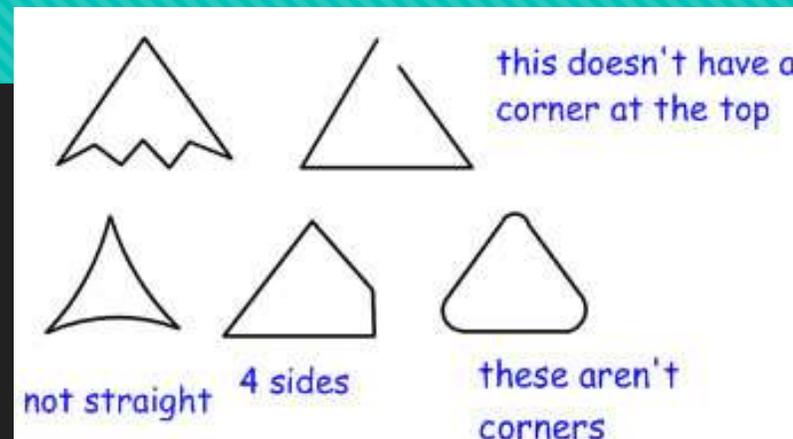
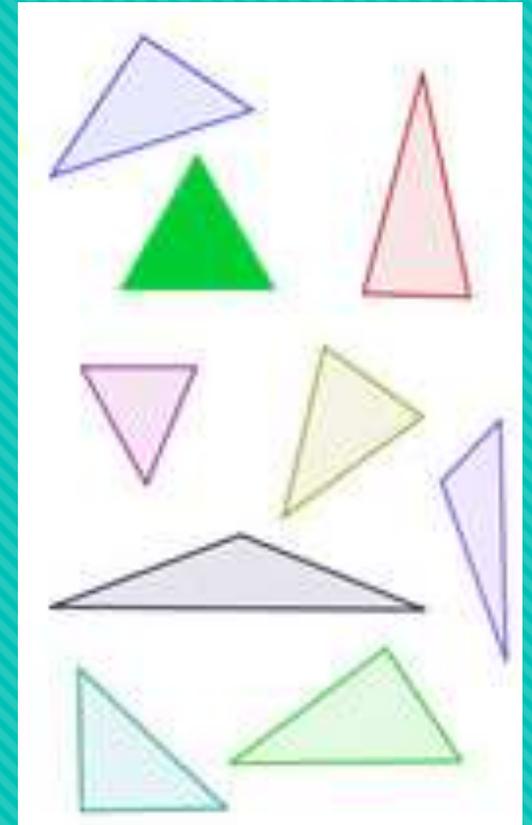


Shape Properties

Many pupils come to associate a particular shape with a mental image, for example, all triangles being equilateral and sitting on its base.

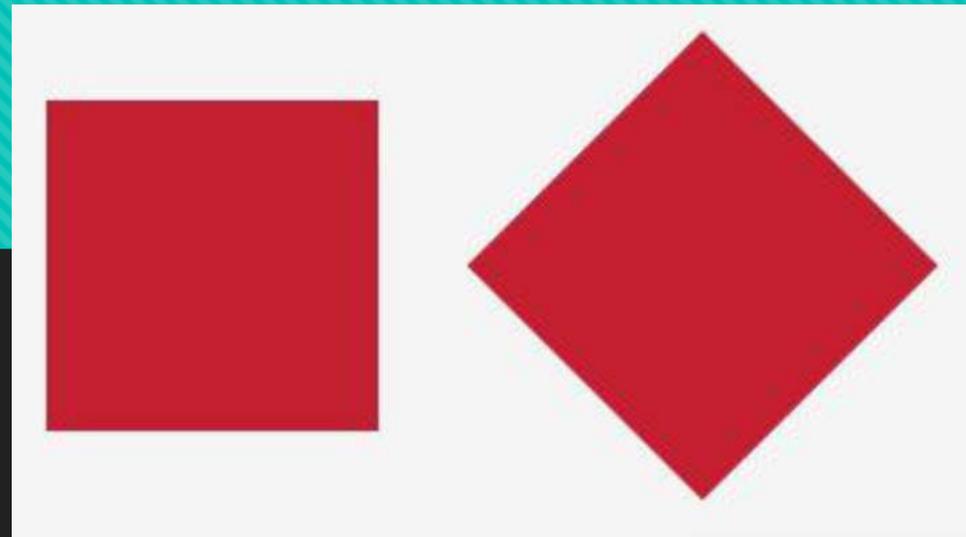
Expose the students to various visual and concrete representations.

Include many types of triangles and non-triangles.



Shape Orientation and Rotation

Identifying shapes when they are positioned in a "non-standard" way can be problematic, especially a square with a vertex at the bottom. A square with a vertex at the bottom is often identified as a rhombus or kite, and not recognized as square. A similarly non-aligned rectangle might be recognized as a parallelogram but not a rectangle.





<http://www.cookie.com/kids/games/tetris-mania.html>

Confusing 3D and 2D shapes

Using the word 'shape' to describe 2-D shapes and 3-D shapes can cause confusion for pupils. It may be helpful for teachers to use the following convention:

call 2-D shapes - flats

call 3-D shapes – solids, containers

Moving from 3-D to 2-D

Unfolding 3-D Shapes



Even though pupils are only beginning to explore shape at an early stage, they will be fascinated to observe everyday 3-D shapes being unfolded into nets. The pupil's curiosity will be sparked by the notion that 3-D shapes can be broken down into 'flat' or 2-D shapes.

Symmetry not halving

Halving a shape is not always symmetrical.



Use folding techniques and mirrors to reveal the symmetry of an object of shape.



Left or right?

Have children place their hands palm down in front of them with the thumbs touching. The left hand looks like the letter L and explain this reminds them it is a left.



Interdisciplinary Opportunities – Mission Based Learning



<https://www.youtube.com/watch?v=GFo2uANiVLs>

What is a Math Journal?

Opportunity for students to reflect on their strategies and assess their own learning using Mathematical prompts.

Look at the shapes.

Build towers using different 3D shapes as a base.

Discuss and decide if the shape makes a good base.

Explain why.

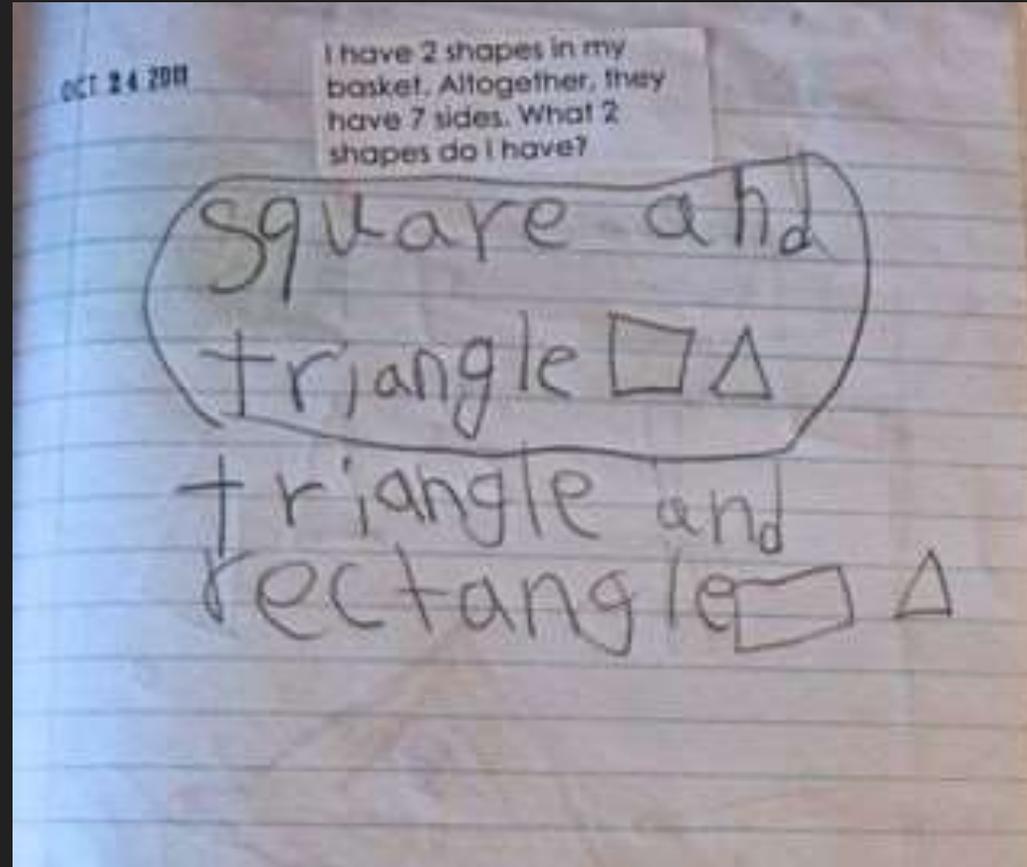


_____ makes a good base

because _____

_____ does not make a good base

because _____



Why Math Journaling?

**Focus is shifted from
computations to
problem solving and
real life application.**

**Journaling is an
open ended and
naturally
differentiated
tool.**

**Teacher gains insight
into children's
abilities, knowledge,
understanding and
misconceptions.**

**It is a record of
students'
growth and
progress.**

Higher order questioning

Changing the way a question is phrased can make a significant difference. Good questions are:

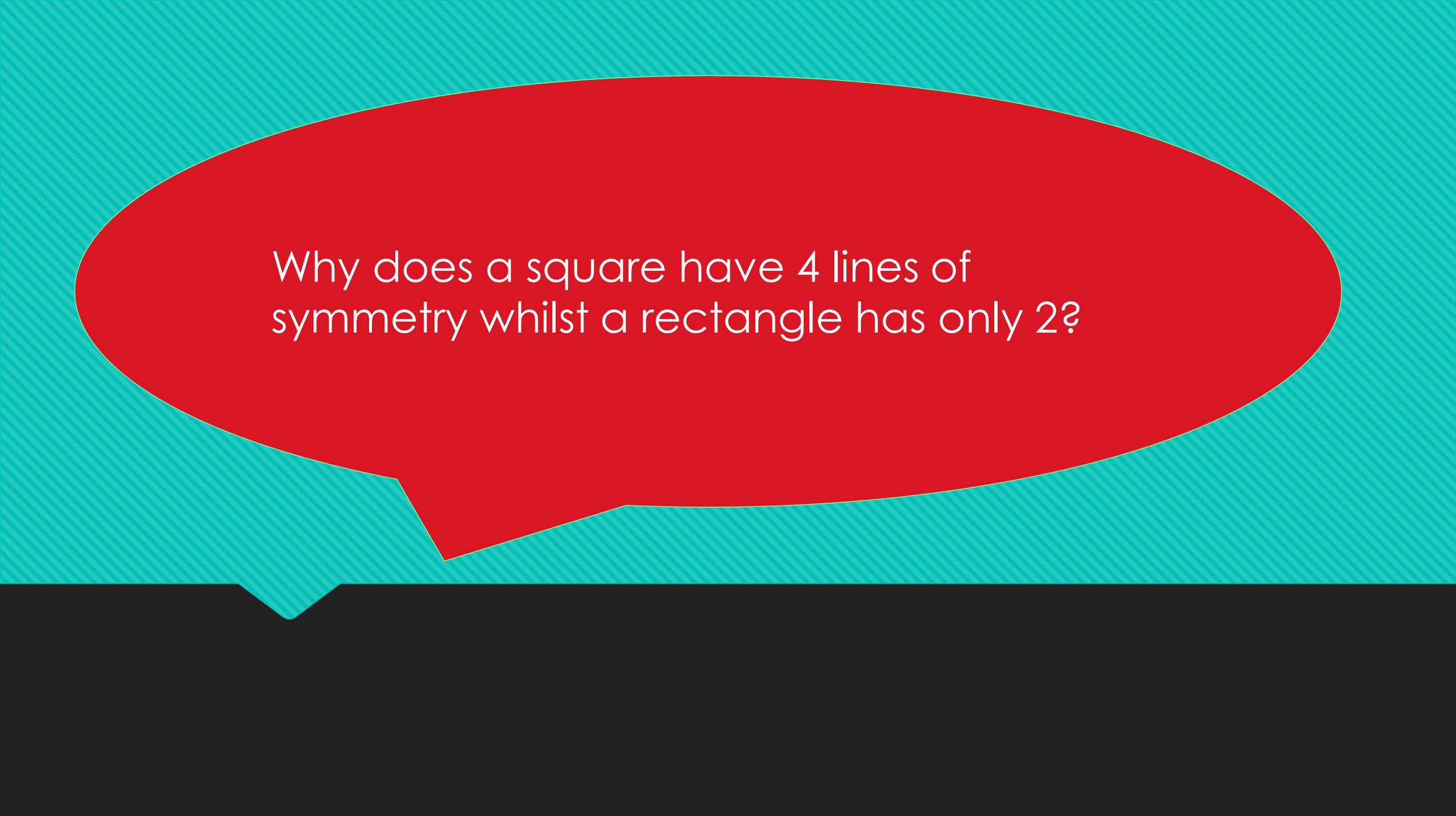
Are self differentiating

Promote dialogue

Lead to more good questions

There is a group of 2-D shapes in a bag. Altogether there are 14 sides. What shapes could be in the bag? Explain your answer using pictures, numbers and words. Make a different group of shapes that also has 14 sides.

Build a tower using various 3D shapes putting the cuboids lying on their longest face. How can you make your tower taller using the same amount of shapes? Explain why.



Why does a square have 4 lines of symmetry whilst a rectangle has only 2?

Jake climbed up the beanstalk.



Find 5 ways, he can get from the starting point to the top?

Hinge point question

How many sides does a rectangle have?

- A) 3
- B) 4
- C) 8
- D) 5

Which of these is a 3D shape?

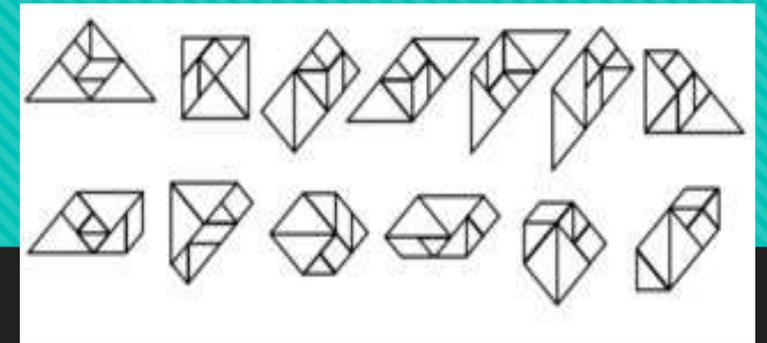
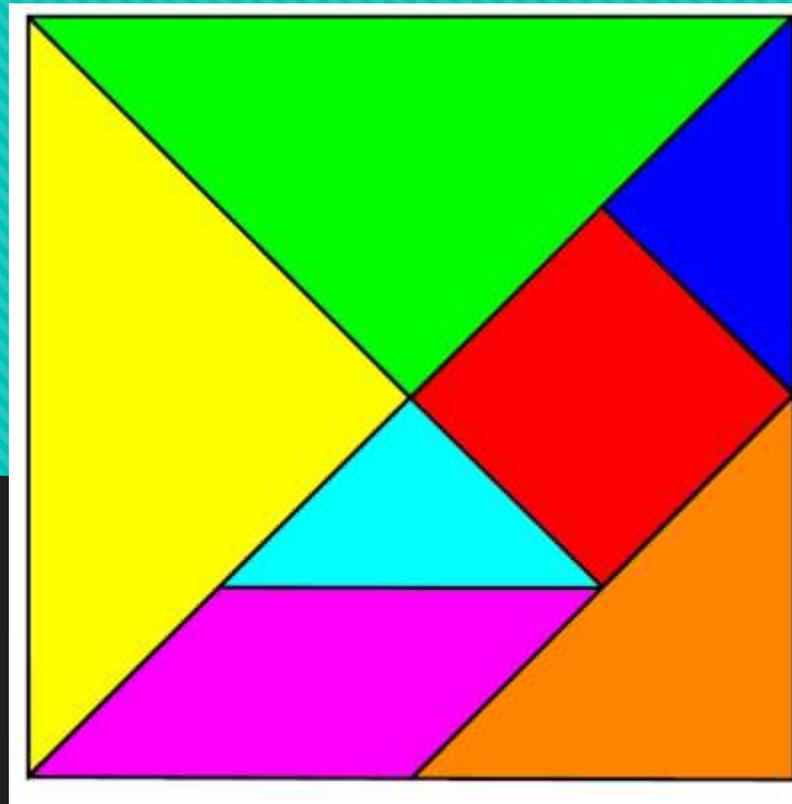
- A) cube
- B) triangle
- C) circle
- D) square

Workshop 1: Tangrams

A tangram is a Chinese puzzle consisting of 7 shapes (or "tans"). It helps to improve spatial skills and boost mathematics performance.

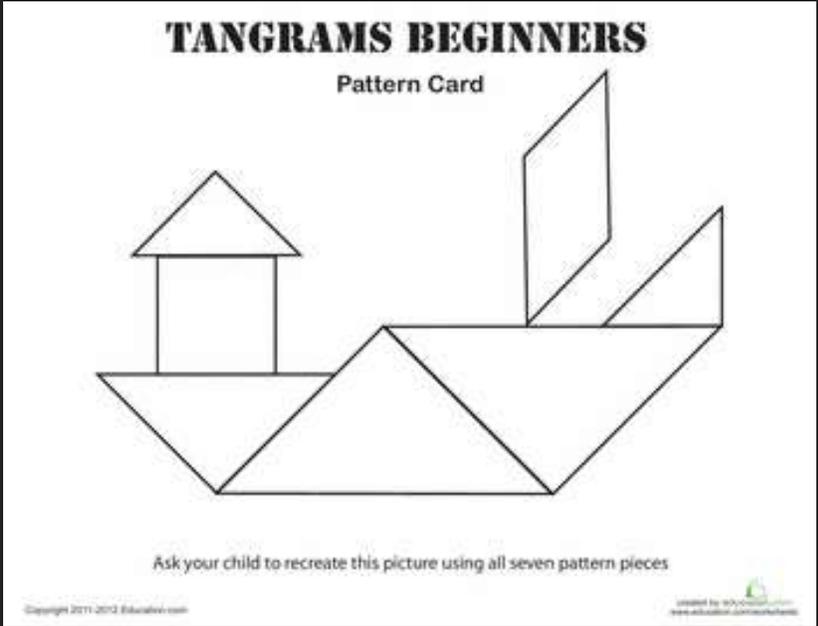
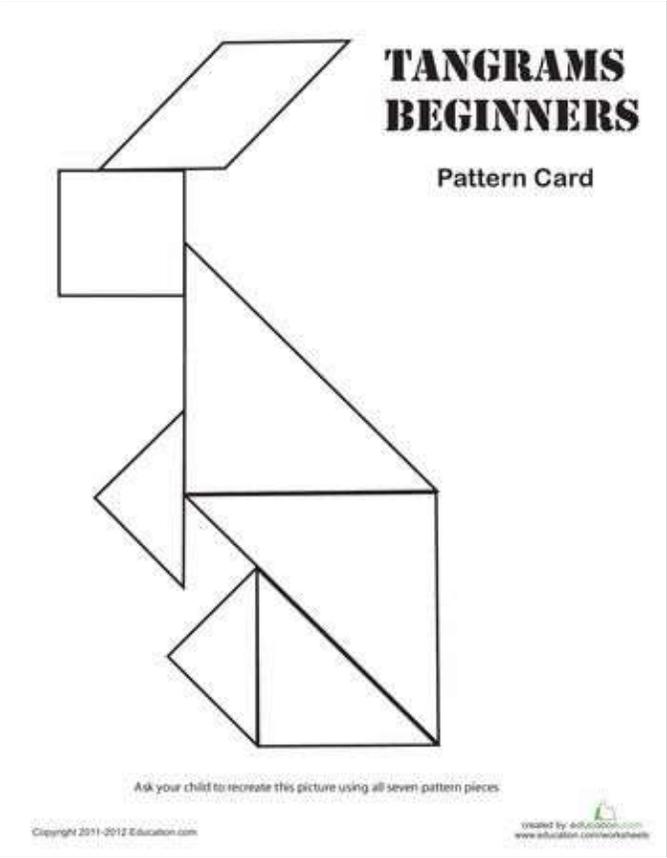
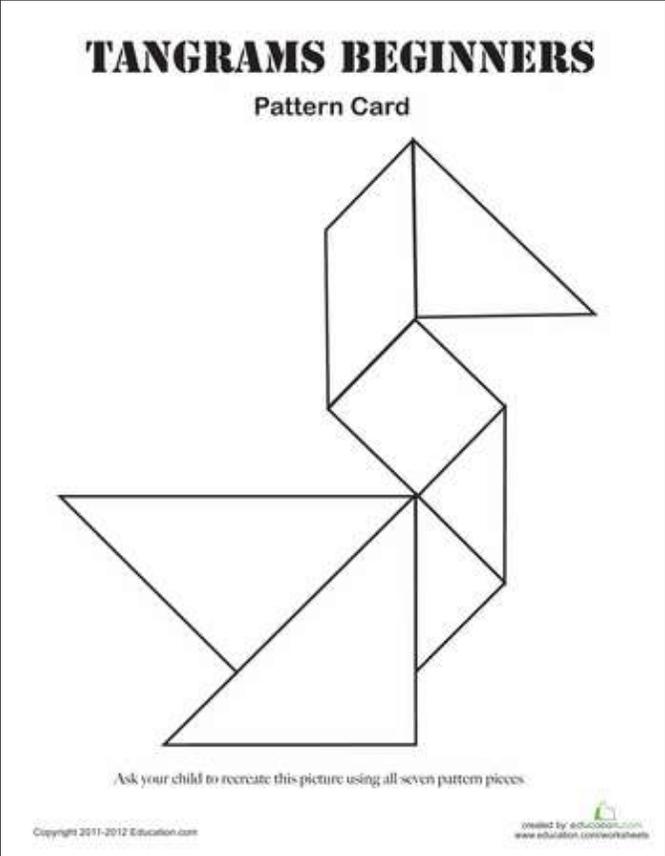
It includes the following pieces:

- Two large right triangles
- One medium sized right triangle
- Two small right triangles
- One small square
- One parallelogram

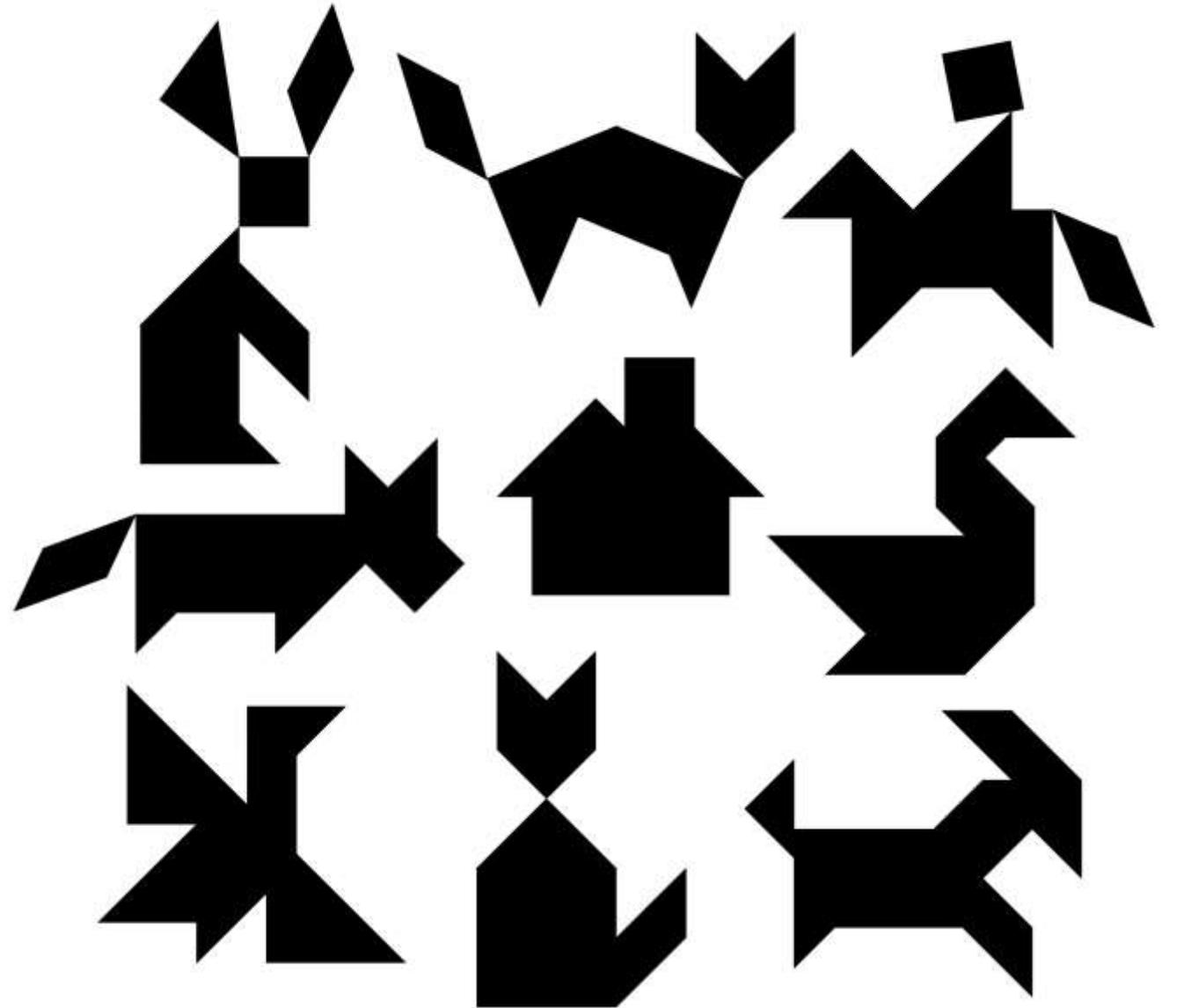


There are many ways to play with tangrams. The simplest way is to let kids create their own complex shapes.

The next stage would be to have students place the correct shapes on given templates.

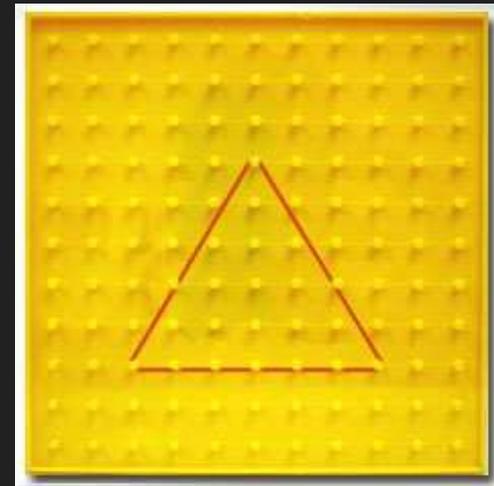


Traditionally, tangrams are treated as puzzles. The player is shown a target shape (in outline, or silhouette only) and then asked to recreate that shape using the seven pieces.



Workshop 2: Geoboards

A **geoboard** is a mathematical manipulative used to explore basic concepts in plane geometry such as perimeter, area and the characteristics of triangles and other polygons. It consists of a physical board with a certain number of nails half driven in, around which are wrapped geo bands that are made of rubber.



Workshop 3: Building landmarks using 3D shapes



Workshop 4: Direction – A cross curricular opportunity





I can do this!



I'm getting there.



I need help!