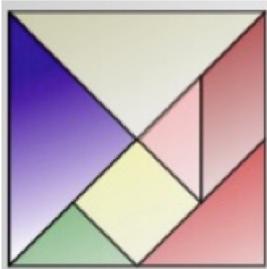


TANGRAM PATTERN



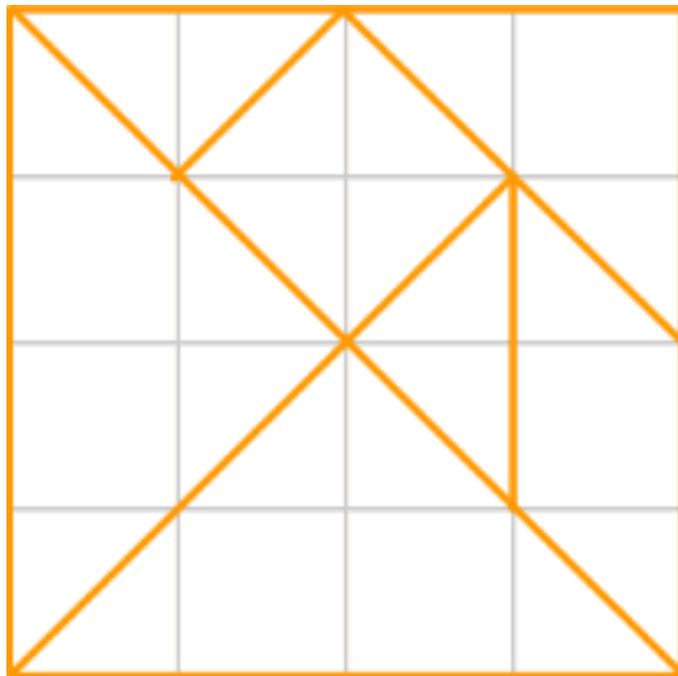
Arrange the 7 tangram pieces to make the pattern in the grey picture.

What do you notice about this pattern?

Describe the shapes of the tangram pieces.

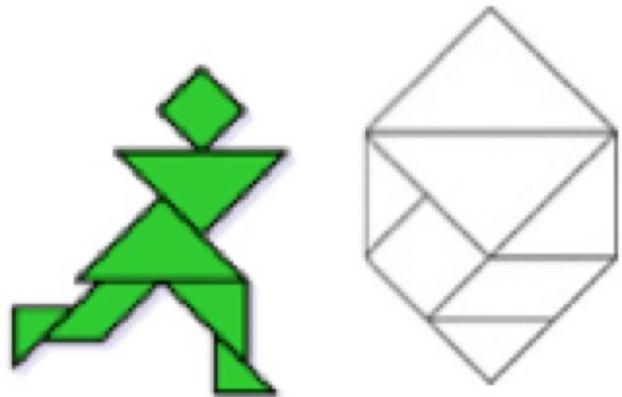
What is the same and what is different about the shapes of the tangram pieces?

Make a pattern of your own using all 7 pieces.



You can cut out your own tangram pieces to make the grey pattern.

Here are some more patterns for you to make with the tangram pieces.



NOTES FOR TEACHERS

Why do this activity?

This activity is very open ended and so all learners should experience success in making the patterns, creating their own patterns and observing the geometrical properties. The activity is designed to lead to spontaneous discussion of symmetry and teachers can pursue this as far as they think appropriate for their class. To make the puzzles easy for young learners they are given showing the individual pieces (actually solutions to the puzzles). The template shows a background grid to facilitate drawing it and also to suggest other questions that can be asked about the individual pieces.

Intended learning outcomes

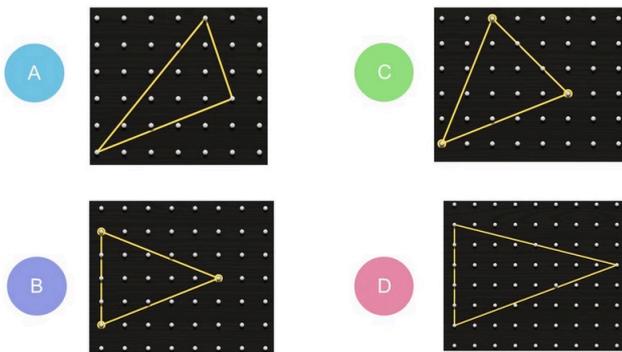
- Recognition of triangles, squares and parallelograms.
- Development of understanding of similarity and scale by comparing the triangles.
- Development of understanding of line symmetry.

Diagnostic Assessment

This should take about 5–10 minutes.

- Write the question on the board, say to the class:
“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D”.
- Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
- Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
- Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.** It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.

Which of these shapes is a right-angled triangle?



- If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

A. is the correct answer.

Common Misconceptions

Learners who give answers **A.**, **B.** or **D.** probably have the misconception that for an angle to be a right angle the two ‘arms’ have to be horizontal and vertical, and so they are just guessing.

<https://diagnosticquestions.com>

Intended learning outcomes

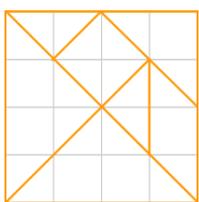
- Recognition of triangles, squares and parallelograms.
- Development of understanding of similarity and scale by comparing the triangles.
- Development of understanding of line symmetry.

Possible approach

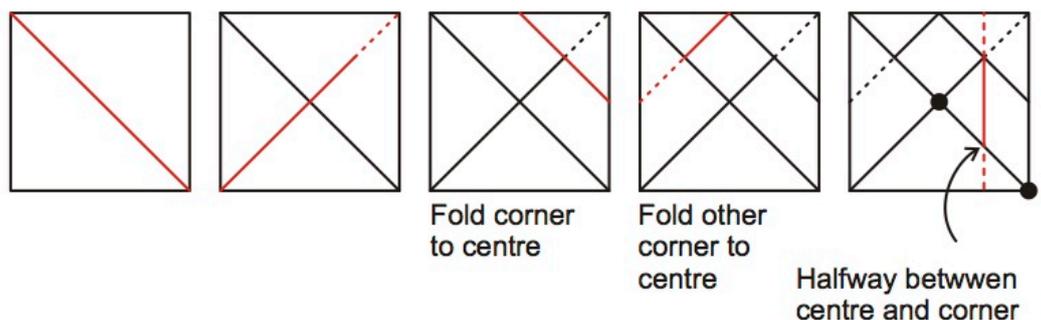
Start with the diagnostic question. After the first round and explanations from learners as to why they chose their answers, show the class a plastic right angled triangle that is NOT isosceles or one cut out of a paper. Rotate the triangle so they can see it in different positions. Ask “Is it still right angled?” Then ask the class again to vote for the right answer to the diagnostic question. Then ask questions about the other 3 triangles in turn and ask the question “What is the same about the triangles B, C and D and what is different?” – answer “They are all isosceles triangles with mirror symmetry but they are different sizes.”

Either give each learner

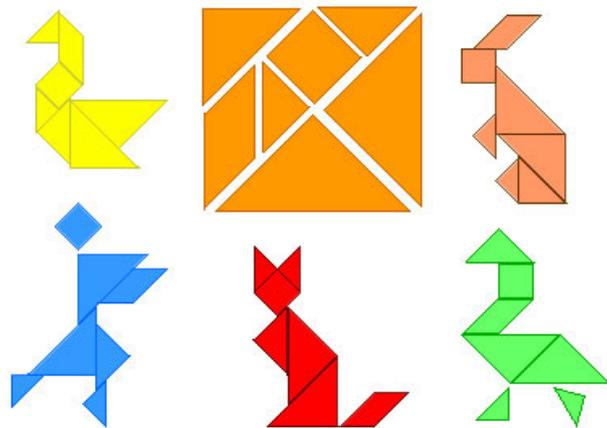
- a set of tangram pieces or
- a copy of the template to cut out or
- A square of paper and help them to make their own tangrams following the instructions here.



Here's a simple way to make a Tangram without any measuring or ruling lines. All you need is a square of paper and some scissors to cut out the shapes when you've finished folding. Follow the steps shown in each diagram and remember that every fold you make is finding half of a shape or line.



Draw the grey pattern on the board and ask the learners to make it with their pieces. Ask the learners what they notice. You might like to record their observations on the board. Ask the key questions. Build on what the learners say helping them to learn the correct mathematical language in which to express their ideas.



Choose how far to pursue the discussion of symmetry and reflections and also discussion of similarity between the triangles. For example: the edges of the largest triangles are double the edges of the smallest triangles so they are *similar* with a *scale factor 2* and one is an *enlargement* of the other.

Give the learners the other puzzles to make the people and the animals in the diagrams given here. The learners will enjoy this and it will help them to develop their visualisation of shapes and their properties.

You might ask the learners to make up a story about the tangram people and animals.

Key Questions

What do you notice about the grey pattern?

How many different shapes do you see in the grey pattern? What are they called?

Look at the 5 triangles – what is the same and what is different about them?

Look at the square and the parallelogram – what is the same and what is different about them?

How have you made two parallelograms in the grey pattern?



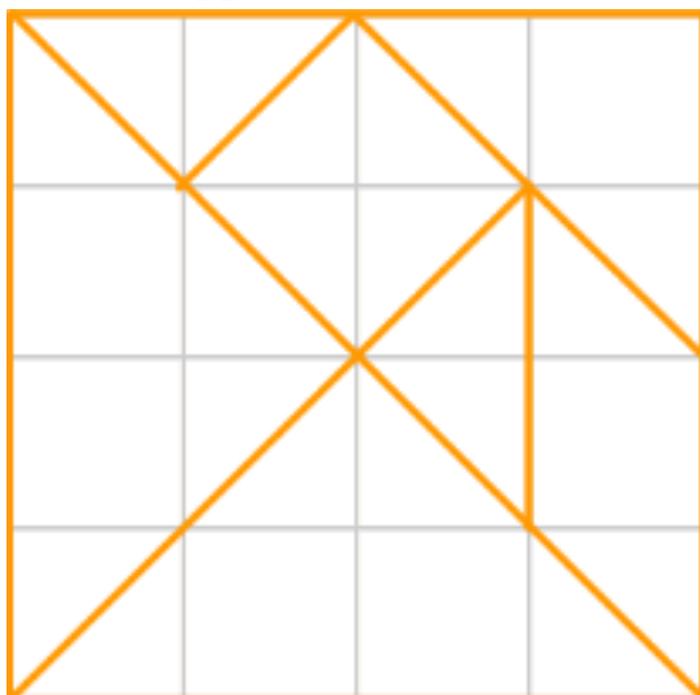
Look at your two hands in front of you. What is the same about them and what is different?

Where is the mirror line in the grey pattern?

Possible extension

You might like to follow on with Tangram Fractions: <https://aiminghigh.aimssec.ac.za/grades-6-to-10-tangram-fractions/>

Possible support



To make it easy for the learners give them this template so they can cut out the 7 pieces by cutting along the orange lines.

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa.

Note: The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **not included in the school curriculum for Grade 12 SA.**

	Lower Primary or Foundation Phase Age 5 to 9	Upper Primary Age 9 to 11	Lower Secondary Age 11 to 14	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6