

#### AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES SCHOOLS ENRICHMENT CENTRE (AIMSSEC)

#### AIMING HIGH



### HELP

You can make your own tangram pieces from scrap card or plastic. Prick through the vertices of the template on page 2 with a sharp pin to mark the vertices, then draw the edges using a ruler, then cut out the 7 pieces.

Alternatively, you can make a tangram by folding a square of paper or thin card. See the video with instructions for making a tangram puzzle by paper folding.





# **NOTES FOR TEACHERS**

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 for D".

- 1. Notice how the learners respond. 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.
- 2. It is important for learners to explain the reason for their answer because it helps them to sort out their ideas and to develop communication skills.
- 3. 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.



4. Ask the class to vote again 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.
A. is the correct answer because the triangle is not symmetric.

https://diagnosticquestions.com

# 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.

# Learning objectives

In doing this activity students will have an opportunity to develop:

- recognition of triangles, squares and parallelograms;
- understanding of similarity and scale by comparing the triangles;
- understanding of reflection (or mirror) symmetry.

### **Generic competences**

In doing this activity students will have an opportunity to develop ideas of symmetry and notice how symmetry appears in nature, art and design.

# Suggestions for teaching

Start with the diagnostic question. Rotate the triangles so they can see them in different positions. Ask "What is the same about the triangles B, C and D and what is different?" The answer is that "They are all isosceles triangles with mirror symmetry but they are different sizes."

Each learner (or pair) should make their own tangram by one of these three methods:



1. a set of tangram pieces

or 2. a copy of the template to cut out or

or 3. a square of paper and help them to make their own tangrams following the instructions below.

#### MAKE A TANGRAM PUZZLE BY FOLDING AND CUTTING.

Here is a simple way to make a tangram without any measuring or ruling lines. All you need is a square of paper or card and some scissors to cut out the shapes when you have finished folding. Follow the steps shown in each diagram, folding on the red lines. Remember that every fold you make is finding half a shape or line.







Fold corner to to centre and cut on 3 red lines (not on red line. on dotted lines).



Fold other corner to centre and cut



Fold edge to centre and cut on red line.

#### See the video with instructions for making a tangram puzzle by paper folding.

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 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.

### **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?
- Where is the mirror line in the grey pattern?
- 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?

#### Follow up

Give the learners these other puzzles to make of the people and animals in the diagrams. Ask them to make up stories about them. The learners will enjoy this and it will help them to develop their visualisation of shapes and their properties.



You might like to follow on with
Tangram 2D shapes: <u>https://aiminghigh.aimssec.ac.za/years-7-9-tangram-2d-shapes/</u>

Tangram Fractions: https://aiminghigh.aimssec.ac.za/years-6-10-tangram-fractions/



Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum links: <u>https://aiminghigh.aimssec.ac.za/</u> <u>http://aiminghigh.aimssec.ac.za</u> Subscribe to the **MATHS TOYS YouTube Channel** <u>https://www.youtube.com/c/mathstoys</u>

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