Activity description

This activity enables students to learn about shape and space using patterns created by tessellating geometric shapes.

Suitability

Level 2 (Intermediate/Higher)

Time

1–2 hours

Resources and equipment

Student information sheet
Optional: slideshow
Squared paper, pencils, rulers etc. for drawing tessellations
Optional:
Coloured pencils for shading patterns created
Tracing paper to assist with symmetry determination
Internet access for research

Key mathematical language

- quadrilaterals including rectangle, square, parallelogram, rhombus, trapezium, kite
- triangles including right-angled, obtuse-angled, acute-angled, equilateral, isosceles
- pentagon, hexagon, octagon
- lines of symmetry
- rotational symmetry (including the idea of centre and order)
- tessellations

Notes on the activity

This activity could be used as a straight-forward consolidation activity on shapes and transformations. It also offers opportunities for learners to see creative applications of mathematics.

Tasks 1 and 2 are very structured and should not take long to complete.

Tasks 3 and 4 are more open-ended. For Task 3 students could be asked to find tiling patterns from the internet, books or magazines. A catalogue showing many tile designs is available from

http://www.decoramic.co.uk/   See

http://www.decoramic.co.uk/download/o_style/victorian/Victorian-Floor-Tiles.pdf

In Task 4 more able students could design patterns having particular symmetries.

Cross-curricular work

This activity provides opportunities for cross-curricular working such as Art using the work of M C Escher http://www.mcescher.com/ – on this site see Picture gallery/Symmetry or multi-culturalism using Islamic patterns http://www.davidmus.dk/en/mest_for_boern/tegneopgave.

See also the video showing a designer using symmetry in fabric design from http://www.bbc.co.uk/learningzone/clips/rotational-symmetry-in-textile-design/667.html)

During the activity

Students could work in pairs or small groups on Tasks 3 and 4.

Points for discussion

Some students may have difficulty visualising reflections and rotations, and may need to use tracing paper.

Students should be encouraged to think about the nature of the shapes they find in tessellations, and why some shapes cannot tessellate.

Answers

Task 1

Pattern 1: Octagons, hexagons, pentagons, squares, trapezia and right-angled isosceles triangles

Pattern 2: Squares and right-angled isosceles triangles

Task 2

Part	A	B	C	D	E	F	G	H	I	J	K
Number of lines of symmetry	1	8	4	2	4	0	4	1	4	2	4
Order of rotational symmetry	1	8	4	2	4	1	4	1	4	2	4

Tasks 3 and 4 are more open-ended.

Extension work

There are further activities involving geometric designs in the FSMA activity 'Suncatchers'.