Symmetry (Lines in 2-D and Planes in 3-D)

Notes

The idea of symmetry will not be new to you.

Lines of symmetry (2-D)

A line of symmetry is where you could fold an image and both halves are identical.

Explanation: Lines and planes of symmetry

Rotational symmetry

A shape has rotational symmetry when it still looks the same after a rotation around its centre (of less than one full turn).

The ***order*** of rotational symmetry is the ***number of times*** a shape matches as it spins round.

Rotational symmetry of a pentagon: Geogebra

After rotating 360^{o} around its centre, every shape will end up back on itself so it could be argued that every shape has order of rotational symmetry of at least 1. However, convention states that if a shape just has order 1, we say that it has ***no rotational symmetry***.

Further examples: Rotational symmetry

E.g. 1 Copy and complete the table:

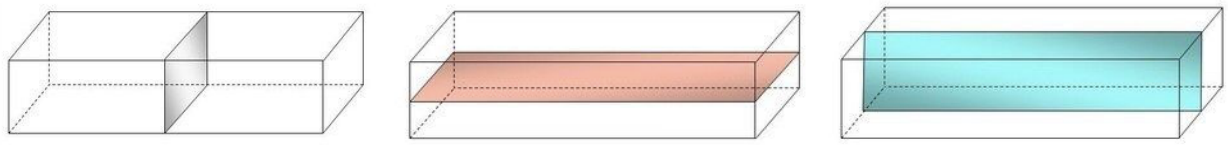
Shape	Number of lines of symmetry	Order of rotational symmetry
Equilateral triangle	3	3
Isosceles triangle		
Scalene triangle		
Square		
Rectangle		
Circle		

Planes of symmetry (3-D)

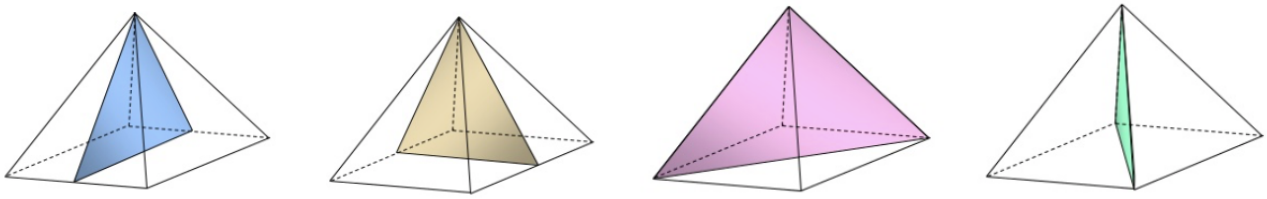
A plane of symmetry of a solid in 3-dimensions is equivalent to a line of symmetry of a shape in 2-dimensions. It is like a sheet of paper that splits the 3-D solid into two identical halves.

Here are some examples to help illustrate the idea:

Cuboid — 3 planes of symmetry



Square-based pyramid — 4 planes of symmetry



Video: Lines of symmetry
Video: Rotational symmetry
Video: Planes of symmetry 1
Video: Planes of symmetry 2

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p275 M9.1 Qu 1-3; p276 M9.2 Qu 1-5
A*-G class textbook:	p234 M9.1 Qu 1-3; p235 M9.2 Qu 1-5
9-1 homework book:	p93 M9.1 Qu 1-12; p94 M9.2 Qu 1-3
A*-G homework book:	p66 M9.1 Qu 1-12; p67 M9.2 Qu 1-3

Summary

Lines of symmetry (2-D) — where you could fold an image and both halves are identical.

A shape has ***rotational symmetry*** when it still looks the same after a rotation around its centre (of less than one full turn).
The ***order*** of rotational symmetry is the ***number of times*** a shape matches as it spins round.
Convention states that if a shape just has order 1, we say that it has ***no rotational symmetry***.

Planes of symmetry (3-D) — are equivalent to a line of symmetry in 2-dimensions. It is like a sheet of paper that splits the 3-D solid into two identical halves.

Homework book answers (only available during a lockdown)