MATHEMATICS · GRADES 4-6

Line and rotational symmetry

Difficulty level: Intermediate

Mathematics: Grades 4-6

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Overview of the concept

This is how you spot balance in a shape, like a logo that looks the same in a mirror or a snowflake that looks the same when you turn it. Symmetry is the balance that makes a shape look right, and it shows up in logos, buildings, nature, and art. A designer uses it to build a logo that feels balanced, an architect uses it to plan a building that looks right from the front, and a scientist uses it to describe crystals and snowflakes.



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Rule

Line and rotational symmetry: a shape has line symmetry if it can be folded so the two halves match exactly. Each fold line is a line of symmetry.

A shape has rotational symmetry if it looks exactly the same after a turn of less than a full turn. The order is how many times it matches in one full turn: a rectangle turned a half turn matches twice, so its order is 2.

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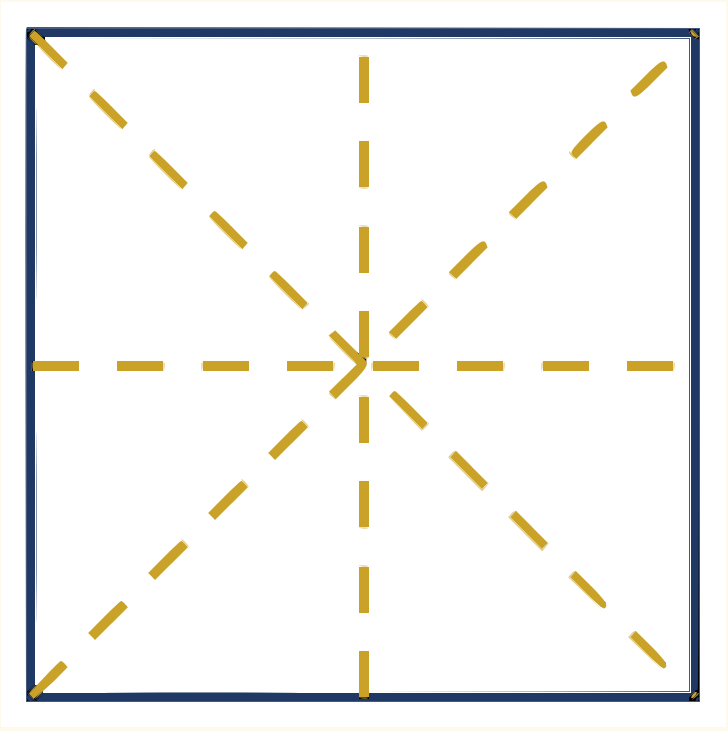
Worked examples

EXAMPLE 1

Q How many lines of symmetry does a square have?



SOLUTION

This is a lines-of-symmetry question, and the one rule to remember is to fold the shape in your head: a line of symmetry is a fold where the two halves match exactly.

A square folds in half across the middle of two sides, and it folds in half corner to corner. That is 2 lines through the middles of sides and 2 lines through corners.

A square has 4 lines of symmetry.

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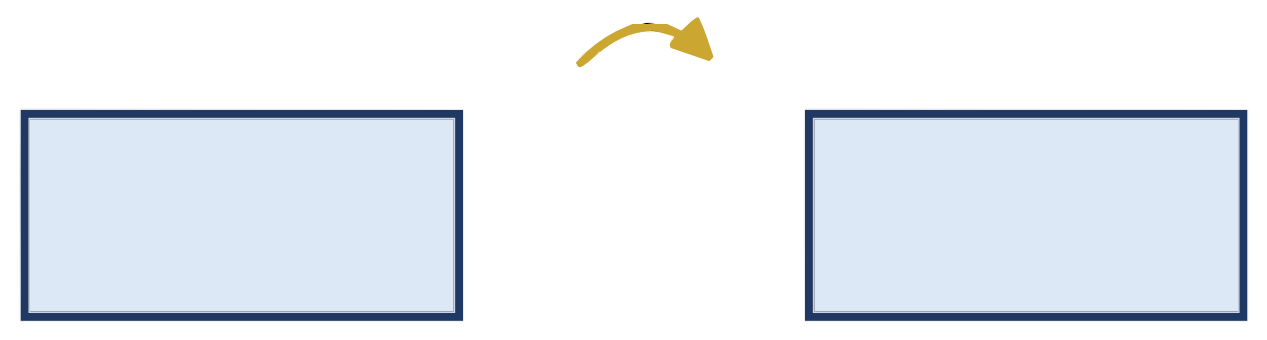
EXAMPLE 2

Q What is the order of rotational symmetry of a non-square rectangle?



SOLUTION

Rotational symmetry is a different test: turn the shape around its centre and count how many times it looks exactly the same in one full turn.

Turn a rectangle half a turn, 180 degrees, and it looks the same. Turn it a full 360 degrees and it looks the same again.

That is 2 times in one full turn, so its order of rotational symmetry is 2.

Practice questions

1 How many lines of symmetry does a square have?

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2 How many lines of symmetry does a rectangle have?

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3 How many lines of symmetry does an equilateral triangle have?

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4 How many lines of symmetry does an isosceles triangle have?

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5 How many lines of symmetry does a scalene triangle have?

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6 How many lines of symmetry does a regular pentagon have?

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7 Does a rectangle have rotational symmetry?

A Yes, order 2

B Yes, order 4

C No

D Yes, order 1

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Does an isosceles triangle have rotational symmetry?

A Yes

B No

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9

How many lines of symmetry does a regular hexagon have?

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How many lines of symmetry does a circle have?

A Infinite

B 0

C 1

D 2

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ANSWER KEY

1. 4

2. 2

3. 3

4. 1

5. 0

6. 5

7. Yes, order 2

8. No

9. 6

10. Infinite

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