Rotational Symmetry

Mana Maths

Notes & Steps

Key idea

A shape has rotational symmetry if it can be rotated (less than 360°) around a centre point to fit exactly onto itself. The order of rotational symmetry is how many times it matches in one full 360° rotation. For a regular n-gon, the order is n.

Steps

1. Find the centre of the shape.
2. Rotate the shape mentally. How many different positions look identical?
3. Count each position (including the starting position) — that's the order.
4. Angle of rotation: $360^\circ \div$ order.

Quick reference

- Square: order 4, angle 90°
- Rectangle: order 2, angle 180°
- Regular triangle: order 3, angle 120°
- Parallelogram: order 2, angle 180°
- Regular pentagon: order 5, angle 72°
- Regular hexagon: order 6, angle 60°
- Circle: infinite order
- Scalene triangle: order 1 (no rotational symmetry)
- Isosceles triangle: order 1 (no rotational symmetry)

Common mistake

Counting only positions after rotation, not including the starting position. If a shape looks the same in 3 different rotated positions, that means order 3 (starting + 2 others).

Notes & Steps

Example 1: square

A square matches itself when rotated 90°, 180°, 270°, and 360° (back to start). That's 4 positions: order of rotational symmetry = 4.

Example 2: rectangle

A rectangle (not square) matches at 180° and 360°. Order of rotational symmetry = 2.

Example 3: letter H

The letter H looks the same when rotated 180° but not 90° or 270°. Order of rotational symmetry = 2.

Example 4: regular pentagon

A regular pentagon matches at 72°, 144°, 216°, 288°, and 360°. That's 5 positions: order = 5.

Try these

1. Order of rotational symmetry for a regular octagon?
2. Order for a regular triangle?
3. What is the angle of rotation for a shape with order 5?

Common mistake

Confusing lines of symmetry with rotational symmetry. A rectangle has 2 lines of symmetry and order 2 rotational symmetry. They are related but different concepts.

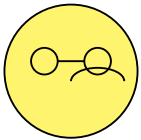
Start Tasks - Symmetry Spotting

1. Vertical reflection?

3. Vertical reflection?

5. Vertical reflection?

2. Vertical reflection?



4. Vertical reflection?

6. Vertical reflection?

Start Tasks - Symmetry Spotting

1. Vertical reflection?

Yes

3. Vertical reflection?

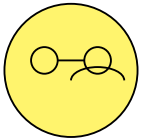
Yes

5. Vertical reflection?

Yes

2. Vertical reflection?

Yes



4. Vertical reflection?

Yes

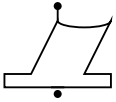
6. Vertical reflection?

Yes

Start Tasks - Symmetry Spotting

7. Vertical reflection?

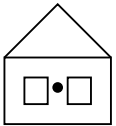
9. Vertical reflection?



11. Vertical reflection?

8. Vertical reflection?

10. Vertical reflection?

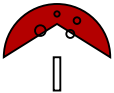


12. Vertical reflection?

Start Tasks - Symmetry Spotting

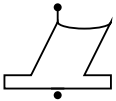
7. Vertical reflection?

Yes



9. Vertical reflection?

Yes



11. Vertical reflection?

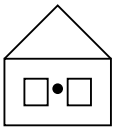
Yes

8. Vertical reflection?

Yes

10. Vertical reflection?

Yes



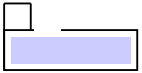
12. Vertical reflection?

Yes

Start Tasks - Symmetry Spotting

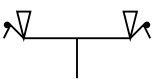
13. Vertical reflection?

15. Vertical reflection?



17. Horizontal reflection?

14. Vertical reflection?



16. Horizontal reflection?

18. Any reflection?

Start Tasks - Symmetry Spotting

13. Vertical reflection?

Yes

15. Vertical reflection?

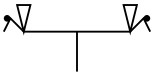
Yes

17. Horizontal reflection?

Yes

14. Vertical reflection?

Yes



16. Horizontal reflection?

Yes

18. Any reflection?

No

Start Tasks - Symmetry Spotting

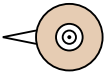
19. Any reflection?

21. Any reflection?

23. Any reflection?

20. Any reflection?

22. Any reflection?



24. Any reflection?

Start Tasks - Symmetry Spotting

19. Any reflection?

No

21. Any reflection?

No

23. Any reflection?

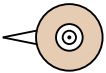
No

20. Any reflection?

No

22. Any reflection?

No



24. Any reflection?

No

Start Tasks - Symmetry Spotting

25. Any reflection?

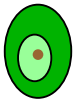
27. Any reflection?

26. Any reflection?

Start Tasks - Symmetry Spotting

25. Any reflection?

No



27. Any reflection?

No

26. Any reflection?

No

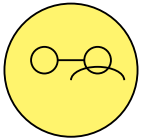
Build Tasks - Deep Symmetry

1. Rotational order?

3. Rotational order?

5. Rotational order?

2. Rotational order?



4. Rotational order?

6. Rotational order?

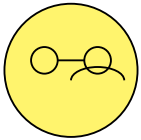
Build Tasks - Deep Symmetry

1. Rotational order?
1 (none)

3. Rotational order?
1 (none)

5. Rotational order?
1 (none)

2. Rotational order?
1 (none)



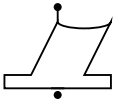
4. Rotational order?
1 (none)

6. Rotational order?
1 (none)

Build Tasks - Deep Symmetry

7. Rotational order?

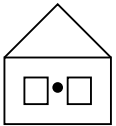
9. Rotational order?



11. Rotational order?

8. Rotational order?

10. Rotational order?

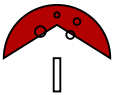


12. Rotational order?

Build Tasks - Deep Symmetry

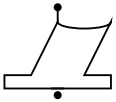
7. Rotational order?

1 (none)



9. Rotational order?

1 (none)



11. Rotational order?

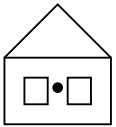
1 (none)

8. Rotational order?

1 (none)

10. Rotational order?

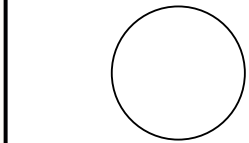
1 (none)



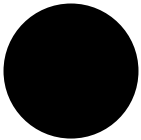
12. Rotational order?

1 (none)

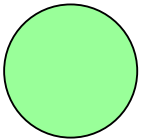
Build Tasks - Deep Symmetry



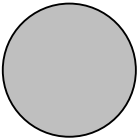
13. Total axes?



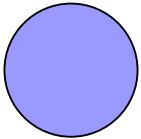
15. Total axes?



17. Total axes?



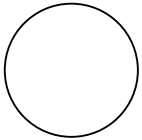
14. Total axes?



16. Total axes?

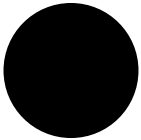
18. Total axes?

Build Tasks - Deep Symmetry



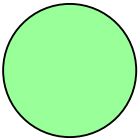
13. Total axes?

0



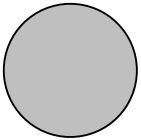
15. Total axes?

4



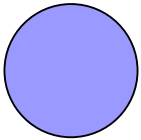
17. Total axes?

4



14. Total axes?

0



16. Total axes?

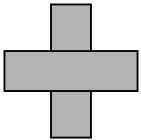
4

18. Total axes?

4

Build Tasks - Deep Symmetry

19. Rotational order?

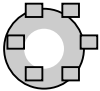


21. Rotational order?

23. Rotational order?

20. Rotational order?

22. Rotational order?

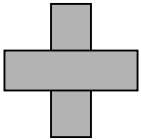


24. Rotational order?

Build Tasks - Deep Symmetry

19. Rotational order?

1 (none)



21. Rotational order?

4

23. Rotational order?

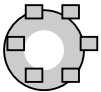
4

20. Rotational order?

2

22. Rotational order?

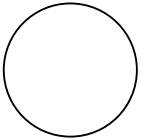
4



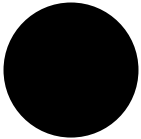
24. Rotational order?

4

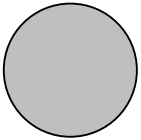
Build Tasks - Deep Symmetry



25. Rotational order?

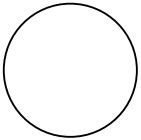


27. Rotational order?



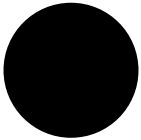
26. Rotational order?

Build Tasks - Deep Symmetry



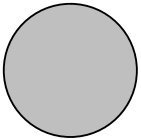
25. Rotational order?

Infinite



27. Rotational order?

Infinite



26. Rotational order?

Infinite

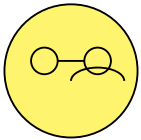
Push Tasks - Full Classification

1. Describe all symmetries.

3. Describe all symmetries.

5. Describe all symmetries.

2. Describe all symmetries.



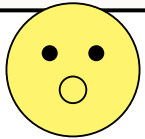
4. Describe all symmetries.

6. Describe all symmetries.

Push Tasks - Full Classification

1. Describe all symmetries.

1 vert axis, order 1 rot



3. Describe all symmetries.

1 vert axis, order 1 rot

5. Describe all symmetries.

1 vert axis, order 1 rot

2. Describe all symmetries.

1 vert axis, order 1 rot

4. Describe all symmetries.

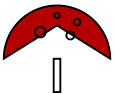
1 vert axis, order 1 rot

6. Describe all symmetries.

1 vert axis, order 1 rot

Push Tasks - Full Classification

7. Describe all symmetries.



9. Describe all symmetries.

11. Describe all symmetries.

8. Describe all symmetries.

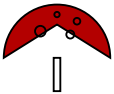
10. Describe all symmetries.

12. Describe all symmetries.

Push Tasks - Full Classification

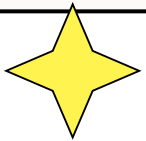
7. Describe all symmetries.

1 vert axis, order 1 rot



9. Describe all symmetries.

1 vert axis, order 1 rot

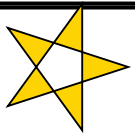


11. Describe all symmetries.

8 axes, order 8 rot

8. Describe all symmetries.

1 vert axis, order 1 rot



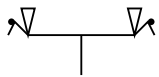
10. Describe all symmetries.

5 axes, order 5 rot

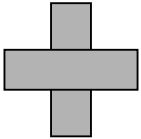
12. Describe all symmetries.

No symmetry (order 1)

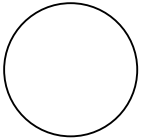
Push Tasks - Full Classification



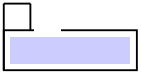
13. Describe all symmetries.



15. Describe all symmetries.

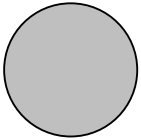


17. Describe all symmetries.



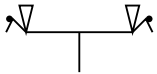
14. Describe all symmetries.

16. Describe all symmetries.



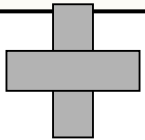
18. Describe all symmetries.

Push Tasks - Full Classification



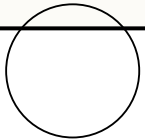
13. Describe all symmetries.

1 horiz axis, order 2 rot



15. Describe all symmetries.

4 axes, order 4 rot



17. Describe all symmetries.

Infinite axes, infinite

14. Describe all symmetries.

1 horiz axis, order 2 rot

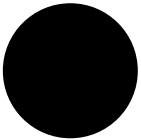
16. Describe all symmetries.

4 axes, order 2 rot

18. Describe all symmetries.

Infinite axes, infinite

Push Tasks - Full Classification

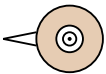


19. Describe all symmetries.

21. Any symmetry? Justify.

23. Any symmetry? Justify.

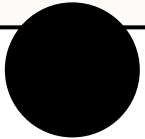
20. Any symmetry? Justify.



22. Any symmetry? Justify.

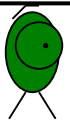
24. Any symmetry? Justify.

Push Tasks - Full Classification



19. Describe all symmetries.

Infinite axes, infinite



21. Any symmetry? Justify.

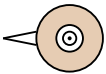
No symmetry (order 1)

23. Any symmetry? Justify.

No symmetry (order 1)

20. Any symmetry? Justify.

No symmetry (order 1)



22. Any symmetry? Justify.

No symmetry (order 1)

24. Any symmetry? Justify.

No symmetry (order 1)

Push Tasks - Full Classification

25. Any symmetry? Justify.

Push Tasks - Full Classification

25. Any symmetry? Justify.

No symmetry (order 1)