

Rotational Symmetry

An image has Rotational Symmetry if there is a center point where an object is turned a certain number of degrees and still look the same. A rotation is sometimes called a TURN. These examples have rotational symmetry, but no reflectional symmetry.



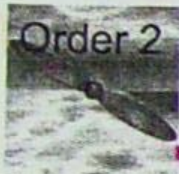
How many **matches** there are as you go **once around** is called the **Order**.

Examples of Different Rotational Symmetry Order

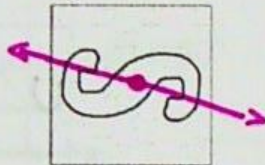
Order

Example Shape

Angle of Rotation



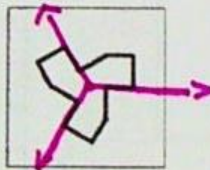
Order 2



$$360^\circ \div 2 = 180^\circ$$



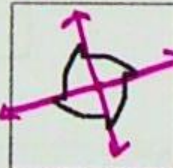
Order 3



$$360^\circ \div 3 = 120^\circ$$



Order 4

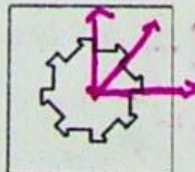


$$360^\circ \div 4 = 90^\circ$$

... and there is also Order 5, 6, 7, and ...



Order 8



$$360^\circ \div 8 = 45^\circ$$

... and then there is Order 9, 10, and so on ...



Is there Rotational Symmetry of Order 1 ?

Not really! If a shape only matches itself **once** as you go around (ie it matches itself after one full rotation) there is really no symmetry at all, because the word "Symmetry" comes from *syn- together* and *metron measure*, and there can't be "together" if there is just one thing.

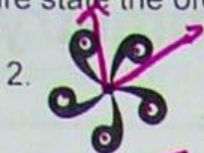
Practice: For each figure state the order and the angle of rotation.



Order: 2

Angle: _____

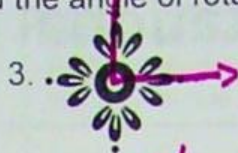
$360 \div 2 = 180^\circ$



Order: 5

Angle: _____

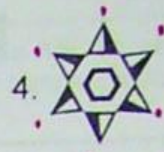
$360 \div 5 = 72^\circ$



Order: 4

Angle: _____

$360 \div 4 = 90^\circ$



Order: 6

Angle: _____

$360 \div 6 = 60^\circ$

Notes for Rotational Symmetry on a Coordinate Grid

The vertices of a polygon are listed. Graph and label each polygon and its image after a given rotation. Name the coordinates of the image.

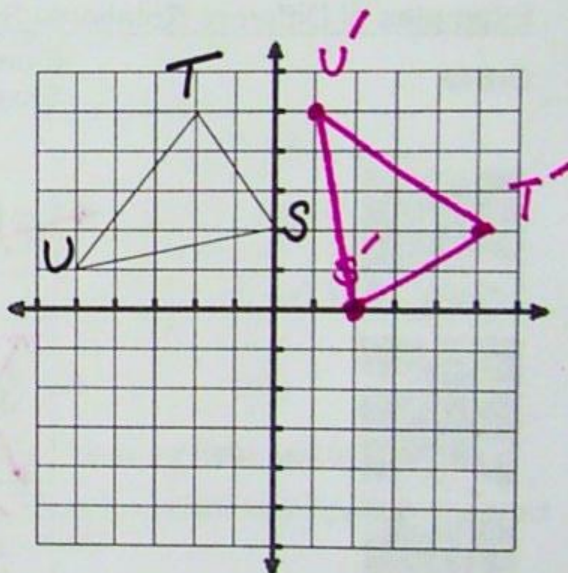
1. Rotate figure STU about the origin 90° clockwise.



- S (0, 2) → S' (2, 0)
 T (-2, 5) → T' (5, 2)
 U (-5, 1) → U' (1, 5)

Write the general rule:

$(x, y) \rightarrow (y, -x)$



2. Rotate figure EFG about the origin 180° .

- E (1, 4) → E' (-1, -4) (h-1-)
 F (3, -2) → F' (-3, 2) (2'8-)
 G (5, 4) → G' (-5, -4) (h-5-)

Write the general rule:

$(x, y) \rightarrow (-x, -y)$

