

Rotational Symmetry

1.
 - a. How many degrees are there in a half-turn?
 - b. How many degrees are there in a quarter-turn?
2.
 - a. Construct a large equilateral triangle on a piece of patty paper.
 - b. Fold the paper to construct the medians of two sides and mark the centroid of the triangle.
 - c. Mark a reference point outside the triangle on the patty paper.
 - d. Now trace the triangle, centroid, and the reference point outside the triangle onto a second piece of patty paper.
 - e. Place the copy on top of the original so that they match up all marks.
 - f. Hold the two copies together by pressing down with the point of a pencil on the centroid. Carefully rotate the triangle until the sides match up again.
3. Any figure that can be turned around a point by less than a full circle and match the original has **rotational symmetry** or **turn symmetry**.
 - a. How many times can you rotate the triangle until not only the sides but also the reference point outside the triangle match up?
 - b. How many degrees was each rotation of the triangle?
 - c. We say that the equilateral triangle has **3-fold symmetry** since the triangle can be turned around the center three times before it is back to its original position.
 - d. How many times could you turn a figure that has 5-fold symmetry?
4. If you turn each figure up to 360° about the center point, how many times will the figure match the original?

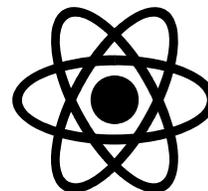
a.



b.



c.



Rotational Symmetry (Continued)

5. How many degrees were there in each turn for each of the figures in 4?
6. a. 2-fold symmetry is often called **point symmetry**. The figure below has point symmetry.

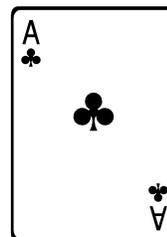
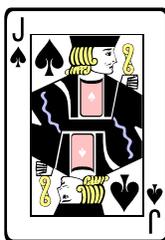
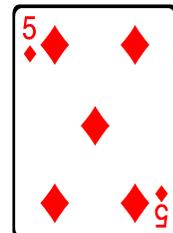
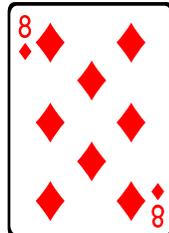
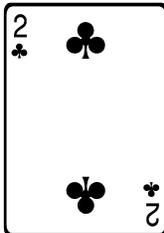


- b. How many degrees did the figure need to be turned to match up again?
7. How does the number of times a figure can be rotated relate to the number of degrees it is turned each time?

8. Which letters of the alphabet have rotational symmetry?

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

9. Which of these cards has rotational symmetry?



- Answers:
1. a. There are 180° in a half-turn.
b. There are 90° in a quarter-turn.
 3. a. You can rotate the equilateral triangle three times so that the sides and point line up.
b. There are 120° in each turn.
c. You can turn a 5-fold symmetry 5 times.
 4. a. 4 b. 2 c. 6
 5. a. 90° b. 180° c. 60°
 6. b. The figure needs to be turned 180° to line up again.
 7. The number of degrees of each turning is 360 degrees divided by the number of times a figure can be rotated.
 8. The letters H, I, O, S, X, and Z have rotational symmetry.
 9. The cards 2 of clubs, 8 of diamonds, 5 of diamonds, and jack of spades have rotational symmetry (the ace of clubs does not).