



Transformations III: Rotations

Task 1: Rotations (Use the graph on the last page and follow the steps below to help you answer the questions on page 2 and 3.)

1. A) **If you are using patty paper:** Create a design (image) on the graph paper on the last page, making sure at least 3 vertices land on whole number (integer) coordinates, in the upper left quadrant (Quadrant II). Place a piece of patty paper over it, with the right, lower corner of the patty paper at the origin $(0, 0)$ and trace it. Label three of the vertices as A, B and C, on both the original design (image) on the graph paper, and on the patty paper. (Note: Draw a point at the bottom right corner of the shape and label this point O. This will be the point about which you rotate the design.)

OR

B) Trace the design (image) you created for the Translation activity in the upper left quadrant (Quadrant II), making sure at least 3 vertices land on whole number (integer) coordinates. Label three of the vertices as A, B and C. (Note: Draw a point at the bottom right corner of the shape and label this point O. This will be the point about which you rotate the design.)

2. A) **If you are using patty paper:** Place your patty paper over the original design (image), with the lower right corner at the origin $(0, 0)$. Record the original vertices of your design (image) in **Rotation 1**, A, B and C in the table on the following page. **Rotate** the patty paper from point O, by putting your pencil at point O and turning the patty paper 90° clockwise. Record the new position of coordinates A, B and C as vertices A' , B' , C' in the table. (Point O should remain the same, and the patty paper should now be in Quadrant I.) Plot and label A' , B' , C' and draw the remainder of your shape.

OR

B) **If you are using your own design:** Place your design on top of the traced image and **Rotate** the image from point O, by putting your pencil at point O and turning the image 90° clockwise. Trace it here and record the new position of coordinates A, B and C as vertices A' , B' , C' in the table. (Point O should remain the same, and the image should now be in Quadrant I.)



We would say that the image is being “rotated about Point O.”

3. Complete **Rotation 1** for this action recording the action taken and any observations you notice about the vertices (how did they change, or not change) and/or visually what happened to the shape.
4. Put your design (image), or patty paper back on the originally traced one. Repeat Step 2 and Step 3, but this time rotate your image 90° to the left, by holding your pencil at point O. Record your work in **Rotation 2**. (Rotating the 90° left is the same as a 270° right!)

5. A) **If you are using patty paper:** Place your patty paper over the original design (image), with the lower right corner at the origin (0, 0). Record the original vertices of your design (image) in **Rotation 3**, A, B, C. Keeping the corner of the patty paper that is at the origin (0, 0) and holding your pencil on point O, rotate the patty paper 180° ($90^\circ \times 2$, or so that that patty paper is now in Quadrant IV). Record the new position of coordinates A, B and C as vertices A''' , B''' , C''' in the table. Plot and label A''' , B''' , C''' and draw the remainder of your image.

OR

B) **If you are using your own design:** Hold the image on the original location and holding your pencil on point O, rotate the image 180° ($90^\circ \times 2$, or so that that patty image is now in Quadrant IV). Trace it there and record the new position of coordinates A, B and C as vertices A''' , B''' , C''' in the table under **Rotation 3**.

6. Complete **Rotation 3** for this action recording the action taken and any observations you notice about the vertices (how did they change, or not change) or visually what happened to the shape.

Recording your Transformations: Rotations

Original Coordinates	Action Taken	Coordinates of the New Image	Observations (What happened to the coordinates of the vertices and visually to the figure?)
Rotation 1			
A (,)		A' (,)	
B (,)		B' (,)	
C (,)		C' (,)	
Rotation 2			
A (,)		A'' (,)	
B (,)		B'' (,)	
C (,)		C'' (,)	
Rotation 3			
A (,)		A''' (,)	
B (,)		B''' (,)	
C (,)		C''' (,)	

Task 2: Analysis Questions (To be done AFTER Task 1 is complete.)

1. What did you notice about the coordinates of the points for each reflection?

Rotating the design 90° right, the coordinates _____.

Rotating the design 90° left, the coordinates _____.

Rotating the design 180° , the coordinates _____.


2. Did the shape change under this transformation? Yes or No

How do you know? _____

3. What other observations did you make about what happens when an object or points are rotated?

I noticed that _____.

4. What does it mean to **rotate** a shape?

 **Rotate** means to _____.

5. Predict: What will happen to the coordinates of the vertices if you rotate the shape 45° to the right?

I predict the coordinates will _____.

Test out your prediction. How does your prediction match up with what happened?

My prediction was _____ because _____.

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