

9.4 Algebraic Representations of Transformations

Essential Question: How can you describe the effect of a translation, rotation, or reflection on coordinates using an algebraic representation?

Learning Goal: **Students will be able to describe the effect translations, rotations, and reflections on two-dimensional figures using coordinates.**
MAFS.8.G.1.3

Questions:

Notes:

Algebraic Representations of Translations

The rules shown in the table describe how coordinates change when a figure is translated up, down, right, and left on the coordinate plane.

Translations	
Right a units	Add a to the x-coordinate: $(x,y) \rightarrow (x + a, y)$
Left a units	Subtract a from the x-coordinate: $(x,y) \rightarrow (x - a, y)$
Up b units	Add b to the y-coordinate: $(x,y) \rightarrow (x, y + b)$
Down b units	Subtract b to the y-coordinate: $(x,y) \rightarrow (x, y - b)$

Algebraic Representations of Reflections

The signs of the coordinates of a figure change when the figure is reflected across the x-axis and y-axis. The table shows the rules for changing the signs of the coordinates after a reflection.

Reflections	
Across the x-axis	Multiply each y-coordinate by -1 : $(x,y) \rightarrow (x,-y)$
Across the y-axis	Multiply each x-coordinate by -1 : $(x,y) \rightarrow (-x,y)$

Algebraic Representations of Rotations

When points are rotated about the origin, the coordinates of the image can be found using the rules shown in the table.

Rotations	
90° Clockwise	Multiply each x-coordinate by -1 ; then switch the x-and y-coordinates: $(x,y) \rightarrow (y, -x)$
90° Counter Clockwise	Multiply each y-coordinate by -1 ; then switch the x-and y-coordinates: $(x,y) \rightarrow (-y, x)$
180	Multiply both coordinates by -1 : $(x,y) \rightarrow (-x, -y)$