

Algebraic Transformations

Translations, rotations, line reflections, dilations, and other transformations can be described algebraically in the following way. Use T to refer to any transformation.

Let's write $T(x,y) = (x+2, y+5)$ to show that the image of any point in the coordinate plane is mapped to an image point that has 2 added to the x -value and 5 added to the y -value. For example, $T(4,1) = (4+2, 1+5)$ or $(6,6)$.

Using graph paper, sketch the following flag figure F in the coordinate plane. Then decide whether the following transformations specify a translation, rotation, line reflection, dilation, combination of these, or none of these. Fully describe the isometries or dilations used. Do each part on a separate coordinate grid and label the coordinates of each image point. Are there any conjectures you can make about algebraic forms of transformations and the associated geometric transformation?

Figure F consists of the endpoints $A(4,8)$, $B(4,6)$, $C(4,2)$ and $D(6,6)$.

1. $T(x,y) = (x+3, y-2)$
2. $T(x,y) = (x, -y)$
3. $T(x,y) = (y,x)$
4. $T(x,y) = (-y,x)$
5. $T(x,y) = (-x + 2, -y+4)$
6. $T(x,y) = (2x, 2y)$
7. $T(x,y) = (x+3, -y)$
8. $T(x,y) = (1/2 x, -1/2 y)$
9. $T(x,y) = (-2x, 1/2y)$

