Translation part2
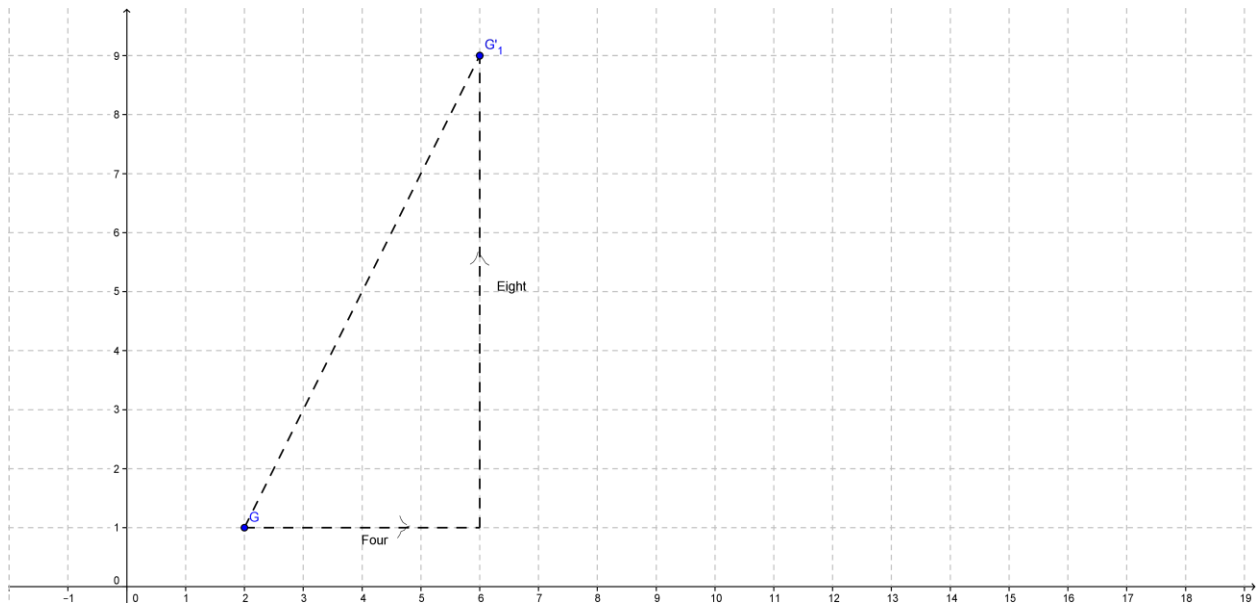
Column vectors

Each displacement or translation vector T can be represented by a column vector or a column matrix $\begin{pmatrix} x \\ y \end{pmatrix}$ Therefore T= $\begin{pmatrix} x \\ y \end{pmatrix}$

Something to remember;

Note this T= $\begin{pmatrix} +x \\ +y \end{pmatrix}$ $\nearrow$ $\uparrow$ move right and move up

And if T= $\begin{pmatrix} -x \\ -y \end{pmatrix}$ $\leftarrow$ $\downarrow$ move left and move down

In case 1 the translation T= $\begin{pmatrix} 4 \\ 8 \end{pmatrix}$ move all points in a plane figure, 4 units to the right and 8 units upwards

In using this format

G   T   G'

$\begin{pmatrix} x \\ y \end{pmatrix}$ + $\begin{pmatrix} x, \\ y, \end{pmatrix}$ = $\begin{pmatrix} x + x, \\ y + y, \end{pmatrix}$

Object   +   Translation   =   Image

matrix   matrix   matrix

Case 1

     G   T   G′

$$\begin{pmatrix} x \\ y \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \begin{pmatrix} 4 \\ 8 \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix} \begin{pmatrix} 6 \\ 9 \end{pmatrix}$$
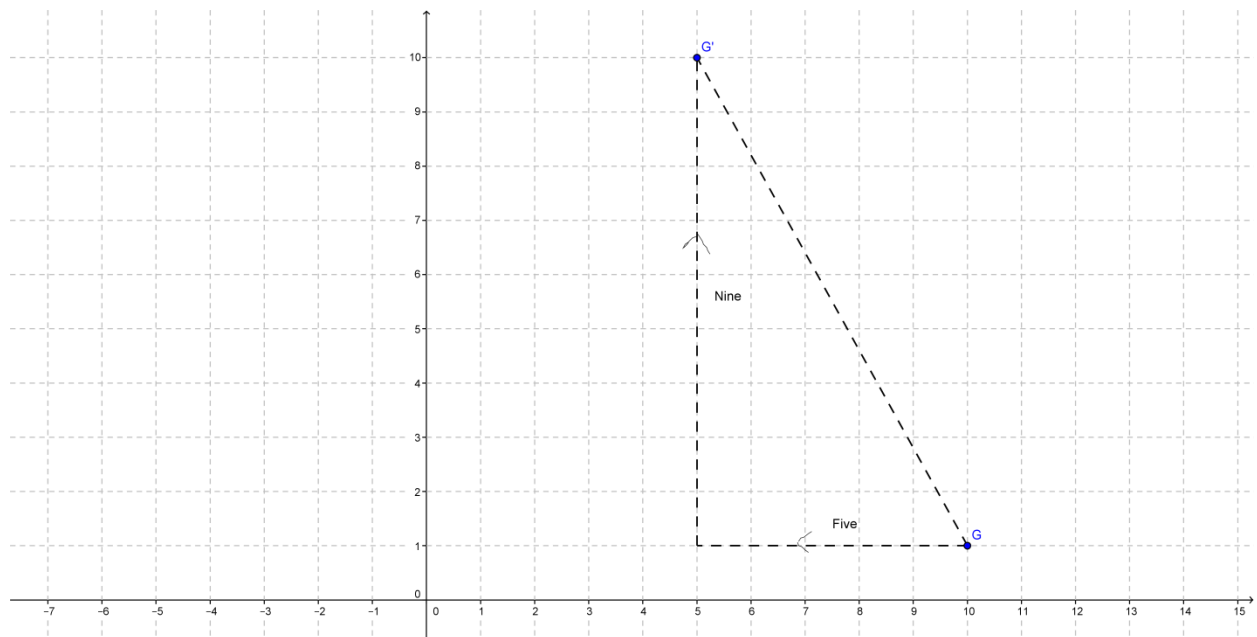
Object   +   Translation   =   Image

matrix   matrix   matrix

In case 2 the translation T= $\begin{pmatrix} -5 \\ 9 \end{pmatrix}$ move all points in a plane figure, 5 units to the left and 9 units upwards
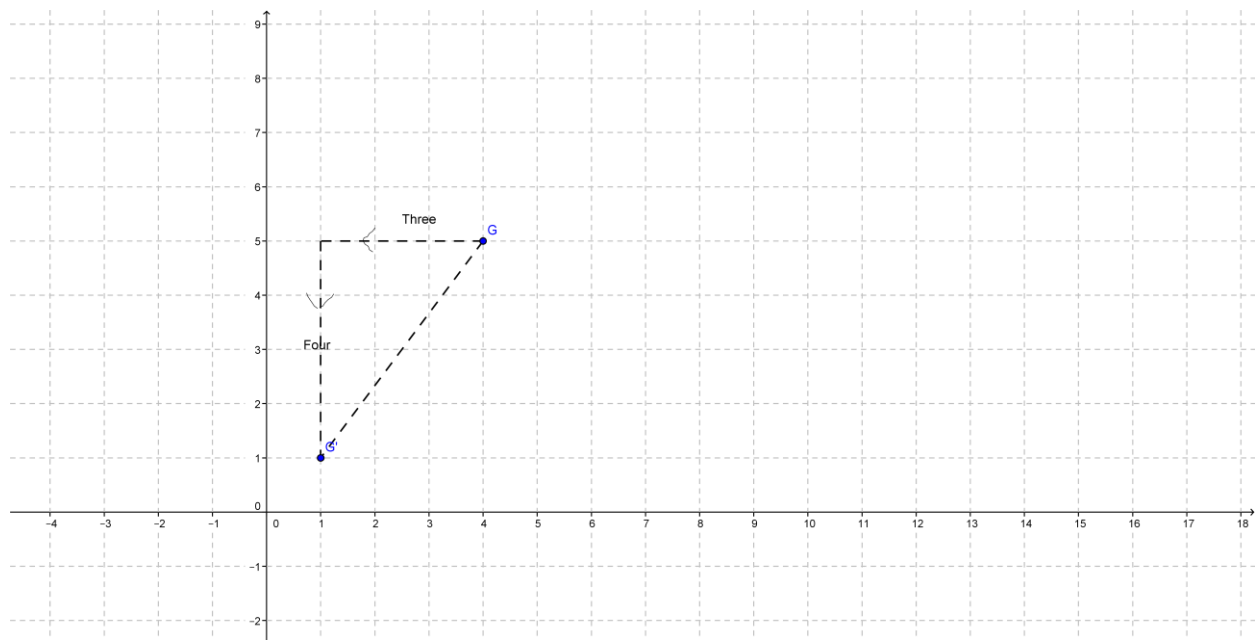

In using this format

G　　　　　　　　　T　　　　　　　　G′

$$\begin{pmatrix} x \\ y \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix}$$

Object　　　+　Translation　　=　Image

matrix　　　　　matrix　　　　　　matrix

Case 2

　　　G　　　　　　　　　　T　　　　　　　　　　G′

$$\begin{pmatrix} x \\ y \end{pmatrix}\begin{pmatrix} 10 \\ 1 \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix}\begin{pmatrix} -5 \\ 9 \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix}\begin{pmatrix} 5 \\ 10 \end{pmatrix}$$

Object　　　　　+　Translation　　　　　=　　Image

matrix　　　　　　　matrix　　　　　　　　　matrix

In case 3 the translation T= $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$ move all points in a plane figure, 3 units to the left and 4 units downwards
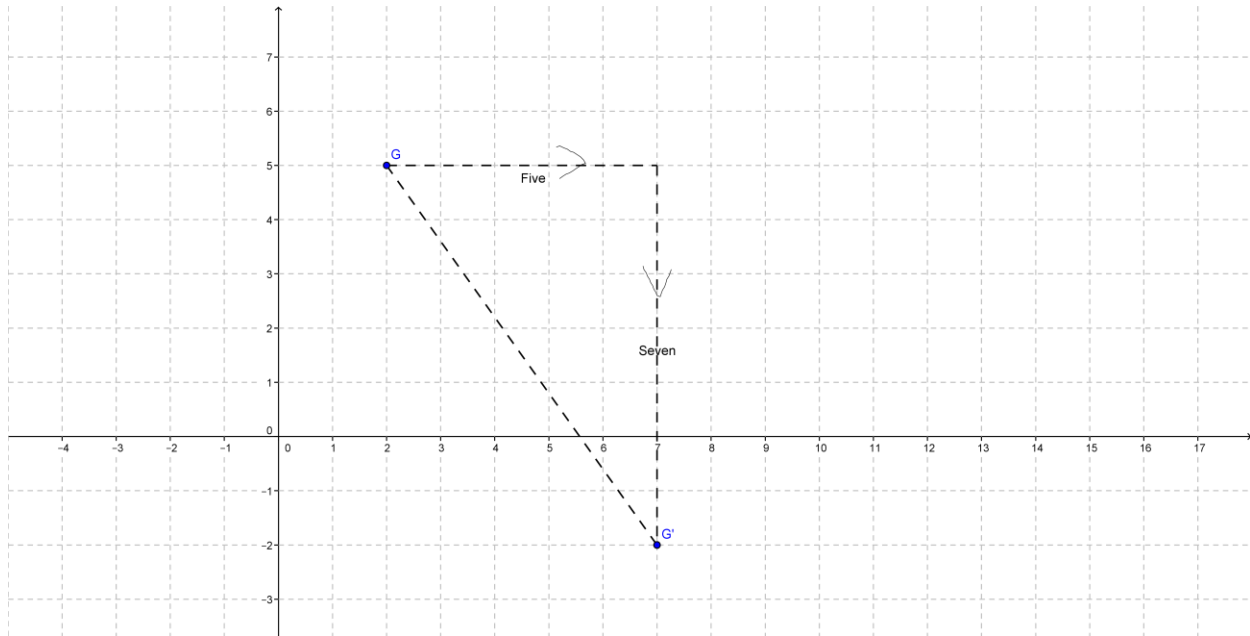
In using this format

G	T	G'

$$\begin{pmatrix} x \\ y \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix}$$

Object	+	Translation	=	Image
matrix		matrix		matrix

Case 3

G	T	G'

$$\begin{pmatrix} x \\ y \end{pmatrix} \begin{pmatrix} 4 \\ 5 \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \begin{pmatrix} -3 \\ -4 \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

Object	+	Translation	=	Image
matrix		matrix		matrix

In case 4 the translation T= $\begin{pmatrix} 5 \\ -7 \end{pmatrix}$ move all points in a plane figure, 5 units to the right and 7 units downwards

In using this format

G   T   G'

$$\begin{pmatrix} x \\ y \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix}$$

Object   +   Translation   =   Image

matrix   matrix   matrix

Case 4

G   T   G'

$$\begin{pmatrix} x \\ y \end{pmatrix} \begin{pmatrix} 2 \\ 5 \end{pmatrix} \quad + \quad \begin{pmatrix} x, \\ y, \end{pmatrix} \begin{pmatrix} 5 \\ -7 \end{pmatrix} \quad = \quad \begin{pmatrix} x + x, \\ y + y, \end{pmatrix} \begin{pmatrix} 7 \\ -2 \end{pmatrix}$$

Object	+	Translation	=	Image
matrix		matrix		matrix