1 Given

We're given a set of letters that align mostly with a set of grid coordinates. We are also given a selection of possible resultant transformations

2 Wanted

We want to find the matching transformation that maps the original set of letters to the new set of letters.

3 Answer

Approach We can start by making a few important observations

1. The letters are made up of lines which are made up of points
2. Each point has a coordinate in the form of (x,y)
3. Each transformation will affect the coordinates of each point in a specific way
4. By applying each transformation to the original coordinates, we can see which one results in the new coordinates
5. The transformation that results in the new coordinates is the correct one

Solution Lets represent the points of the original letters as a composite matrix

$$\begin{bmatrix} 0 & 0 & 0 & x_4 & x_5 & ... & x_{27} \\ 0 & 3 & 3 & y_4 & y_5 & ... & y_{27} \end{bmatrix}$$

And multiply that along with our imposed transformation $A = \begin{bmatrix} 1 & \frac{1}{3} \\ 0 & \frac{4}{3} \end{bmatrix}$.

$$\begin{bmatrix} 0 & 0 & 0 & x_4 & x_5 & ... & x_{27} \\ 0 & 3 & 3 & y_4 & y_5 & ... & y_{27} \end{bmatrix} \begin{bmatrix} 1 & \frac{1}{3} \\ 0 & \frac{4}{3} \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & x_4 & x_5 & ... & x_{27} \\ 0 & 3 & 3 & y_4 & y_5 & ... & y_{27} \end{bmatrix}$$

What results is a new set of coordinates that match the new set of letters. Therefore the transformation that maps the original set of letters to the new set of letters is B.

Aside

We could also arive at this conclusion by eliminating the other options. For example, others could not have been arrived at by transformation as they had characteristics, like $(0,0) \not\to (0,0)$

4 Illustration

Happily, through this method, and alot of punching at a calculator, we can see that the transformation B does indeed map the original set of letters to the new set of letters.