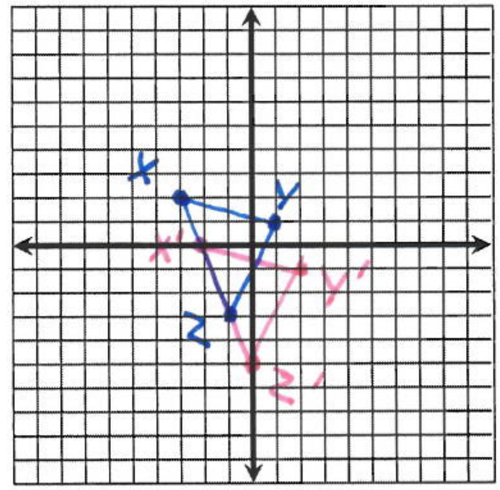
Geometry **REVIEW 9.1 - 9.4** Name Key

Hour ____________

***SECTION 9.1***

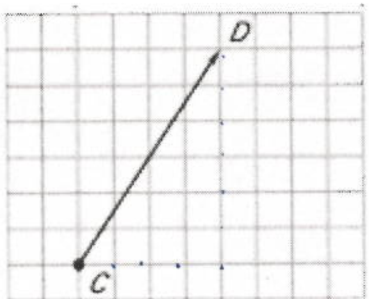
The vertices of $\Delta XYZ$ are X (-3, 2), Y (1, 1), and Z (-1, -3). Graph the image of the triangle using prime notation after the translation (x, y) → (x + 1, y - 2).




Translate A (-8, 6) using (x, y) → (x - 7, y + 10).

A' (-15, 16)

Name the vector and write it in component form.




$\overrightarrow{CD}$

$\langle 4, 6 \rangle$

Use the point M (8, -2). Find the component form of the vector that describes the translation to M' (7, 5).

$\langle -1, 7 \rangle$

***SECTION 9.2***

Add or subtract. $\begin{bmatrix} 2.8 & -9.2 \end{bmatrix} + \begin{bmatrix} 3.5 & 6.1 \end{bmatrix}$

$\begin{bmatrix} 6.3 & -3.1 \end{bmatrix}$

$\begin{bmatrix} 8 & -2 \\ -3 & 5 \end{bmatrix} - \begin{bmatrix} 4 & 3 \\ 1 & -7 \end{bmatrix}$

$\begin{bmatrix} 4 & -5 \\ -4 & 12 \end{bmatrix}$

$\Delta ABC$ has vertices A (2, -1), B (1, 3), and C (-2, 2). Write a matrix equation that shows how to find the image matrix that represents the translation of $\Delta ABC$ 4 units left and 5 units up.

$$\begin{array}{ccc} A & B & C \end{array} \qquad \text{translation matrix} \qquad \begin{array}{ccc} A' & B' & C' \end{array}$$

$$\begin{bmatrix} 2 & 1 & -2 \\ -1 & 3 & 2 \end{bmatrix} + \begin{bmatrix} -4 & -4 & -4 \\ 5 & 5 & 5 \end{bmatrix} = \begin{bmatrix} -2 & -3 & -6 \\ 4 & 8 & 7 \end{bmatrix}$$

Multiply $\underset{2\times2}{\begin{bmatrix} 2 & -5 \\ 1 & 0 \end{bmatrix}} \underset{2\times2}{\begin{bmatrix} 6 & -1 \\ 3 & -2 \end{bmatrix}} = 2\times2$

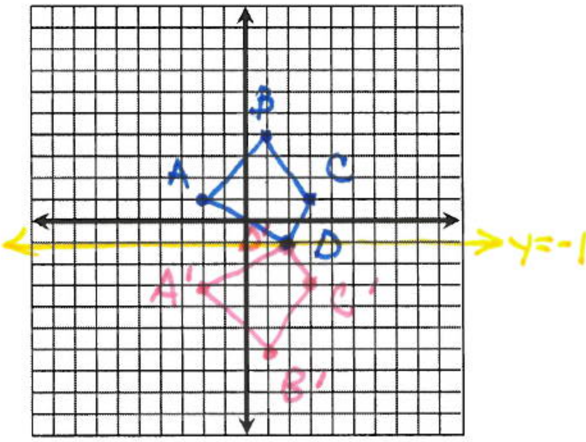
$\begin{bmatrix} -3 & 8 \\ 6 & -1 \end{bmatrix}$

$\underset{3\times2}{\begin{bmatrix} 3 & -1 \\ -3 & 6 \\ -6 & -6 \end{bmatrix}} \underset{2\times2}{\begin{bmatrix} -1 & 6 \\ 5 & 4 \end{bmatrix}} = 3\times2$

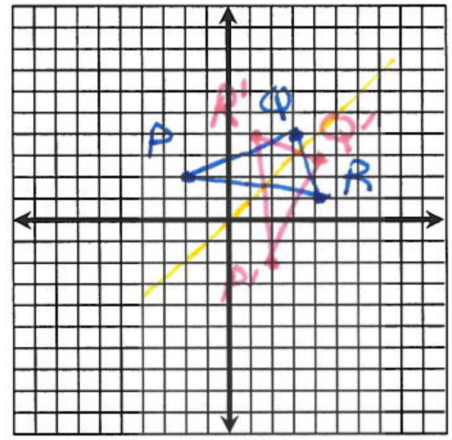
$\begin{bmatrix} -8 & 14 \\ 33 & 6 \\ -30 & -60 \end{bmatrix}$

***SECTION 9.3***

Reflect the quadrilateral with vertices A (-2, 1), B (1, 4), C (3, 1), and D (2, -1) over y = -1.




Reflect the triangle with vertices P (-2, 2), Q (3, 4), and R (4, 1) over y = x.




Find the image matrix when $\Delta ABC$ is reflected in the y - axis. $(-x, y)$ $\begin{array}{ccc} A & B & C \\ \left[\begin{matrix} 2 & -1 & 0 \\ 3 & 4 & -1 \end{matrix}\right. & & \left.\right] \end{array}$ $\begin{array}{ccc} A' & B' & C' \end{array}$ $\begin{bmatrix} -2 & 1 & 0 \\ 3 & 4 & -1 \end{bmatrix}$

If (x, y) is reflected in the x – axis, its image is the point ( X , -Y )

If (x, y) is reflected in the y – axis, its image is the point ( -X , Y )

If (x, y) is reflected in the line y = x, its image is the point ( Y , X )

If (x, y) is reflected in the line y = -x, its image is the point ( -x , -Y )

***SECTION 9.4***

Use the quadrilateral HIJK with vertices H (3, 0), I (1, -4), J (0, -4), K (-1, -3).

Rotate 180° about the origin by using the shortcuts $(-y, -x)$

H'(0, -3) I'(4, -1) J'(-4, 0) K'(3, 1)

Rotate 270° about the origin by matrix multiplication

$$\underset{2\times 2}{\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}} \underset{2\times 4}{\begin{bmatrix} 3 & 1 & 0 & -1 \\ 0 & -4 & -4 & -3 \end{bmatrix}} = \begin{array}{cccc} H' & I' & J' & K' \\ \end{array} \begin{bmatrix} 0 & -4 & -4 & -3 \\ -3 & -1 & 0 & 1 \end{bmatrix}$$

When a point (x, y) is rotated counterclockwise about the origin, the following are true:

For a rotation of 90°, (a, b) → ( -b , a )

For a rotation of 180°, (a, b) → ( -a , -b )

For a rotation of 270°, (a, b) → ( b , -a )

**ROTATION MATRICES (COUNTERCLOCKWISE)**

| 90° | 180° | 270° | 360° |
|---|---|---|---|
| $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ | $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ | $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ | $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ |