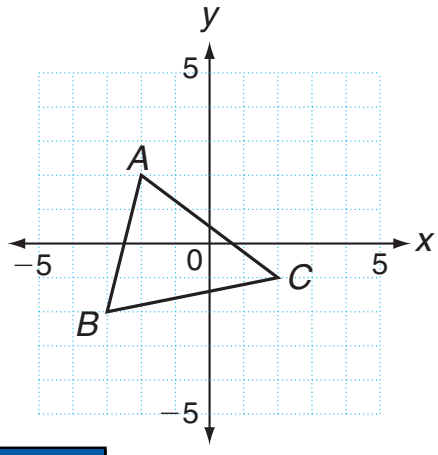
EXPLORATION

4-3 Using Matrices to Transform Geometric Figures

You can use matrices to describe figures in the coordinate plane.



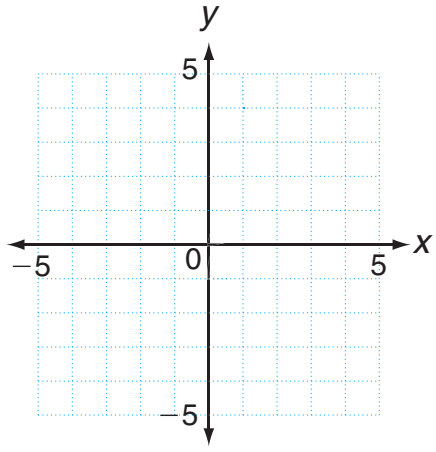
1. Complete the table by finding the coordinates of the vertices of $\triangle ABC$.

	Point *A*	Point *B*	Point *C*
***x*-coordinate**			
***y*-coordinate**			

2. Create a matrix P based on the data in the table.

3. Find the sum $P + R$ when $R = \begin{bmatrix} 3 & 3 & 3 \\ 2 & 2 & 2 \end{bmatrix}$

4. Use the columns of the matrix you found in Problem 3 as the coordinates of the vertices of a triangle $\triangle A'B'C'$. Plot the vertices of $\triangle A'B'C'$ to graph the triangle.



THINK AND DISCUSS

5. **Describe** how $\triangle A'B'C'$ is related to $\triangle ABC$.

6. **Discuss** what would have happened if you have added the matrix $\begin{bmatrix} 3 & 3 & 3 \\ -2 & -2 & -2 \end{bmatrix}$ to matrix P.

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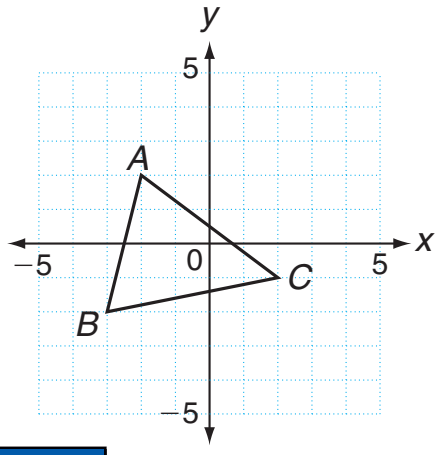


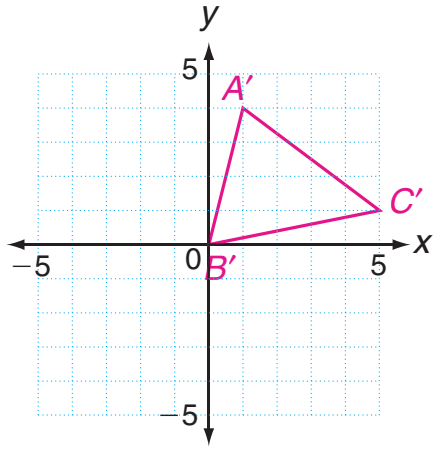
1. Complete the table by finding the coordinates of the vertices of $\triangle ABC$.

	Point *A*	Point *B*	Point *C*
***x*-coordinate**	−2	−3	2
***y*-coordinate**	2	−2	−1

2. Create a matrix P based on the data in the table. $P = \begin{bmatrix} -2 & -3 & 2 \\ 2 & -2 & -1 \end{bmatrix}$

3. Find the sum $P + R$ when $R = \begin{bmatrix} 3 & 3 & 3 \\ 2 & 2 & 2 \end{bmatrix}$ $P + R = \begin{bmatrix} 1 & 0 & 5 \\ 4 & 0 & 1 \end{bmatrix}$.

4. Use the columns of the matrix you found in Problem 3 as the coordinates of the vertices of a triangle $\triangle A'B'C'$. Plot the vertices of $\triangle A'B'C'$ to graph the triangle.



THINK AND DISCUSS

5. **Describe** how $\triangle A'B'C'$ is related to $\triangle ABC$.

6. **Discuss** what would have happened if you have added the matrix $\begin{bmatrix} 3 & 3 & 3 \\ -2 & -2 & -2 \end{bmatrix}$ to matrix P.

5. $\triangle A'B'C'$ is a translation of $\triangle ABC$. $\triangle ABC$ is translated 3 units right and 2 units up.

6. $\triangle ABC$ would have been translated 3 units right and 2 units down.