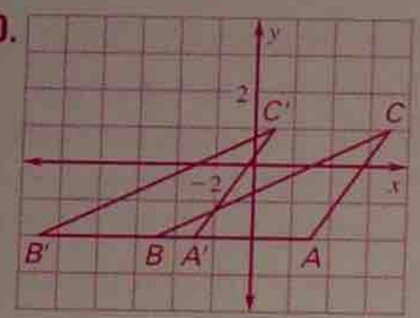
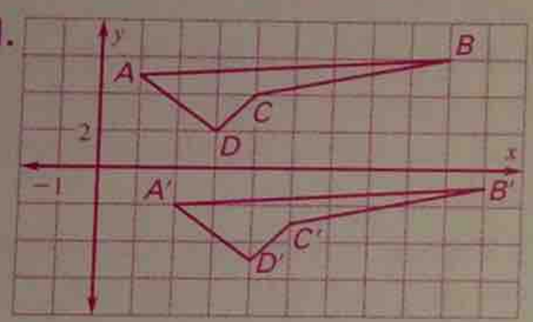
8. $\begin{bmatrix} 5 & -4 \\ -13 & 5 \end{bmatrix}$

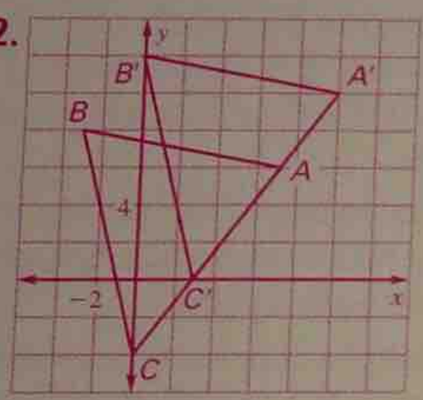
10.



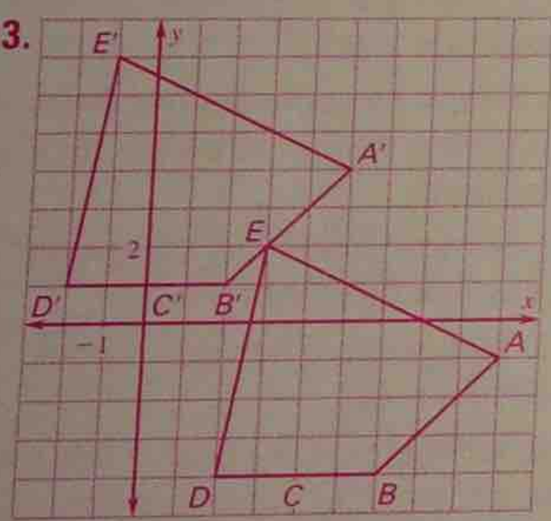
11.



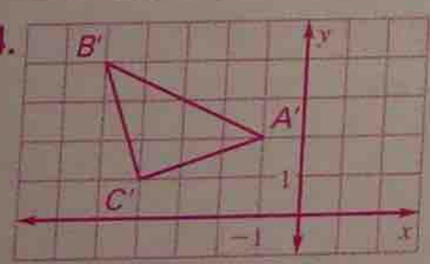
12.



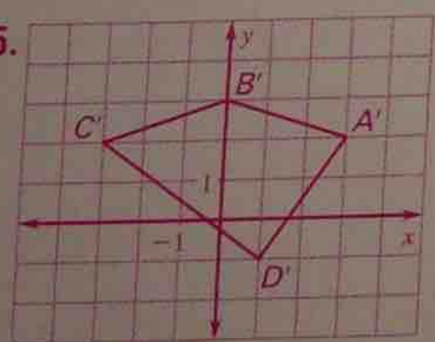
13.



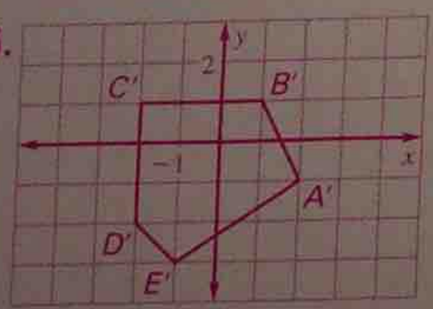
14.



15.



16.

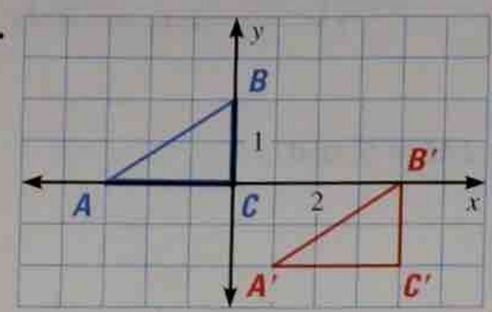


Chapter 9

EXTRA PRACTICE

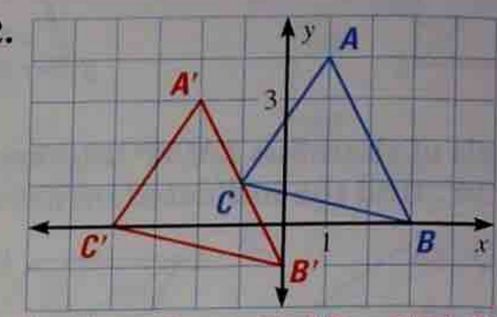
9.1 $\triangle A'B'C'$ **is the image of** $\triangle ABC$ **after a translation. Write a rule for the translation. Then *verify* that the translation is an isometry.**

1.



$(x, y) \rightarrow (x + 4, y - 2)$; $AB = A'B'$, $BC = B'C'$, $AC = A'C'$

2.



$(x, y) \rightarrow (x - 3, y - 1)$; $AB = A'B'$, $BC = B'C'$, $AC = A'C'$

9.1 **Use the point** $P(7, -3)$**. Find the component form of the vector that describes the translation to** P'**.**

3. $P'(-3, 4)$ $\langle -10, 7 \rangle$
4. $P'(1, -1)$ $\langle -6, 2 \rangle$
5. $P'(3, 2)$ $\langle -4, 5 \rangle$
6. $P'(-8, -11)$ $\langle -15, -8 \rangle$

9.2 **Add, subtract, or multiply.**

7. $\begin{bmatrix} 2 \\ 7 \end{bmatrix} + \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ $\begin{bmatrix} 5 \\ 11 \end{bmatrix}$

8. $\begin{bmatrix} 5 & -3 \\ -9 & 4 \end{bmatrix} - \begin{bmatrix} 0 & 1 \\ 4 & -1 \end{bmatrix}$ See margin.

9. $\begin{bmatrix} 7 & -3 \\ 5 & 9 \end{bmatrix}\begin{bmatrix} 2 & -1 \\ 6 & 8 \end{bmatrix}$ $\begin{bmatrix} -4 & -31 \\ 64 & 67 \end{bmatrix}$

9.2 **Find the image matrix that represents the translation of the polygon. Then graph the polygon and its image.** 10–13. See margin for art.

10. $\begin{bmatrix} 3 & -5 & 7 \\ -2 & -2 & 1 \end{bmatrix}$; 6 units left $\begin{bmatrix} -3 & -11 & 1 \\ -2 & -2 & 1 \end{bmatrix}$

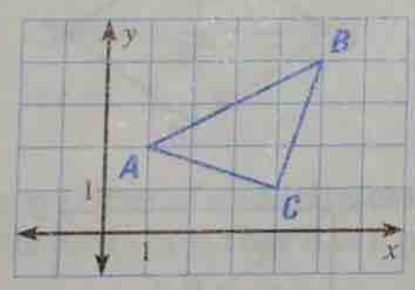
11. $\begin{bmatrix} 1 & 9 & 4 & 3 \\ 5 & 6 & 4 & 2 \end{bmatrix}$; 1 unit right and 7 units down $\begin{bmatrix} 2 & 10 & 5 & 4 \\ -2 & -1 & -3 & -5 \end{bmatrix}$

12. $\begin{bmatrix} 7 & -3 & 0 \\ 6 & 8 & -4 \end{bmatrix}$; 3 units right and 4 units up $\begin{bmatrix} 10 & 0 & 3 \\ 10 & 12 & 0 \end{bmatrix}$

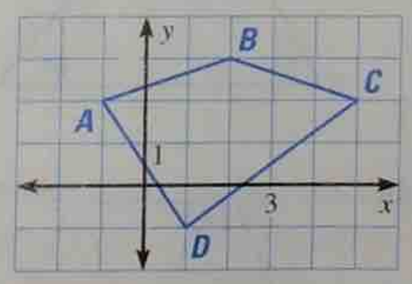
13. $\begin{bmatrix} 9 & 6 & 4 & 2 & 3 \\ -1 & -4 & -4 & -4 & 2 \end{bmatrix}$; 4 units left and 5 units up $\begin{bmatrix} 5 & 2 & 0 & -2 & -1 \\ 4 & 1 & 1 & 1 & 7 \end{bmatrix}$

9.3 **Graph the reflection of the polygon in the given line.** 14–16. See margin.

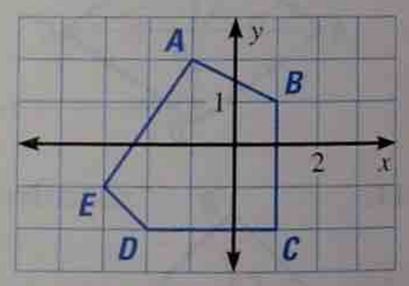
14. y-axis



15. $x = 1$

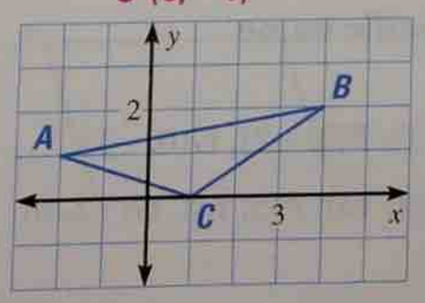


16. $y = x$

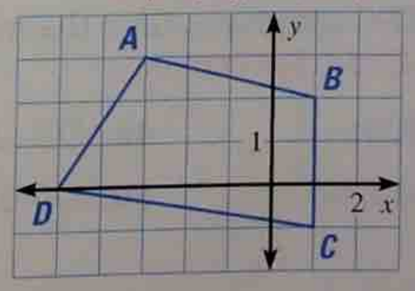


9.4 **Rotate the figure the given number of degrees about the origin. List the coordinates of the vertices of the image.**

17. 270° $A'(1, 2)$, $B'(2, -4)$, $C'(0, -1)$



18. 180° $A'(3, -3)$, $B'(-1, -2)$, $C'(-1, 1)$, $D'(5, 0)$



19. 90° $A'(-1, 2)$, $B'(-1, 5)$, $C'(2, 6)$, $D'(3, 3)$, $E'(1, -1)$