PRACTICE & PROBLEM SOLVING

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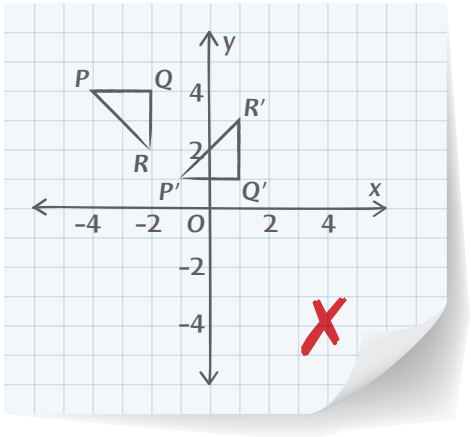
Practice Tutorial

Additional Exercises Available Online

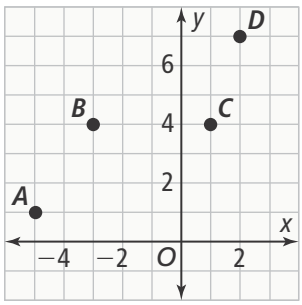
UNDERSTAND

11. Error Analysis Hugo graphed $\triangle PQR$ and $(R_t \circ T_{\langle 3, 1\rangle})(\triangle PQR)$ where the equation of line t is $y = 2$. His translation and reflection were both correct. What mistake did Hugo make?

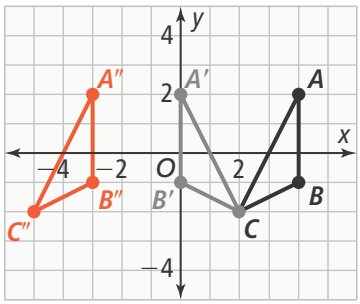


12. Mathematical Connections Suppose line k has equation $x = 3$. Compare the areas of $ABCD$ and $A''B''C''D'' = (T_{\langle 1, 2\rangle} \circ R_k)(ABCD)$. Justify your answer.

13. Make Sense and Persevere A robot travels from position A to B to C to D. What composition of rigid motions represents those moves?



14. Higher Order Thinking How can you describe the complete transformation to a person who cannot see the transformations below?



PRACTICE

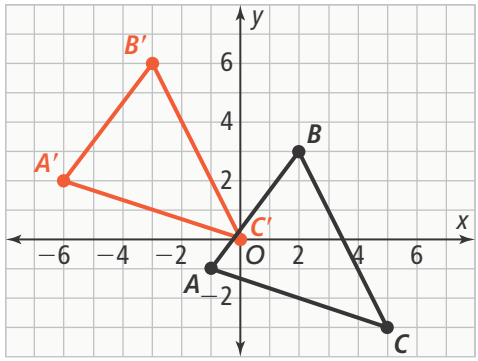
For Exercises 15–17, give the coordinates of the image. SEE EXAMPLE 1

15. $T_{\langle 3, -1\rangle}(\triangle ABC)$ for $A(5, 0)$, $B(-1, 2)$, $C(6, -3)$

16. $T_{\langle -4, 0\rangle}(\triangle DEF)$ for $D(3, 3)$, $E(-2, 3)$, $F(0, 2)$

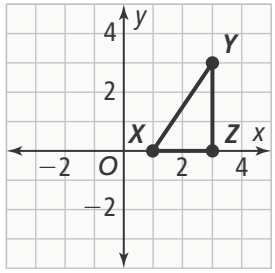
17. $T_{\langle -10, -5\rangle}(\triangle GHJ)$ for $G(0, 0)$, $H(3, 6)$, $J(12, -1)$

18. What is the rule for the rigid motion?
SEE EXAMPLE 2



19. Write a composition of translations that is equivalent to $T_{\langle 8, -5\rangle}(x, y)$. SEE EXAMPLE 3

20. Given $\triangle XYZ$, line n with equation $x = -2$, and line p with equation $x = 2$, write a translation that is equivalent to $R_n \circ R_p$.
SEE EXAMPLE 4



For Exercises 21–24, write each composition of translations as one translation. SEE EXAMPLE 3

21. $T_{\langle -3, 3\rangle} \circ T_{\langle -2, 4\rangle}$

22. $T_{\langle -4, -3\rangle} \circ T_{\langle 3, 1\rangle}$

23. $T_{\langle 5, -6\rangle} \circ T_{\langle -7, 5\rangle}$

24. $T_{\langle 8, -2\rangle} \circ T_{\langle -4, 9\rangle}$

For Exericses 25–28, write each composition of reflections as one translation. Suppose k is the line with equation $x = -3$, ℓ is the line with equation $x = -2$, m is the line with equation $x = 1$, n is the line with equation $x = -1$, p is the line with equation $y = 1$, q is the line with equation $y = 3$, s is the line with equation $y = 2$, and t is the line with equation $y = -4$. SEE EXAMPLE 4

25. $R_k \circ R_\ell$

26. $R_m \circ R_n$

27. $R_p \circ R_q$

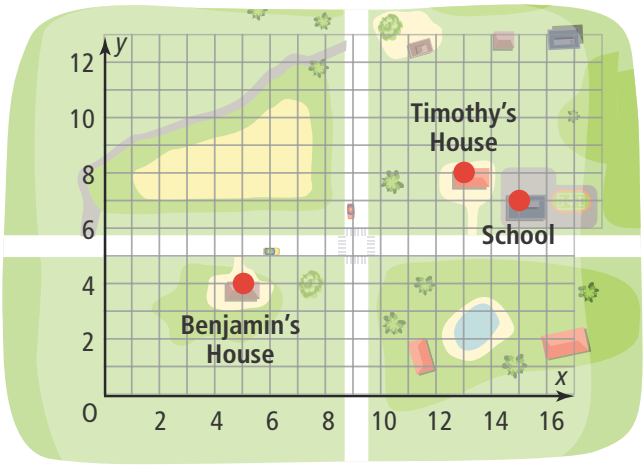
28. $R_s \circ R_t$

29. The distance between vertical lines a and b is 6 units and a is left of b. If $T_{\langle x, 0\rangle}(\triangle JKL) = (R_b \circ R_a)(\triangle JKL)$, what is the value of x?
SEE EXAMPLE 5

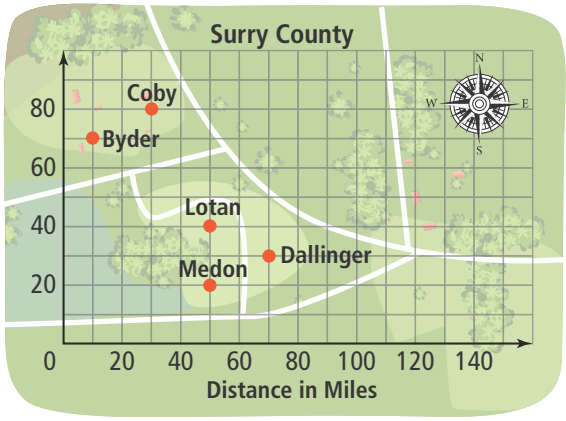
PRACTICE & PROBLEM SOLVING

APPLY

30. Communicate Precisely Benjamin walks from his house to Timothy's house and then to school. Describe Benjamin's walk as a composition of translations. If Benjamin walks from his house directly to school, what translation describes his walk?



Use the map for Exercises 31 and 32.

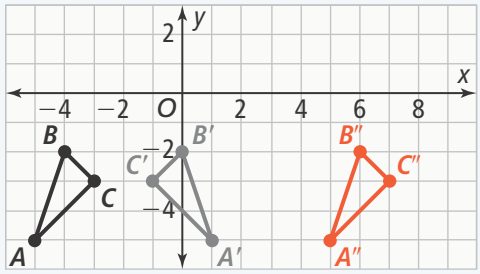


31. Model With Mathematics The Surry County sheriff's patrol route starts in Coby. The composition of rigid motions $T_{\langle -20,\ 10\rangle} \circ T_{\langle 40,\ -50\rangle}$ describes her route. How would you describe the sheriff's route in words?

32. Reason What composition of rigid motions describes a car trip starting in Medon, stopping in Dallinger, and then going on to Byder?

ASSESSMENT PRACTICE

33. Does each of the rigid motions below result in $\triangle A''B''C''$? Select *Yes* or *No*.



Suppose a is the line with equation $x = 6$, b is the line with equation $x = 3$, and c is the line with equation $x = -2$.

	Yes	No
$T_{\langle 0,\ 10\rangle}(\triangle ABC)$	❑	❑
$T_{\langle 10,\ 0\rangle}(\triangle ABC)$	❑	❑
$(R_{y\text{-axis}} \circ R_a)(\triangle ABC)$	❑	❑
$(R_b \circ R_c)(\triangle ABC)$	❑	❑

34. SAT/ACT Suppose the equation of line m is $x = -7$ and the equation of line n is $x = 7$. Which is the equivalent to the composition $T_{\langle -1,\ 3\rangle} \circ T_{\langle -6,\ 4\rangle}$?

Ⓐ R_m Ⓒ R_n

Ⓑ $T_{\langle -7,\ 7\rangle}$ Ⓓ $T_{\langle -6,\ 4\rangle} \circ T_{\langle -1,\ 3\rangle}$

35. Performance Task Rectangle $WXYZ$ has a perimeter of 16 units and an area of 15 square units.

Part A Graph $WXYZ$ on a sheet of graph paper. Write a composition of rigid motions describing two reflections of $WXYZ$ across parallel lines of your choosing. Graph and label the parallel lines, $W'X'Y'Z'$, and $W''X''Y''Z''$.

Part B Write a single rigid motion that is equivalent to the composition of rigid motions in Part B. Justify your answer.

Part C Compare the perimeter and area of $WXYZ$ and $W''X''Y''Z''$. What can you conclude about the effect of translation on the properties of figures?