10. Given the quadrilateral $RSTU$ with vertices $R(5, -3)$, $S(9, 0)$, $T(3, 8)$, and $U(-1, 5)$.

a. Show that $RSTU$ is a rectangle.

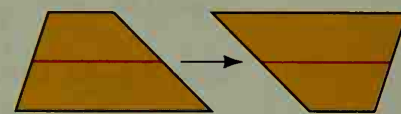
b. Use the distance formula to verify that the diagonals are congruent.

11. Given the quad. $DEFG$ with vertices $D(-4, 1)$, $E(2, 3)$, $F(4, 9)$, and $G(-2, 7)$.

a. Use the distance formula to show that $DEFG$ is a rhombus.

b. Use slopes to verify that the diagonals are perpendicular.

12. Suppose two congruent trapezoids glide together as shown. Explain how you can deduce the length of the median, shown in red, of a trapezoid.

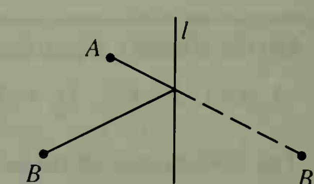


13–34. Work Exercises 28 and 41 on page 527; Exercises 3–6 and 11–18 on pages 537–538; Classroom Exercise 3 on page 541 and Exercises 26, 33 on pages 542–543; Exercises 15, 18, 19, and 21 on page 546; and Exercise 34 on page 555.

Minimal Paths (Chapter 6)

Objective: Solve "shortest distance" problems using translations and coordinate geometry. (Requires understanding of Lessons 13-1 through 13-7 and 14-1 through 14-4.)

The Application found on page 224 shows how to find the shortest path from point A to line l to point B. The solution is found by using a reflection of B in line l. Example 1 shows a different kind of shortest-path problem. It is solved by another kind of transformation: a *translation*.



Example 1 Where should a bridge perpendicular to two parallel river banks be built if the total distance from A to B, including the distance across the bridge, is to be minimum?

Solution Translate B toward the river a distance equal to the width of the river. Draw $\overline{AB'}$ and build the bridge at the point X where $\overline{AB'}$ intersects the river on A's side.

Here is why this method works: We want to minimize $AX + XY + YB$, but since XY is fixed, we need to minimize $AX + YB$, which equals $AX + XB'$ because $XYBB'$ is a parallelogram. This sum is minimum when X is on $\overline{AB'}$. In effect, translating B to B' "sews up" the gap of the river.