

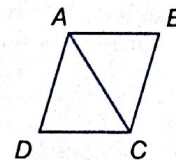
# Check Your Understanding

Step-by-Step Solutions begin on page R20.

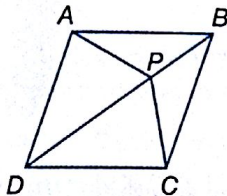


**Example 1** ALGEBRA Quadrilateral  $ABCD$  is a rhombus. Find each value or measure.

- If  $m\angle BCD = 64$ , find  $m\angle BAC$ .
- If  $AB = 2x + 3$  and  $BC = x + 7$ , find  $CD$ .



**Examples 2-3** 3. **PROOF** Write a two-column proof to prove that if  $ABCD$  is a rhombus with diagonal  $\overline{DB}$ , then  $AP \cong CP$ .



4. **GAMES** The checkerboard below is made up of 64 congruent black and red squares. Use this information to prove that the board itself is a square.



**Example 4** COORDINATE GEOMETRY Given each set of vertices, determine whether  $\square QRST$  is a rhombus, a rectangle, or a square. List all that apply. Explain.

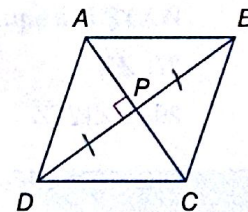
- $Q(1, 2), R(-2, -1), S(1, -4), T(4, -1)$
- $Q(-2, -1), R(-1, 2), S(4, 1), T(3, -2)$

## Practice and Problem Solving

Extra Practice begins on page 969.

**Example 1** ALGEBRA Quadrilateral  $ABCD$  is a rhombus. Find each value or measure.

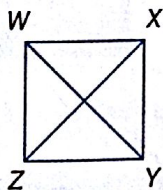
- If  $AB = 14$ , find  $BC$ .
- If  $m\angle BCD = 54$ , find  $m\angle BAC$ .
- If  $AP = 3x - 1$  and  $PC = x + 9$ , find  $AC$ .
- If  $DB = 2x - 4$  and  $PB = 2x - 9$ , find  $PD$ .
- If  $m\angle ABC = 2x - 7$  and  $m\angle BCD = 2x + 3$ , find  $m\angle DAB$ .
- If  $m\angle DPC = 3x - 15$ , find  $x$ .



**Example 2** **PROOF** Write a two-column proof.

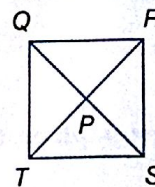
13. Given:  $\overline{WZ} \parallel \overline{XY}, \overline{WX} \parallel \overline{ZY}$   
 $\overline{WZ} \cong \overline{ZY}$

Prove:  $WXYZ$  is a rhombus.



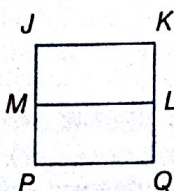
14. Given:  $QRST$  is a parallelogram.  
 $\overline{TR} \cong \overline{QS}, m\angle QPR = 90$

Prove:  $QRST$  is a square.



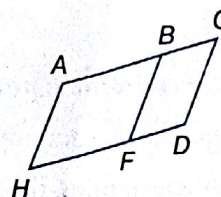
15. Given:  $JKQP$  is a square.  
 $\overline{ML}$  bisects  $\overline{JP}$  and  $\overline{KQ}$ .

Prove:  $JKLM$  is a parallelogram.



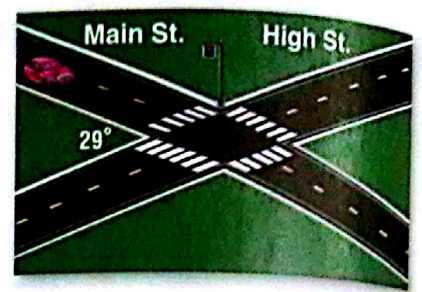
16. Given:  $ACDH$  and  $BCDF$  are parallelograms;  $\overline{BF} \cong \overline{AB}$ .

Prove:  $ABFH$  is a rhombus.

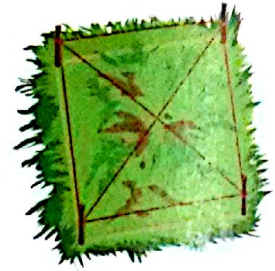


**Example 3**

17. **ROADWAYS** Main Street and High Street intersect as shown in the diagram. Each of the crosswalks is the same length. Classify the quadrilateral formed by the crosswalks. Explain your reasoning.



18. **CONSTRUCTION** A landscaper has staked out the area for a square garden as shown. She has confirmed that each side of the quadrilateral formed by the stakes is congruent and that the diagonals are perpendicular. Is this information enough for the landscaper to be sure that the garden is a square? Explain your reasoning.



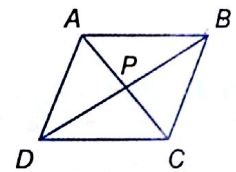
**Example 4**

**COORDINATE GEOMETRY** Given each set of vertices, determine whether  $\square JKLM$  is a rhombus, a rectangle, or a square. List all that apply. Explain.

19.  $J(-4, -1), K(1, -1), L(4, 3), M(-1, 3)$       20.  $J(-3, -2), K(2, -2), L(5, 2), M(0, 2)$   
 21.  $J(-2, -1), K(-4, 3), L(1, 5), M(3, 1)$       22.  $J(-1, 1), K(4, 1), L(4, 6), M(-1, 6)$

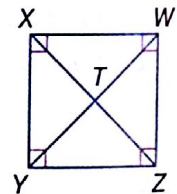
$ABCD$  is a rhombus. If  $PB = 12$ ,  $AB = 15$ , and  $m\angle ABD = 24$ , find each measure.

23.  $AP$       24.  $CP$   
 25.  $m\angle BDA$       26.  $m\angle ACB$

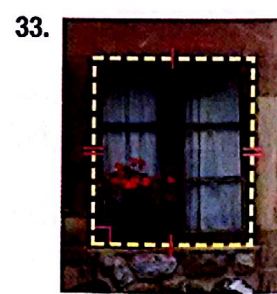
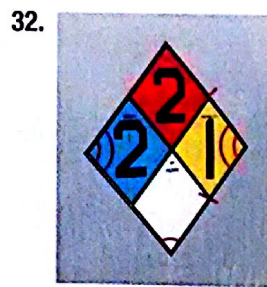


$WXYZ$  is a square. If  $WT = 3$ , find each measure.

27.  $ZX$       28.  $XY$   
 29.  $m\angle WTZ$       30.  $m\angle WYX$



Classify each quadrilateral.



**PROOF** Write a paragraph proof.

34. Theorem 6.16      35. Theorem 6.17      36. Theorem 6.18  
 37. Theorem 6.19      38. Theorem 6.20

**CONSTRUCTION** Use diagonals to construct each figure. Justify each construction.

39. rhombus      40. square

**PROOF** Write a coordinate proof of each statement.

41. The diagonals of a square are perpendicular.  
 42. The segments joining the midpoints of the sides of a rectangle form a rhombus.

