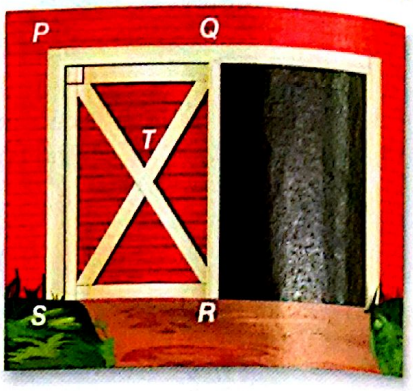
Check Your Understanding

= Step-by-Step Solutions begin on page R20.

Example 1

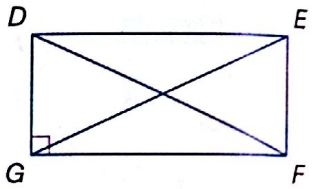
FARMING An X-brace on a barn door is both decorative and functional. It helps to prevent the door from warping over time. If $ST = 3\frac{13}{16}$ feet, $PS = 7$ feet, and $m\angle PTQ = 67$, find each measure.



1. QR
2. SQ
3. $m\angle TQR$
4. $m\angle TSR$

Example 2

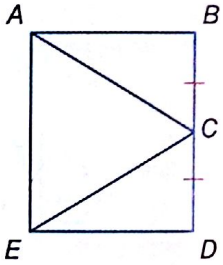
ALGEBRA Quadrilateral $DEFG$ is a rectangle.



5. If $FD = 3x - 7$ and $EG = x + 5$, find EG.
6. If $m\angle EFD = 2x - 3$ and $m\angle DFG = x + 12$, find $m\angle EFD$.

Example 3

7. **PROOF** If $ABDE$ is a rectangle and $\overline{BC} \cong \overline{DC}$, prove that $\overline{AC} \cong \overline{EC}$.



Example 4

COORDINATE GEOMETRY Graph each quadrilateral with the given vertices. Determine whether the figure is a rectangle. Justify your answer using the indicated formula.

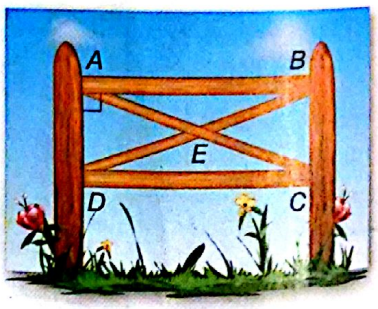
8. $W(-4, 3)$, $X(1, 5)$, $Y(3, 1)$, $Z(-2, -2)$; Slope Formula
9. $A(4, 3)$, $B(4, -2)$, $C(-4, -2)$, $D(-4, 3)$; Distance Formula

Practice and Problem Solving

Extra Practice begins on page 969.

Example 1

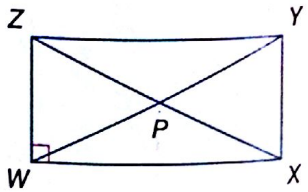
FENCING X-braces are also used to provide support in fencing. If $AB = 6$ feet, $AD = 2$ feet, and $m\angle DAE = 65$, find each measure.



10. BC
11. DB
12. $m\angle CEB$
13. $m\angle EDC$

Example 2

ALGEBRA Quadrilateral $WXYZ$ is a rectangle.

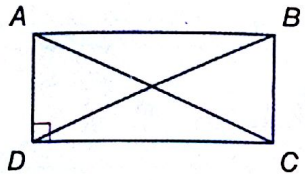


14. If $ZY = 2x + 3$ and $WX = x + 4$, find WX.
15. If $PY = 3x - 5$ and $WP = 2x + 11$, find ZP.
16. If $m\angle ZYW = 2x - 7$ and $m\angle WYX = 2x + 5$, find $m\angle ZYW$.
17. If $ZP = 4x - 9$ and $PY = 2x + 5$, find ZX.
18. If $m\angle XZY = 3x + 6$ and $m\angle XZW = 5x - 12$, find $m\angle YXZ$.
19. If $m\angle ZXW = x - 11$ and $m\angle WZX = x - 9$, find $m\angle ZXY$.

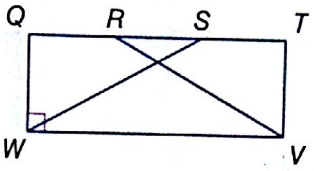
Example 3

PROOF Write a two-column proof.

20. **Given:** $ABCD$ is a rectangle.
Prove: $\triangle ADC \cong \triangle BCD$



21. **Given:** $QTVW$ is a rectangle.
$\overline{QR} \cong \overline{ST}$
Prove: $\triangle SWQ \cong \triangle RVT$



Example 4

COORDINATE GEOMETRY Graph each quadrilateral with the given vertices. Determine whether the figure is a rectangle. Justify your answer using the indicated formula.

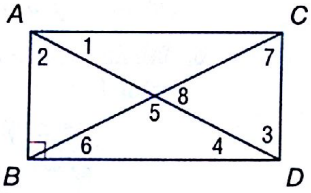
22. $W(-2, 4)$, $X(5, 5)$, $Y(6, -2)$, $Z(-1, -3)$; Slope Formula

23. $J(3, 3)$, $K(-5, 2)$, $L(-4, -4)$, $M(4, -3)$; Distance Formula

24. $Q(-2, 2)$, $R(0, -2)$, $S(6, 1)$, $T(4, 5)$; Distance Formula

25. $G(1, 8)$, $H(-7, 7)$, $J(-6, 1)$, $K(2, 2)$; Slope Formula

Quadrilateral $ABCD$ is a rectangle. Find each measure if $m\angle 2 = 40$.



26. $m\angle 1$

27. $m\angle 7$

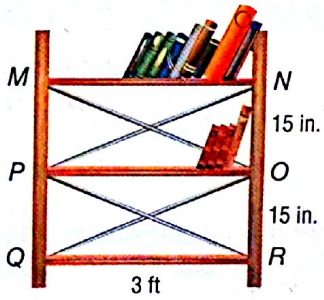
28. $m\angle 3$

29. $m\angle 5$

30. $m\angle 6$

31. $m\angle 8$

32. **CONSTRUCTION** Jody is building a new bookshelf using wood and metal supports like the one shown. To what length should she cut the metal supports in order for the bookshelf to be *square*, which means that the angles formed by the shelves and the vertical supports are all right angles? Explain your reasoning.



PROOF Write a two-column proof.

33. Theorem 6.13

34. Theorem 6.14

PROOF Write a paragraph proof of each statement.

35. If a parallelogram has one right angle, then it is a rectangle.

36. If a quadrilateral has four right angles, then it is a rectangle.

37. **CONSTRUCTION** Construct a rectangle using the construction for congruent segments and the construction for a line perpendicular to another line through a point on the line. Justify each step of the construction.

38. **SPORTS** The end zone of a football field is 160 feet wide and 30 feet long. Kyle is responsible for painting the field. He has finished the end zone. Explain how Kyle can confirm that the end zone is the regulation size and be sure that it is also a rectangle using only a tape measure.

ALGEBRA **Quadrilateral $WXYZ$ is a rectangle.**

39. If $XW = 3$, $WZ = 4$, and $XZ = b$, find YW.

40. If $XZ = 2c$ and $ZY = 6$, and $XY = 8$, find WY.