

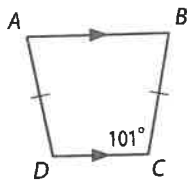
Check Your Understanding

Step-by-Step Solutions begin on page R14.

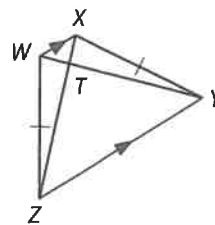


Example 1 Find each measure.

1. $m\angle D$



2. WT , if $ZX = 20$ and $TY = 15$



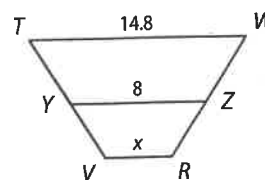
Example 2

COORDINATE GEOMETRY Quadrilateral $ABCD$ has vertices $A(-4, -1)$, $B(-2, 3)$, $C(3, 3)$, and $D(5, -1)$.

- Verify that $ABCD$ is a trapezoid.
- Determine whether $ABCD$ is an isosceles trapezoid. Explain.

Example 3

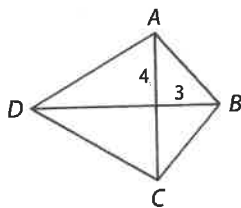
GRIDDED RESPONSE In the figure at the right, \overline{YZ} is the midsegment of trapezoid $TWRV$. Determine the value of x .



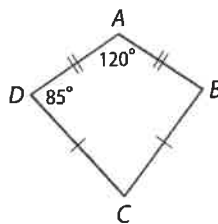
Example 4

CCSS SENSE-MAKING If $ABCD$ is a kite, find each measure.

6. AB



7. $m\angle C$

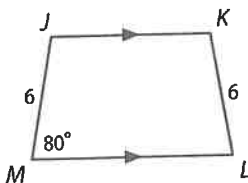


Practice and Problem Solving

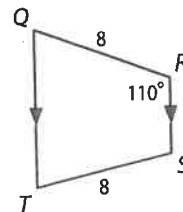
Extra Practice is on page R6.

Example 1 Find each measure.

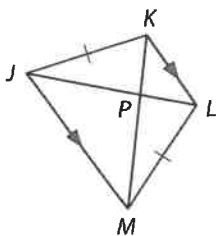
8. $m\angle K$



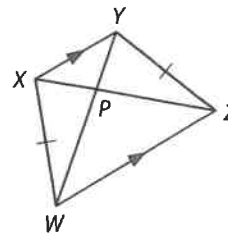
9. $m\angle Q$



10. JL , if $KP = 4$ and $PM = 7$



11. PW , if $XZ = 18$ and $PY = 3$



Example 2

COORDINATE GEOMETRY For each quadrilateral with the given vertices, verify that the quadrilateral is a trapezoid and determine whether the figure is an isosceles trapezoid.

12. $A(-2, 5)$, $B(-3, 1)$, $C(6, 1)$, $D(3, 5)$

13. $J(-4, -6)$, $K(6, 2)$, $L(1, 3)$, $M(-4, -1)$

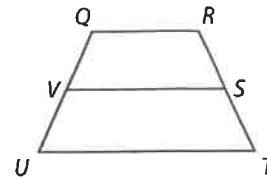
14. $Q(2, 5)$, $R(-2, 1)$, $S(-1, -6)$, $T(9, 4)$

15. $W(-5, -1)$, $X(-2, 2)$, $Y(3, 1)$, $Z(5, -3)$



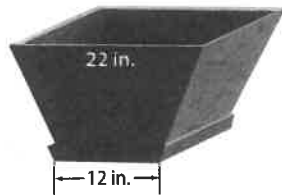
Example 3

For trapezoid $QRTU$, V and S are midpoints of the legs.

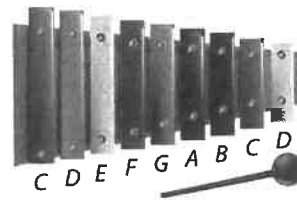


16. If $QR = 12$ and $UT = 22$, find VS .
17. If $QR = 4$ and $UT = 16$, find VS .
18. If $VS = 9$ and $UT = 12$, find QR .
19. If $TU = 26$ and $SV = 17$, find QR .
20. If $QR = 2$ and $VS = 7$, find UT .
21. If $RQ = 5$ and $VS = 11$, find UT .

22. **DESIGN** Juana is designing a window box. She wants the end of the box to be a trapezoid with the dimensions shown. If she wants to put a shelf in the middle for the plants to rest on, about how wide should she make the shelf?



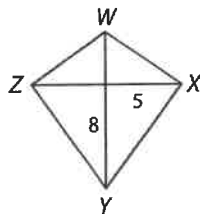
23. **MUSIC** The keys of the xylophone shown form a trapezoid. If the length of the lower pitched C is 6 inches long, and the higher pitched D is 1.8 inches long, how long is the G key?



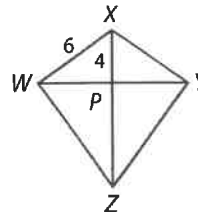
Example 4

CCSS SENSE-MAKING If $WXYZ$ is a kite, find each measure.

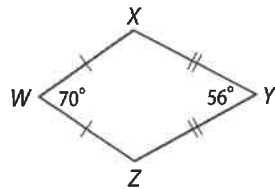
24. YZ



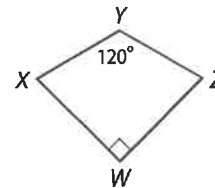
25. WP



26. $m\angle X$



27. $m\angle Z$



PROOF Write a paragraph proof for each theorem.

28. Theorem 6.21

29. Theorem 6.22

30. Theorem 6.23

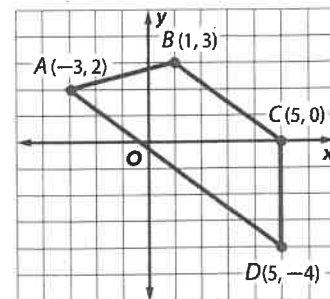
31. Theorem 6.25

32. Theorem 6.26

33. **PROOF** Write a coordinate proof for Theorem 6.24.

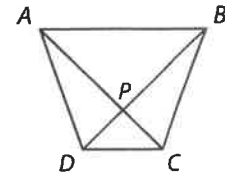
34. **COORDINATE GEOMETRY** Refer to quadrilateral $ABCD$.

- a. Determine whether the figure is a trapezoid. If so, is it isosceles? Explain.
- b. Is the midsegment contained in the line with equation $y = -x + 1$? Justify your answer.
- c. Find the length of the midsegment.

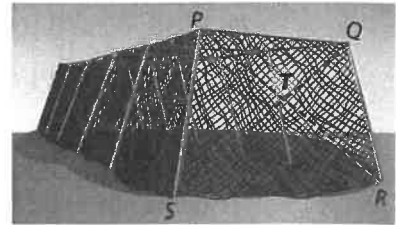


ALGEBRA $ABCD$ is a trapezoid.

35. If $AC = 3x - 7$ and $BD = 2x + 8$, find the value of x so that $ABCD$ is isosceles.
36. If $m\angle ABC = 4x + 11$ and $m\angle DAB = 2x + 33$, find the value of x so that $ABCD$ is isosceles.



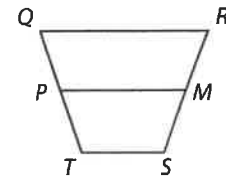
SPORTS The end of the batting cage shown is an isosceles trapezoid. If $PT = 12$ feet, $ST = 28$ feet, and $m\angle PQR = 110$, find each measure.



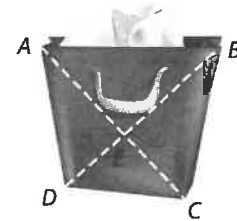
37. TR
38. SQ
39. $m\angle QRS$
40. $m\angle QPS$

ALGEBRA For trapezoid $QRST$, M and P are midpoints of the legs.

41. If $QR = 16$, $PM = 12$, and $TS = 4x$, find x .
42. If $TS = 2x$, $PM = 20$, and $QR = 6x$, find x .
43. If $PM = 2x$, $QR = 3x$, and $TS = 10$, find PM .
44. If $TS = 2x + 2$, $QR = 5x + 3$, and $PM = 13$, find TS .



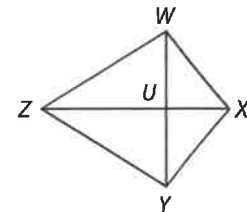
SHOPPING The side of the shopping bag shown is an isosceles trapezoid. If $EC = 9$ inches, $DB = 19$ inches, $m\angle ABE = 40$, and $m\angle EBC = 35$, find each measure.



45. AE
46. AC
47. $m\angle BCD$
48. $m\angle EDC$

ALGEBRA $WXYZ$ is a kite.

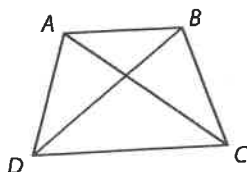
49. If $m\angle WXY = 120$, $m\angle WZY = 4x$, and $m\angle ZWX = 10x$, find $m\angle ZYX$.
50. If $m\angle WXY = 13x + 24$, $m\angle WZY = 35$, and $m\angle ZWX = 13x + 14$, find $m\angle ZYX$.



CCSS ARGUMENTS Write a two-column proof.

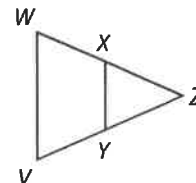
51. **Given:** $ABCD$ is an isosceles trapezoid.

Prove: $\angle DAC \cong \angle CBD$



52. **Given:** $\overline{WZ} \cong \overline{ZV}$, \overline{XY} bisects \overline{WZ} and \overline{ZV} , and $\angle W \cong \angle ZXY$.

Prove: $WXYV$ is an isosceles trapezoid.



Determine whether each statement is *always*, *sometimes*, or *never* true. Explain.

53. The opposite angles of a trapezoid are supplementary.
54. One pair of opposite sides are parallel in a kite.
55. A square is a rhombus.
56. A rectangle is a square.
57. A parallelogram is a rectangle.

