

Quadrilateral Property Quest

Use side, angle, and diagonal facts to solve.

GRADE 7 • 7.MG.3.a.ii

7.MG.3.a.ii "Compare and contrast properties of the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid: congruence of angle measures, side, and diagonal lengths; and"

NAME _____

DATE _____

MATCH THE PROPERTIES

Every parallelogram has congruent opposite sides and congruent opposite angles. Rectangles are parallelograms with four right angles and congruent diagonals, while rhombi are parallelograms with four congruent sides. A square is both a rectangle and a rhombus, and a trapezoid has exactly one pair of parallel sides, but its other sides, angles, and diagonals are not necessarily congruent.

WORKED EXAMPLE

Rectangle WXYZ has diagonals $WY = 18$ cm and $XZ = x + 5$ cm. Find x .

1. Diagonals of a rectangle are congruent.
2. Set the diagonal lengths equal: $18 = x + 5$.
3. Subtract 5 from both sides: $x = 13$.

Answer: $x = 13$

PRACTICE 6 problems

- 1** In parallelogram ABCD, angle A = 67 degrees. Find angle C and angle B.

ANSWER _____

- 2** Rectangle PQRS has $PQ = 14$ cm and $QR = 9$ cm. Find RS and PS.

ANSWER _____

- 3** In rhombus JKLM, $JK = x + 4$ cm and $KL = 21$ cm. Find x .

ANSWER _____

- 4** A trapezoid has one leg measuring 15 cm and its other leg measuring $x + 4$ cm. Can you determine x using only the properties of a trapezoid? Explain.

ANSWER _____

- 5** A square has one diagonal measuring 30 cm and its other diagonal measuring $x + 11$ cm. Find x .

ANSWER _____

- 6** A rectangle has one diagonal measuring 31 cm and its other diagonal measuring $x + 6$ cm. Find x .

ANSWER _____

APPLY IT Show your work

- 1** An esports club makes a rectangular display with two corner-to-corner support cables. One cable is 35 cm long. The other is $x + 12$ cm long. Find x .

WORK SPACE

ANSWER _____

- 2** A student designs a diamond-shaped rhombus patch for a backpack. One side is $x + 9$ cm, and another side is 26 cm. Find x . Then state the length of all four sides.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A quadrilateral has four right angles and four congruent sides. Its diagonals measure $x + 10$ cm and 34 cm. Name the most specific quadrilateral, find x , and explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	In parallelogram ABCD, angle A = 67 degrees. Find angle C and angle B.	angle C = 67 degrees; angle B = 113 degrees
2	Rectangle PQRS has PQ = 14 cm and QR = 9 cm. Find RS and PS.	RS = 14 cm; PS = 9 cm
3	In rhombus JKLM, JK = $x + 4$ cm and KL = 21 cm. Find x.	$x = 17$
4	A trapezoid has one leg measuring 15 cm and its other leg measuring $x + 4$ cm. Can you determine x using only the properties of a trapezoid? Explain.	No. A trapezoid does not have to have congruent legs, so x cannot be determined.
5	A square has one diagonal measuring 30 cm and its other diagonal measuring $x + 11$ cm. Find x.	$x = 19$
6	A rectangle has one diagonal measuring 31 cm and its other diagonal measuring $x + 6$ cm. Find x.	$x = 25$

PART 2 • APPLY IT

- $x = 23$** The support cables are the diagonals of a rectangle, so they are congruent. Set $35 = x + 12$ and subtract 12.
- $x = 17$; all four sides are 26 cm long** All sides of a rhombus are congruent. Set $x + 9 = 26$, then subtract 9.

CHALLENGE

It is a square, and $x = 24$. Four right angles and four congruent sides identify a square. A square has congruent diagonals, so $x + 10 = 34$.

Accept equivalent wording for congruent, such as equal in measure or same length. For the trapezoid problem, accept any clear explanation that its legs are not required to be congruent.