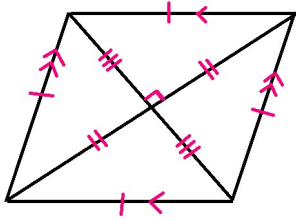
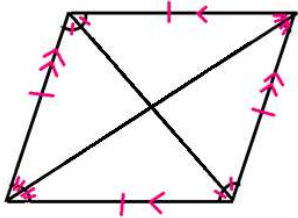


Lesson 5.6 – Properties of Special Parallelograms

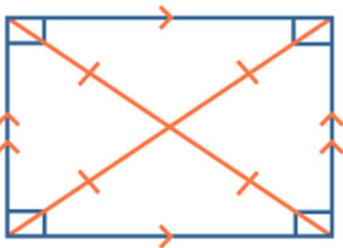
Rhombus Diagonals Conjecture - The diagonals of a rhombus are perpendicular, and they bisect each other.



Rhombus Angles Conjecture - The diagonals of a rhombus bisect the angles of the rhombus.



Rectangle Diagonals Conjecture - The diagonals of a rectangle are congruent and bisect each other.



REMINDER

Remember that a square is both a rhombus and a rectangle, so each of the previous three conjectures apply to a square as well.

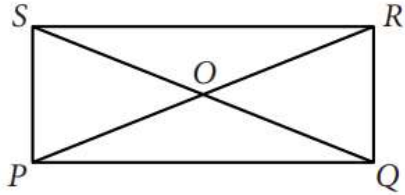
Example 1: Find each missing measure

$PQRS$ is a rectangle and $OS = 16$.

$$OQ = \underline{\hspace{2cm}}$$

$$m\angle QRS = \underline{\hspace{2cm}}$$

$$PR = \underline{\hspace{2cm}}$$



We know that the diagonals of a rectangle bisect each other (cut each other in half). So, since $OS = 16$, we know that OQ should also equal sixteen.

$$\mathbf{OQ = 16}$$

Since we are told that $PQRS$ is a rectangle, we know that each of the angles of $PQRS$ is a right angle.

$$\mathbf{m\angle QRS = 90^\circ}$$

We know that $OS = 16$. We determined that $OQ = 16$. That means that $SQ = 32$. Since the diagonals of a rectangle are congruent, then PR should be the same as SQ .

$$\mathbf{PR = 32}$$

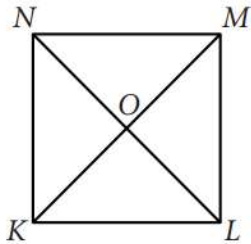
Example 2: Find each missing measure

$KLMN$ is a square and $NM = 8$.

$$m\angle OKL = \underline{\hspace{2cm}}$$

$$m\angle MOL = \underline{\hspace{2cm}}$$

$$\text{Perimeter } KLMN = \underline{\hspace{2cm}}$$



Since $KLMN$ is a square, we know that all of the angles of $KLMN$ are right angles. We also know that the angles of a rhombus (remember that a square is a type of rhombus) are bisected by the diagonals. This means that each right angle is cut in half by the diagonals.

$$\frac{90}{2} = 45$$

$$m\angle OKL = 45^\circ$$

The diagonals of a rhombus are perpendicular (Rhombus Diagonals Conjecture). Remember that perpendicular means intersecting at right angles.

$$m\angle MOL = 90^\circ$$

We know that squares are equilateral. So, to find the perimeter of the square, we need to multiply a side length by 4.

$$8 \cdot 4 = 32$$

$$\text{Perimeter } KLMN = 32$$

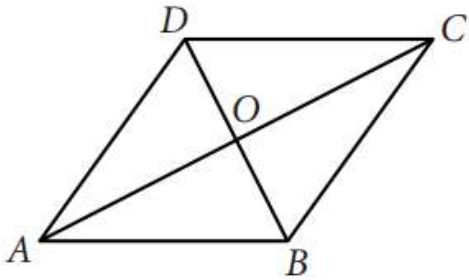
Example 3: Find each missing measure

$ABCD$ is a rhombus, $AD = 11$, and $DO = 6$.

$OB =$ _____

$BC =$ _____

$m\angle AOD =$ _____



The diagonals of a rhombus bisect each other. So, $DO = OB$.

$OB = 6$

A rhombus is equilateral. So, all sides of the rhombus are congruent.

$BC = 11$

The diagonals of a rhombus are perpendicular.

$m\angle AOD = 90^\circ$

Example 4: Match the description with all the terms that fit it

- | | | | |
|--------------|-----------------------|------------------|-----------------------|
| a. Trapezoid | b. Isosceles triangle | c. Parallelogram | d. Rhombus |
| e. Kite | f. Rectangle | g. Square | h. All quadrilaterals |

_____ Diagonals bisect each other.

The figures that have diagonals that bisect each other are parallelogram, rhombus, rectangle, and square. So, **c, d, f, g**.

Example 5: Match the description with all the terms that fit it

- a. Trapezoid b. Isosceles triangle c. Parallelogram d. Rhombus
e. Kite f. Rectangle g. Square h. All quadrilaterals

_____ Diagonals are perpendicular.

The figures that have diagonals that are perpendicular are rhombus, square, and kite. So, **d, e, g.**

Example 6: Match the description with all the terms that fit it

- a. Trapezoid b. Isosceles triangle c. Parallelogram d. Rhombus
e. Kite f. Rectangle g. Square h. All quadrilaterals

_____ Diagonals are congruent,

The figures that have diagonals that are congruent are rectangle, and square. So, **f, g.**

**An isosceles trapezoid has diagonals that are congruent, but not all trapezoids.

Example 7: Match the description with all the terms that fit it

- a. Trapezoid b. Isosceles triangle c. Parallelogram d. Rhombus
e. Kite f. Rectangle g. Square h. All quadrilaterals

_____ Measures of interior angles sum to 360° .

All quadrilaterals have interior angles that add to 360° . So, **a, c, d, e, f, g, h.**

Example 8: Match the description with all the terms that fit it

- a. Trapezoid b. Isosceles triangle c. Parallelogram d. Rhombus
e. Kite f. Rectangle g. Square h. All quadrilaterals

_____ Opposite sides are congruent.

The figures that have opposite sides congruent are parallelogram, rhombus, rectangle, and square. So, **c, d, f, g**.

Example 9: Match the description with all the terms that fit it

- | | | | |
|--------------|-----------------------|------------------|-----------------------|
| a. Trapezoid | b. Isosceles triangle | c. Parallelogram | d. Rhombus |
| e. Kite | f. Rectangle | g. Square | h. All quadrilaterals |

_____ Opposite angles are congruent.

The figures that have opposite angles congruent are parallelogram, rhombus, rectangle, and square. So, **c, d, f, g**.

**A kite does have one set of opposite angles (the nonvertex angles) that are congruent. However, since the vertex angles are not congruent, I excluded kite from this set.

Example 10: Match the description with all the terms that fit it

- | | | | |
|--------------|-----------------------|------------------|-----------------------|
| a. Trapezoid | b. Isosceles triangle | c. Parallelogram | d. Rhombus |
| e. Kite | f. Rectangle | g. Square | h. All quadrilaterals |

_____ Both diagonals bisect angles.

The figures that have both diagonals bisecting angles are rhombus, and square. So, **d, g**.

Example 11: Match the description with all the terms that fit it

- | | | | |
|--------------|-----------------------|------------------|-----------------------|
| a. Trapezoid | b. Isosceles triangle | c. Parallelogram | d. Rhombus |
| e. Kite | f. Rectangle | g. Square | h. All quadrilaterals |

_____ Diagonals are perpendicular bisectors of each other.

The figures that have diagonals that are perpendicular bisectors of each other are rhombus, and square. So, **d, g**.