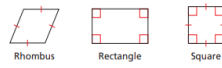


7.4 Rhombus, Rectangle, Square with work

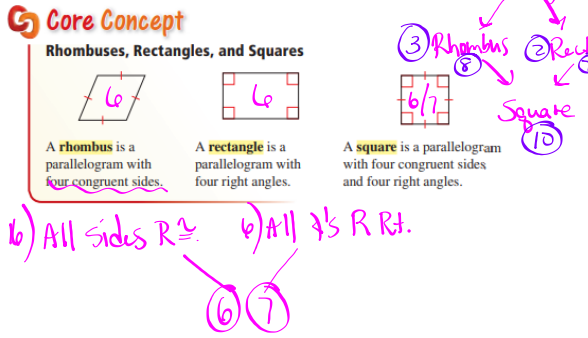
7.4 Properties of Special Parallelograms



What are the properties from the parallelogram (5)?

- 1) opp. sides $R \parallel$.
- 2) opp sides $R \cong$.
- 3) opp \angle 's $R \cong$.
- 4) Diagonals bisect each other.
- 5) Consecutive \angle 's R supp.

Core Concept Rhombuses, Rectangles, and Squares



⑤ Parallelograms
③ Rhombus
② Rect
⑩ Square

⑥ All sides $R \cong$
⑦ All \angle 's $R \text{ Rt}$.

Corollary 7.2 Rhombus Corollary
A quadrilateral is a rhombus if and only if it has four congruent sides.
 $ABCD$ is a rhombus if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$.

Corollary 7.3 Rectangle Corollary
A quadrilateral is a rectangle if and only if it has four right angles.
 $ABCD$ is a rectangle if and only if $\angle A, \angle B, \angle C,$ and $\angle D$ are right angles.

Corollary 7.4 Square Corollary
A quadrilateral is a square if and only if it is a rhombus and a rectangle.
 $ABCD$ is a square if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$ and $\angle A, \angle B, \angle C,$ and $\angle D$ are right angles.

⑥
⑥
⑥ ⑦

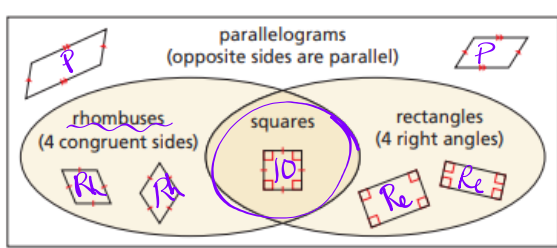
↓ Sometimes
Never
Parallelogram
Rhombus | Rect
↓
Square
↑ Always

parallelograms (opposite sides are parallel)

rhombuses (4 congruent sides)

squares

rectangles (4 right angles)



1. For any square $JKLM$, is it *always* or *sometimes* true that $\overline{JK} \perp \overline{KL}$? Explain your reasoning.
Yes, always true.
2. For any rectangle $EFGH$, is it *always* or *sometimes* true that $\overline{FG} \cong \overline{GH}$? Explain your reasoning.
Sometimes
3. A quadrilateral has four congruent sides and four congruent angles. Sketch the quadrilateral and classify it.
Square

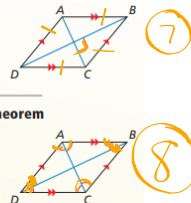
$\frac{360^\circ}{4} = 90^\circ$
Rt

Rhombus

5 properties of the parallelogram and...

Theorem 7.11 Rhombus Diagonals Theorem
A parallelogram is a rhombus if and only if its diagonals are perpendicular.
 $\square ABCD$ is a rhombus if and only if $\overline{AC} \perp \overline{BD}$.
Proof p. 390; Ex. 72, p. 395

Theorem 7.12 Rhombus Opposite Angles Theorem
A parallelogram is a rhombus if and only if each diagonal bisects a pair of opposite angles.
 $\square ABCD$ is a rhombus if and only if \overline{AC} bisects $\angle BCD$ and $\angle BAD$, and \overline{BD} bisects $\angle ABC$ and $\angle ADC$.

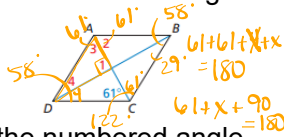


7.4 Rhombus, Rectangle, Square with work

ABCD is a rhombus, find the numbered angle measures.

$$m\angle 1 = 90^\circ \quad m\angle 3 = 61^\circ$$

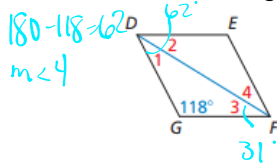
$$m\angle 2 = 61^\circ \quad m\angle 4 = 29^\circ$$



DEFG is a rhombus, find the numbered angle measures.

$$m\angle 1 \cong m\angle 2 \cong m\angle 3 \cong m\angle 4$$

$$= 31^\circ$$



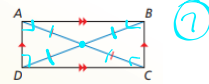
Rectangles

5 properties of a parallelogram and...

Theorem 7.13 Rectangle Diagonals Theorem

A parallelogram is a rectangle if and only if its diagonals are congruent.

$\square ABCD$ is a rectangle if and only if $\overline{AC} \cong \overline{BD}$.



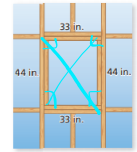
You are building a frame for a window. The window will be installed in the opening shown in the diagram.

a. The opening must be a rectangle. Given the measurements in the diagram, can you assume that it is? Explain.

No

b. You measure the diagonals of the opening. The diagonals are 54.8 inches and 55.3 inches. What can you conclude about the shape of the opening?

Parallelogram



Square

5 properties of the parallelogram

- 1) opp sides congruent
- 2) opp sides parallel
- 3) consecutive angles supplementary
- 4) diagonals bisect
- 5) opp angles are congruent

3 from the rhombus

- 1) all sides congruent
- 2) diagonals are perpendicular
- 3) diagonals bisect corner angles

2 from the rectangle

- 1) all corner angles are 90°
- 2) diagonals are congruent

7.4 HW: pg. 393: 3, 7, 9, 13, 25, 29 - 35 (o), 65 - 69 (o), 89 - 91

Answers
with work for
spiral
review:

$$89. \overline{AE} = \overline{EC}$$

$$x = 10$$

$$\overline{ED} = \frac{1}{2}\overline{CB}$$

$$y = \frac{1}{2} \cdot 16 = 8$$

$$90. \overline{DE} = \frac{1}{2}\overline{BC}$$

$$7 = \frac{1}{2}x$$

$$14 = x$$

$$\overline{BD} = \overline{DA}$$

$$y = 6$$

$$91. \overline{AD} = \overline{DB}$$

$$x = 9$$

$$\overline{DE} = \frac{1}{2}\overline{AC}$$

$$13 = \frac{1}{2} \cdot y$$

$$26 = y$$