Honors Geometry

Notes Section 8.4

Properties of Rhombuses, Rectangles, and Squares

Rhombus: _____

Rectangle: _____

Square: _____

RHOMBUS COROLLARY

A quadrilateral is a rhombus if and only if it has four congruent sides.

$ABCD$ is a rhombus if and only if $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{AD}$.

RECTANGLE COROLLARY

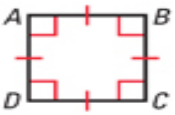
A quadrilateral is a rectangle if and only if it has four right angles.

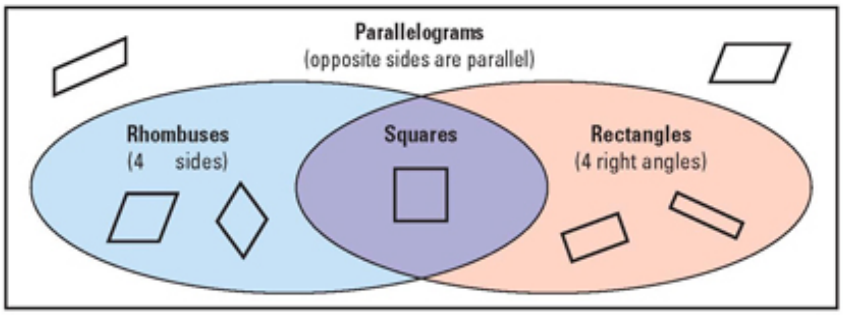
$ABCD$ is a rectangle if and only if $\angle A$, $\angle B$, $\angle C$, and $\angle D$ are right angles.

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.

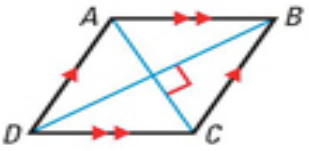




THEOREM 8.11

A parallelogram is a rhombus if and only if its diagonals are perpendicular.

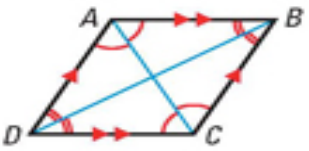
$\square ABCD$ is a rhombus if and only if $\overline{AC} \perp \overline{BD}$.



THEOREM 8.12

A parallelogram is a rhombus if and only if each diagonal bisects a pair of opposite angles.

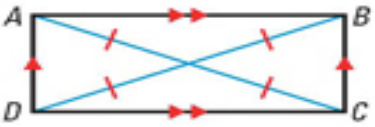
$\square ABCD$ is a rhombus if and only if $\overline{AC}$ bisects $\angle BCD$ and $\angle BAD$ and $\overline{BD}$ bisects $\angle ABC$ and $\angle ADC$.



THEOREM 8.13

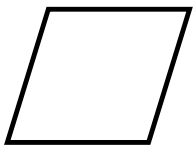
A parallelogram is a rectangle if and only if its diagonals are congruent.

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

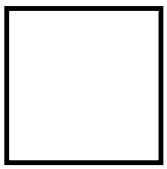


EXAMPLE 1 For any rhombus QRST, decide whether the statement is always or sometimes True. Draw a sketch & explain your reasoning.

a) $\angle Q \cong \angle S$

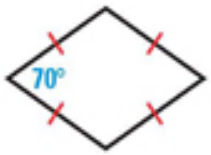


b) $\angle Q \cong \angle R$



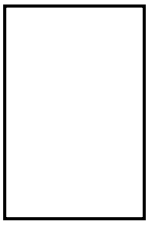
EXAMPLE 2 Classify the special quadrilateral. Explain your reasoning.

a)

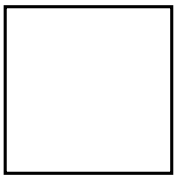


b) A quadrilateral has 4 congruent sides and 4 congruent angles.

EXAMPLE 3 Sketch rectangle ABCD. List everything that you know about it.

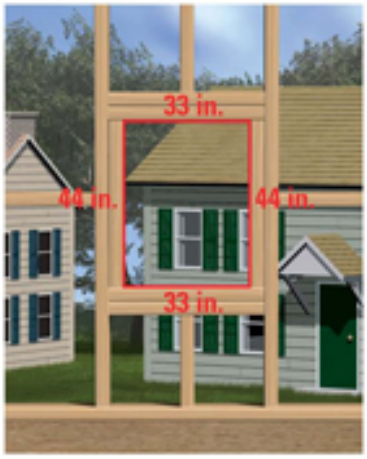


EXAMPLE 4 Sketch square PQRS. List everything you know about it.



EXAMPLE 5 You are building a frame for a window. The window will be installed in the opening shown.

a) The opening must be a rectangle. Can you assume this?



b) The diagonals are 54.8 and 55.3 inches.

What can you conclude about the shape?