Geometry: *Hutschenreuter* Name KEY

Section 8.4: Properties of Rhombuses, Rectangles, and Squares

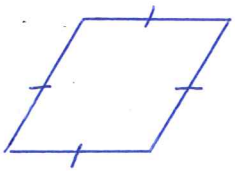
Essential Question:
What are the properties of parallelograms that have all sides or all angles congruent?

VOCABULARY:

Bi-conditional Statement:
A statement that contains the phrase "if and only if"; abbreviated by iff

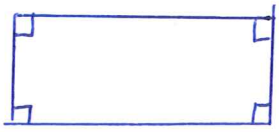
Rhombus

A parallelogram with four congruent sides



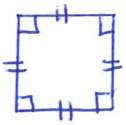
Rectangle

A parallelogram with four right angles



Square

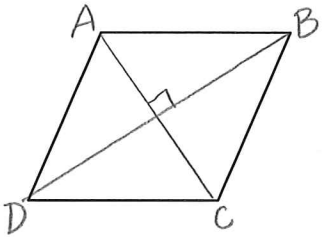
A parallelogram with 4 congruent sides and 4 right angles



Theorem 8.11:

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

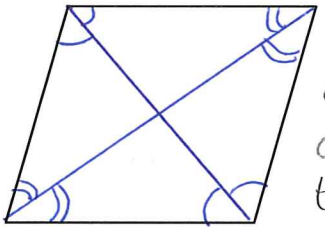
"If diagonals are ⊥, then a rhombus"



$\overline{AC} \perp \overline{BD}$

Theorem 8.12:

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

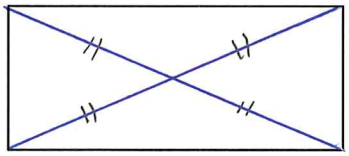


If the diagonals bisect opp. angles, then its a rhombus.

Theorem 8.13:

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

"If the diagonals are $\cong$, then rectangle"



A1. Name each quadrilateral type for which the statement is true.

a. It is equilateral.
Rhombus, Square

b. Diagonals are <u>not</u> congruent.
Parallelogram, Rhombus

c. It can contain obtuse angles.
Parallelogram, Rhombus

d. It has no acute angles.
Rectangle, Square

e. All four angles are congruent.
Rectangle, Square

f. Both sets of sides are parallel.
Parallelogram, Rhombus
Rectangle, Square

A2. Find the indictated measures of the rhombus.

→ diagonals ⊥ & bisect each other
→ diagonals bisect angles
→ 4 ≅ sides

a. $m\angle PQT$

If $\angle P = 30+30 = 60°$

then $\angle Q = 180-60 = 120°$

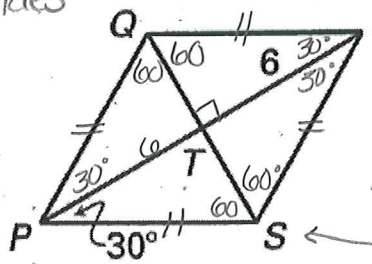
And if bisected → $\frac{120}{2} = 60$

$m\angle PQT = 60°$

because consecutive ∠s are supplementary

b. PT

A rhombus is a parallelogram ∴ diagonals bisect each other so $PT = 6$



$\angle R = 60$ so $\angle S = 180 - 60 = 120°$

Consecutive ∠s are supp.

A3. Find the indictated measures of the rectangle with $WY = 12$.

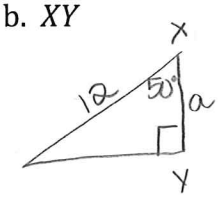
a. $m\angle WZX$

∠W, ∠X, ∠Y, ∠Z all rt. angles = 90°

And alt. int. ∠'s are ≅

$m\angle WZX = 50°$

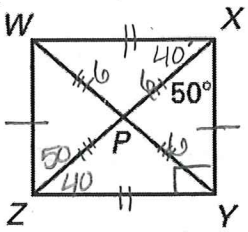
b. XY



$\cos 50° = \frac{a}{12}$

$a = \frac{12(\cos 50°)}{1}$

$a = XY = 7.71$



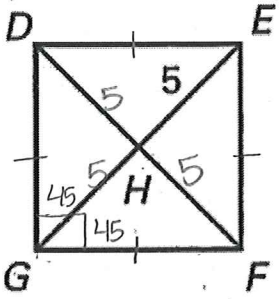
A4. Find the indictated measures of the square.

a. $m\angle HGD = 45°$

Diagonals bisect angle which is 90°

b. $HF = 5$

Diagonals are ≅ and bisect each other



- Diagonals ≅ & bisect
- Angles bisected

Summary 8.4:

A parallelogram has all:

- sides ≅ if it's a rhombus or square
- angles ≅ if it's a rectangle or square

* A square is a rectangle & a rectangle is a parallelogram.
* A square is a rhombus & a rhombus is a parallelogram.