Definition of a Rectangle: A quadrilateral with four right angles.

Since a Rectangle is a Parallelogram it has all the properties of a parallelogram **PLUS** some additional properties.

If a quad is a Rectangle then:
- Opp sides are parallel
- Opp sides are congruent
- Opp angles are congruent
- Diagonals bisect each other   **AND**

Rectangle

Def:
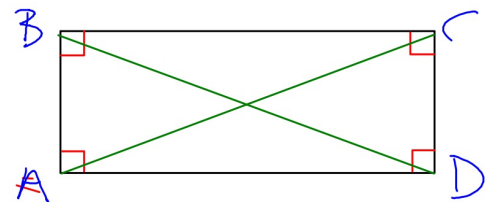Quadrilateral with rt. angles

- All properties of a ||-gram
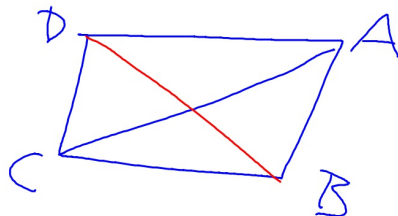 PLUS
- Diagonals ≅

Theorem 6-11

The diagonals of a rectangle are congruent.

$\overline{AC} \cong \overline{BD}$

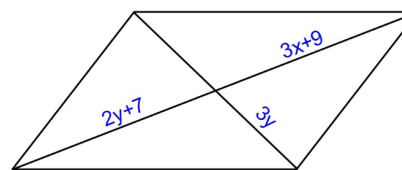Given ABCD is a rectangle, find the value of x.

AC = 5x+10   BD = 6x-1

AC & BD are diagonals of a Rectangle which means they are ≅

$$5x + 10 = 6x - 1$$
$$-5x \qquad\qquad -5x$$
$$10 = x - 1$$
$$+1 \qquad +1$$

$$\boxed{x = 11}$$

Find the values of x and y that makes this figure a Rectangle.

3x+9
2y+7
3y

A Rectangle is a Parallelogram so the diagonals bisect each other. The diagonals of a Rectangle are congruent.
Therefore, two congruent segments that bisect each other must create four congruent smaller segments.

3x+9
2y+7
3y
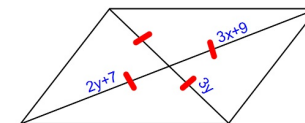
$$3y = 2y + 7$$
$$-2y \quad -2y$$
$$\boxed{y = 7}$$

$$2y + 7 = 3x + 9$$
$$2(7) + 7 = 3x + 9$$
$$14 + 7 = 3x + 9$$
$$21 = 3x + 9$$
$$-9 \qquad -9$$
$$\frac{12}{3} = \frac{3x}{3}$$
$$\boxed{x = 4}$$

How do you determine if a Parallelogram is a Rhombus or a Rectangle?

Theorem 6-11

The diagonals of a rectangle are congruent.

Converse of Theorem 6-11

Theorem 6-14

If the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle.

Another way to show a quadrilateral is a Rectangle:

If a quadrilateral has four right angles, then it is a Rectangle.

Quadrilateral Booklet

Rectangle	Proving a Quad is a Rectangle:
Quadrilateral with rt. angles	1. Show it is a ||-gram with ≅ diagonals
• All properties of a ||-gram **PLUS**	
• Diagonals ≅	2. Show all four angles are right angles.

Use the coordinates of Quadrilateral ABCD to determine the most precise name: Parallelogram, Rhombus, Rectangle or neither?

A(13,-5)   B(8,3)   C(1,11)   D(6,3)

IS IT A ||-gram?

mdpt AC: $\left(\frac{13+1}{2}, \frac{-5+11}{2}\right)$

$= (7,3)$

mdpt BD: $\left(\frac{8+6}{2}, \frac{3+3}{2}\right)$

$= (7,3)$

ABCD IS a ||-gram b/c diag. bisect each other.

IS IT A Rhombus?

slope AC: $m = \frac{11--5}{1-13}$

$= \frac{16}{-12} = \frac{4}{-3}$

slope BD: $m = \frac{3-3}{8-6} = \frac{0}{2}$

ABCD IS NOT a Rhombus b/c diag NOT ⊥

IS IT A Rectangle?

Length of AC:

$\sqrt{(13-1)^2 + (11--5)^2}$

$= \sqrt{144+256} = \sqrt{400}$

Length of BD:

$\sqrt{(8-6)^2 + (3-3)^2} = \sqrt{4+0}$

$= \sqrt{4}$

ABCD IS NOT a rectangle b/c diag not ≅

Therefore the most precise name for ABCD is: PARALLELOGRAM

Hwk #5   Sec 6-4

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Problems 2, 4-6, 12, 16-21