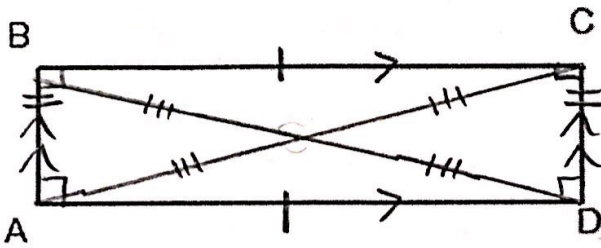


Objective: SWBAT discover and apply the properties of all rectangles.

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

**LESSON 2: PROPERTIES OF RECTANGLES**

Do Now: Does the rectangle below have *all* the properties of a parallelogram? Check each property. Mark your diagram with arcs/slashes to show what parts are congruent.

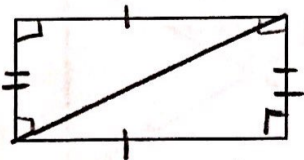


- 2 sets of opposite sides  $\parallel$ ? ✓
- 2 sets of opposite sides  $\cong$ ? ✓
- Opposite angles  $\cong$ ? ✓
- Consecutive  $\angle$ s supplementary? ✓
- Diagonals bisect each other? ✓
- Diagonals form two  $\cong$   $\Delta$ s? \_\_\_\_\_

a) What additional properties does the rectangle have that a parallelogram does *not* have?

- the diagonals are  $\cong$
- All 4 angles are right  $\angle$ 's

b) What types of triangles are formed when one diagonal is drawn in a rectangle?

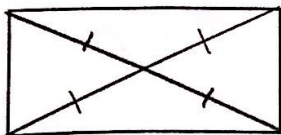


2  $\cong$  right  $\Delta$ 's

c) What formula is used on this type of triangle that could help you solve for a missing side?

Pythagorean theorem:  $a^2 + b^2 = c^2$   
 Leg, Leg, Hypotenuse

d) When both diagonals are drawn, what could be said about the four segments that are formed?



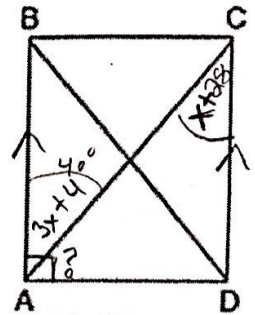
All 4 segments are  $\cong$

## Rectangle

All the properties of a parallelogram PLUS:

- 4 right angles
- Diagonals congruent

Ex 1) In the accompanying diagram of rectangle  $ABCD$ ,  $m\angle BAC = 3x + 4$  and  $m\angle ACD = x + 28$ . What is  $m\angle CAD$ ?



$$\begin{array}{r} 3x + 4 = x + 28 \\ -x \quad -4 \quad -x \quad -4 \\ \hline \end{array}$$

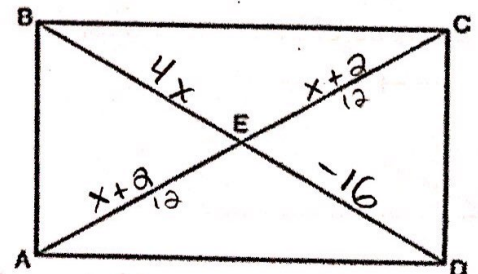
$$\frac{2x}{2} = \frac{24}{2}$$

$$x = 12$$

$$\begin{array}{l} 3(12) + 4 \\ 36 + 4 \\ 40 \end{array}$$

$$\angle CAD = 50^\circ$$

Ex 2) As shown in the diagram of rectangle  $ABCD$  below, diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ . If  $AE = x + 2$  and  $BD = 4x - 16$ , what is the length of  $AC$ ?



$$x + 2 + x + 2 = 4x - 16$$

$$\begin{array}{r} 2x + 4 = 4x - 16 \\ -2x \quad +16 \quad -2x \quad +16 \\ \hline \end{array}$$

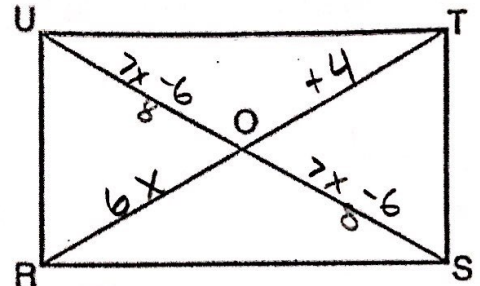
$$\frac{20}{2} = \frac{2x}{2}$$

$$10 = x$$

$$AC = 24$$



3) In the diagram below of rectangle  $RSTU$  diagonals  $\overline{RT}$  and  $\overline{SU}$  intersect at  $O$ . If  $RT = 6x + 4$  and  $SO = 7x - 6$ , what is the length of  $\overline{US}$ ?



$$6x + 4 = 7x - 6 + 7x - 6$$

$$\begin{array}{r} 6x + 4 = 14x - 12 \\ -6x \quad +12 \quad -6x \quad +12 \\ \hline \end{array}$$

$$\frac{16}{8} = \frac{8x}{8}$$

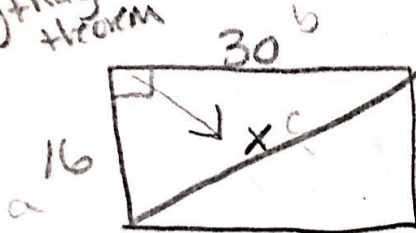
$$2 = x$$

$$US = 16$$

$$\begin{array}{r} 7(2) - 6 \\ 14 - 6 \\ \hline 8 \end{array}$$

\* Ex 4) A builder is building a rectangular deck with dimensions of 16 feet by 30 feet. To ensure that the sides form  $90^\circ$  angles, what should each diagonal measure?

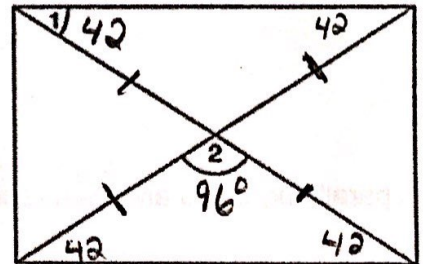
Pythagorean Theorem



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 16^2 + 30^2 &= x^2 \\ 256 + 900 &= x^2 \\ \sqrt{1156} &= \sqrt{x^2} \end{aligned}$$

$$34_{ft} = x$$

Ex 5) As shown in the accompanying diagram, a rectangular gate has two diagonal supports. If  $m\angle 1 = 42$ , what is  $m\angle 2$ ?

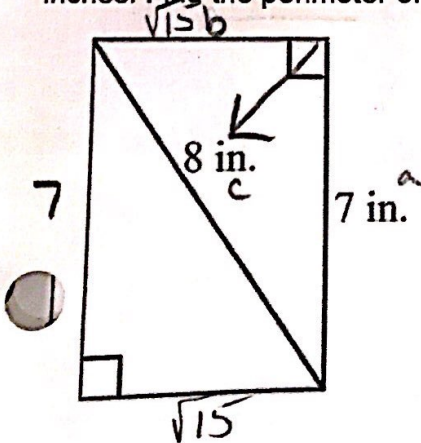


$$\begin{array}{r} 42 \\ +42 \\ \hline 84 \end{array}$$

$$\begin{array}{r} 180 \\ -84 \\ \hline 96 \end{array}$$

$$\angle 2 = 96^\circ$$

Ex 6) A rectangle is shown below with one side measuring 7 inches and the diagonal measuring 8 inches. Find the perimeter of the rectangle.

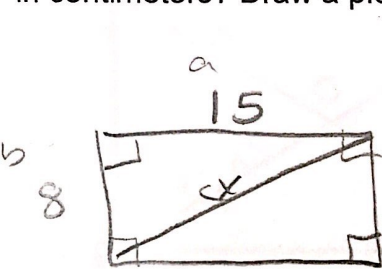


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 7^2 + b^2 &= 8^2 \\ 49 + b^2 &= 64 \\ -49 \quad -49 \\ \hline \sqrt{b^2} &= \sqrt{15} \\ b &= \sqrt{15} \end{aligned}$$

$$P = 7 + 7 + \sqrt{15} + \sqrt{15}$$

$$P = 14 + 2\sqrt{15}$$

**Closure:** The length and width of a rectangle are 15 cm. and 8 cm. What is the length of the diagonal in centimeters? Draw a picture to help you!



$$a^2 + b^2 = c^2$$

$$8^2 + 15^2 = x^2$$

$$64 + 225 = x^2$$

$$\sqrt{289} = \sqrt{x^2}$$

$$17 = x$$

**Homework**