

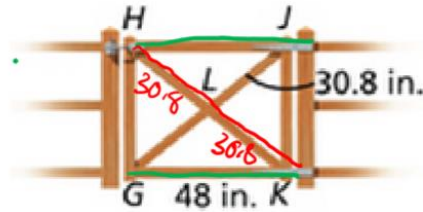
Rectangle Theorem Notes

A type of special parallelogram is a Rectangle.

A Rectangle is a quadrilateral with 4 right angles.

THEOREM	HYPOTHESIS
If a quadrilateral is a rectangle, then it is a parallelogram. (rect. \rightarrow \square)	
If a parallelogram is a rectangle, then its diagonals are congruent. (rect. \rightarrow diags. \cong)	

All parts of diagonals are congruent.



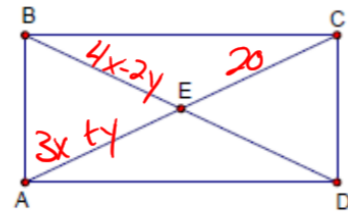
Carpentry The rectangular gate has diagonal braces. Find each length.

1a. $HJ = 48$ in
 \downarrow
 opp. side of CK

1b. $HK = 30.8 + 30.8 = 61.6$ in

Each piece of diagonal is congruent. HK is made up of 2 pieces

1. In the diagram of rectangle ABCD, diagonals AC and BD intersect at E. If $AE = 3x + y$, $BE = 4x - 2y$ and $CE = 20$, find x and y .



$$4x - 2y = 20 \rightarrow 4x - 2y = 20$$

$$2(3x + y = 20) \rightarrow + 6x + 2y = 40$$

Eliminate y by adding

$$\underline{10x = 60} \rightarrow x = 6$$

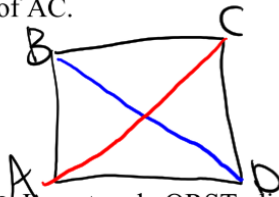
Use x to find y.

$$3(6) + y = 20$$

$$18 + y = 20$$

$$y = 2$$

2. In rectangle ABCD, diagonals AC and BD are drawn. If $AC = x^2 + 4x - 23$ and $BD = 5x + 33$, find the length of AC.



Diagonals are \cong

$$x^2 + 4x - 23 = 5x + 33$$

$$x^2 - x - 23 = 33$$

$$x^2 - x - 56 = 0$$

$$(x+7)(x-8) = 0$$

$$x+7=0 \quad x-8=0$$

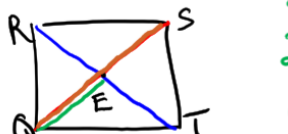
$$x=-7 \quad x=8$$

sub into $m \overline{AC}$

$$m \overline{AC} = (8)^2 + 4(8) - 23$$

$$m \overline{AC} = 73$$

3. In rectangle QRST, diagonals QS and RT intersect at E. If $QE = 3x - 10$ and $QS = 5x - 8$, find the length of QS.



$$2(QE) = QS$$

$$2(3x - 10) = 5x - 8$$

$$6x - 20 = 5x - 8$$

$$x - 20 = -8$$

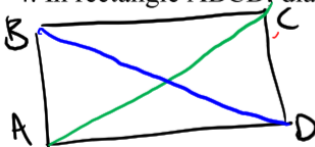
$$x = 12$$

$$m \overline{QS} = 5(12) - 8$$

$$m \overline{QS} = 60 - 8$$

$$m \overline{QS} = 52$$

4. In rectangle ABCD, diagonal $AC = 6x - 2$ and diagonal $BD = 4x + 2$. Find the length of AC.



$$6x - 2 = 4x + 2$$

$$2x - 2 = 2$$

$$2x = 4$$

$$x = 2$$

$$m \overline{AC} = 6(2) - 2$$

$$m \overline{AC} = 12 - 2$$

$$m \overline{AC} = 10$$

5. Mr. Harmon is building a shelving unit for his bathroom. He wants the frame of the shelf to be a perfect rectangle. How could he verify this if he doesn't have a way to measure the angles?

If he measures the diagonals of the frame. If the diagonals are equal then the shape should be a rectangle, since he should know the opposite sides are \cong .