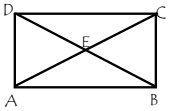
Section 10-4: The Rectangle

Given rectangle ABCD with diagonals AC and DB:



DO NOW

Name:

1. A pair of opposite sides: $\overline{DA} \cong \overline{CB}$, $\overline{DC} \cong \overline{AB}$
2. A pair of consecutive angles: $\angle DAB$ & $\angle ABC$
3. A pair of opposite angles: $\angle ADC \cong \angle ABC$
4. A pair of vertical angles: $\angle DEC \cong \angle AEB$
5. Two segment bisectors: $\overline{DB}$ and $\overline{AC}$
6. A pair of right angles: $\angle DAB \perp \angle DCB$
7. A pair of perpendicular lines: $\overline{DA} \perp \overline{AB}$
8. What is true about the diagonals of a rectangle? they are equal

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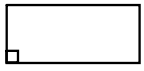

A ~~rectangle~~ is a parallelogram with one right angle.

Properties of a Rectangle :

P 1. A rectangle has all the properties of a parallelogram.

A 2. A rectangle has 4 right angles (equiangular)

D 3. The diagonals of a rectangle are congruent.

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Proving a quadrilateral is a rectangle

1ST

Choose one of the 3 ways of proving that the quadrilateral is a parallelogram.

THEN

Show that the parallelogram is a rectangle by proving

diagonal equal in length

or

a right angle

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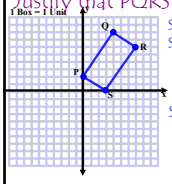
Ways to prove a Rectangle

Justify that PQRS is a rectangle. P(0,2), Q(4,8), R(7,6), S(3,0)



Step 1: Graph

Step 2: If a quadrilateral has 2 pair of opposite side parallel and a right angle then it is a rectangle

Step 3: $m = \frac{y_1 - y_2}{x_1 - x_2}$

Step 4:

$m_{\overline{PQ}} = \frac{8-2}{4-0} = \frac{6}{4} = \frac{3}{2}$ $\quad m_{\overline{RS}} = \frac{6-0}{7-3} = \frac{6}{4} = \frac{3}{2}$

$m_{\overline{QR}} = \frac{8-6}{4-7} = \frac{2}{-3}$ $\quad m_{\overline{SP}} = \frac{0-2}{3-0} = -\frac{2}{3}$

Step 5: $\overline{PQ} \parallel \overline{RS}$, $\overline{QR} \parallel \overline{SP}$

$\overline{PQ}$ & $\overline{QR}$ have negative reciprocal slopes, $\overline{PQ} \perp \overline{QR}$, $\angle Q$ is a right angle.

Step 6: ∴ Quad PQRS is a rectangle

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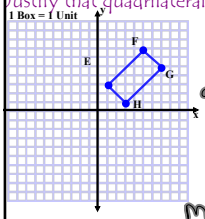
Justify that quadrilateral EFGH is a rectangle. E(1,3), F(5,7), G(7,5), H(3,1).



Step 1: Graph

Step 2: If a quadrilateral has 2 pair of opposite sides parallel and a right angle, then it is a rectangle.

Step 3: $m = \frac{y_1 - y_2}{x_1 - x_2}$

Step 4:

$m_{\overline{EF}} = \frac{3-7}{1-5} = \frac{-4}{-4} = 1$ $\quad m_{\overline{GH}} = \frac{5-1}{7-3} = \frac{4}{4} = 1$

$m_{\overline{FG}} = \frac{7-5}{5-7} = \frac{2}{-2} = -1$ $\quad m_{\overline{HE}} = \frac{1-3}{3-1} = \frac{-2}{2} = -1$

Step 5: $\overline{EF} \parallel \overline{GH}$, $\overline{FG} \parallel \overline{HE}$

$\overline{EF}$ and $\overline{FG}$ have negative reciprocal slopes, $\overline{EF} \perp \overline{FG}$, $\angle F$ is a right angle

Step 6: ∴ Quad EFGH is a rectangle.

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Homework:

Worksheet and pg 392 #15a and b

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