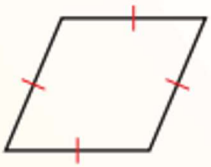
7.4 special parallelograms

Monday, January 23, 2017 2:59 PM

What You Will Learn

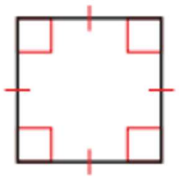
- Use properties of special parallelograms.
- Use properties of diagonals of special parallelograms.
- Use coordinate geometry to identify special types of parallelograms.

Rhombuses, Rectangles, and Squares



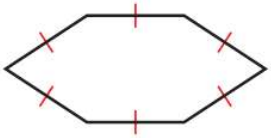
A **rhombus** is a parallelogram with four congruent sides.

A **rectangle** is a parallelogram with four right angles.

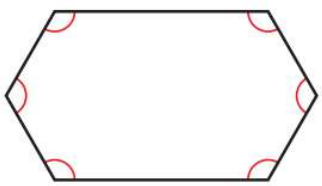


A **square** is a parallelogram with four congruent sides and four right angles.

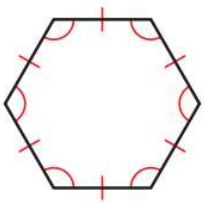
In an **equilateral polygon**, all sides are congruent.



In an **equiangular polygon**, all angles in the interior of the polygon are congruent.



A **regular polygon** is a convex polygon that is both equilateral and equiangular.



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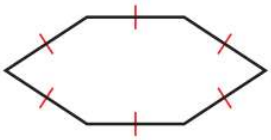

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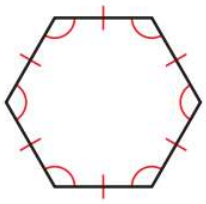
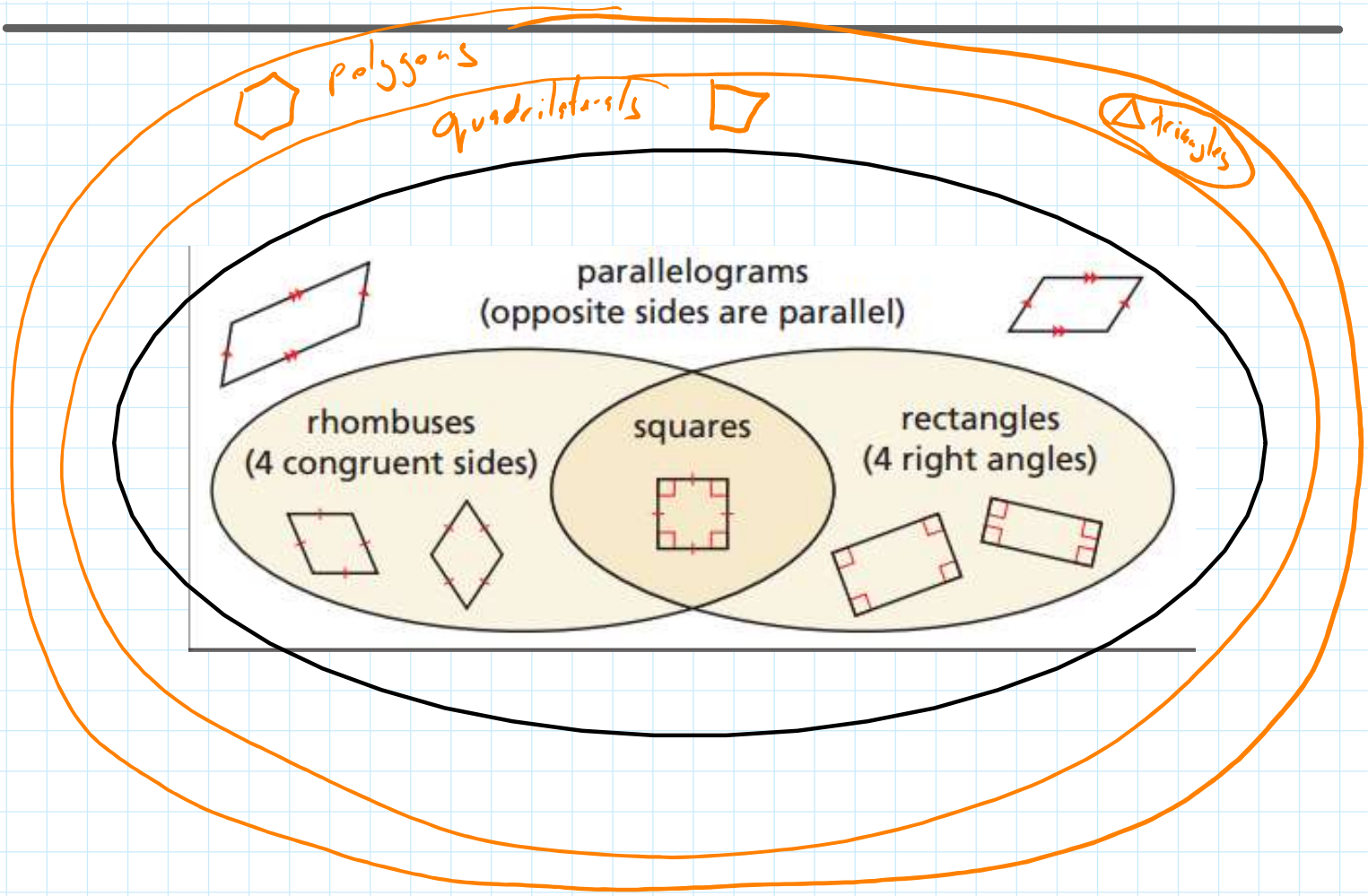
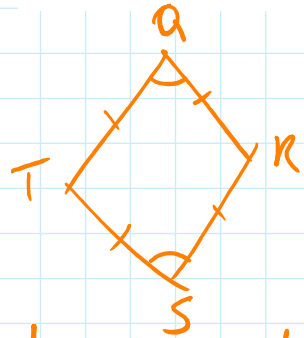




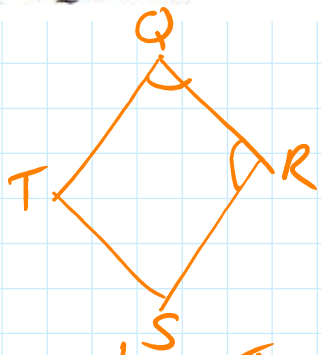
For any rhombus $QRST$, decide whether the statement is *always* or *sometimes* true. Draw a diagram and explain your reasoning.

a. $\angle Q \cong \angle S$



Always True because QRST is a Rhombus and All Rhombus' are Parallelograms

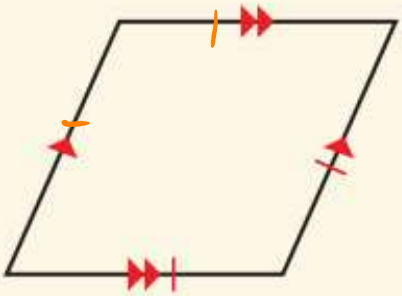
b. $\angle Q \cong \angle R$



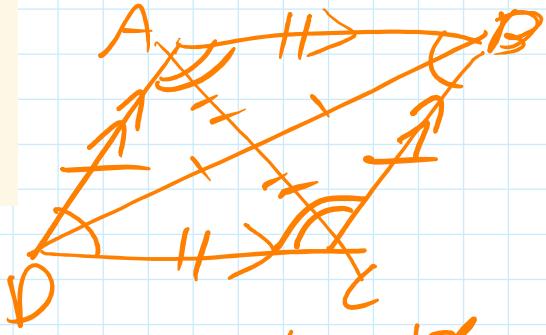
Sometimes True, when the Rhombus is a square.

and opp ∠s are ≅

Classify the special quadrilateral. Explain your reasoning.



Rhombus



m∠D + m∠C = 180

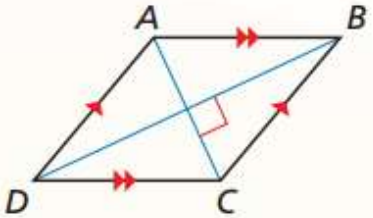
m∠A + m∠B = 180

Theorem 7.11 Rhombus Diagonals Theorem

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

$\square ABCD$ is a rhombus if and only if $\overline{AC} \perp \overline{BD}$.

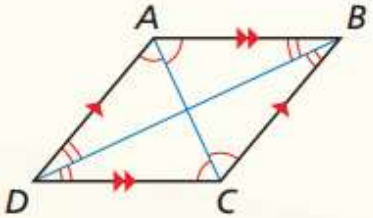
Proof p. 390; Ex. 72, p. 395



Theorem 7.12 Rhombus Opposite Angles Theorem

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

$\square ABCD$ is a rhombus if and only if $\overline{AC}$ bisects $\angle BCD$ and $\angle BAD$, and $\overline{BD}$ bisects $\angle ABC$ and $\angle ADC$.



Find the measures of the numbered angles in rhombus $ABCD$.

$m\angle 1 = 90°$

$m\angle 2 = 61°$

$m\angle 3 = 61°$

$m\angle 4 = 29°$

$(n-2)180$

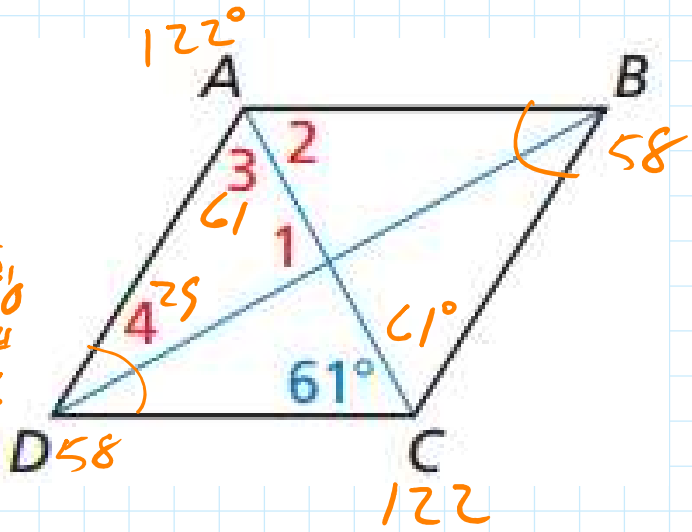
$(4-2)180$

360

$244 + 2x = 380$

$2x = 136$

$x = 58$

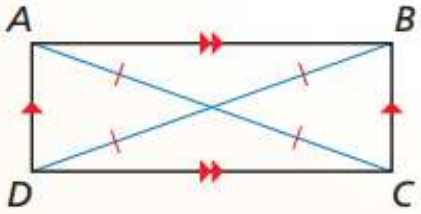


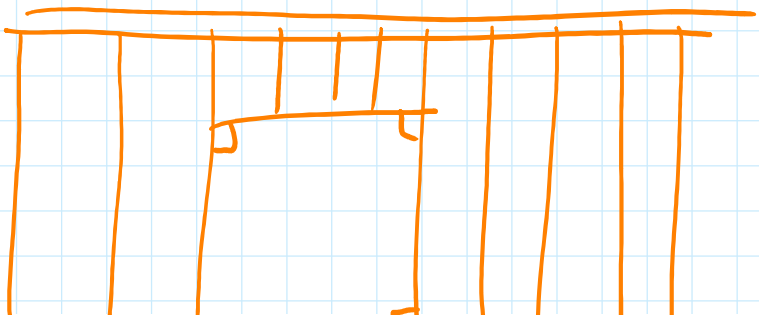
Theorem 7.13 Rectangle Diagonals Theorem

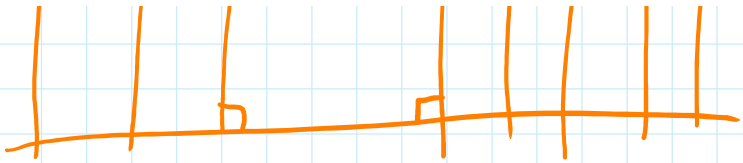
A parallelogram is a rectangle if and only if its diagonals are congruent.

$\square ABCD$ is a rectangle if and only if $\overline{AC} \cong \overline{BD}$.

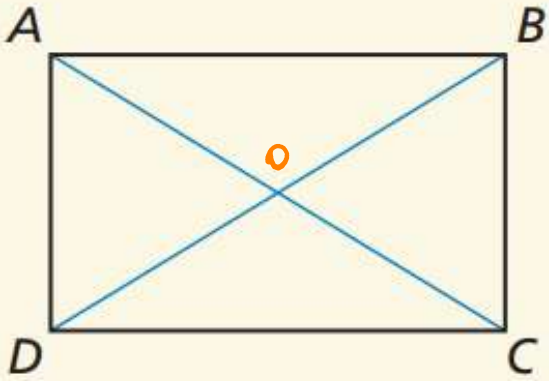
Proof Exs. 87 and 88, p. 396







In rectangle $ABCD$, $AC = 7x - 15$ and $BD = 2x + 25$. ~~Find the lengths of the diagonals of $ABCD$.~~



$AO = 20\frac{1}{2}$

$7x - 15 = 2x + 25$

$+15 \quad +15$

$7x = 2x + 40$

$-2x \quad -2x$

$5x = 40$

$x = 8$

$2x + 25 \; ; \; x = 8$

$2 \cdot 8 + 25$

$16 + 25$

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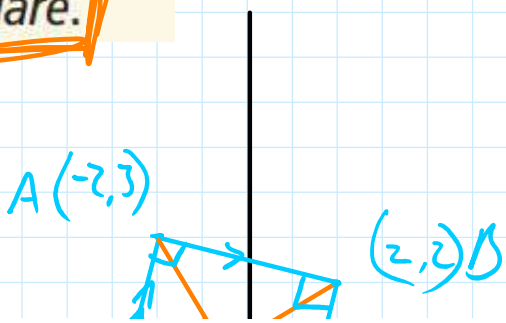
Decide whether $\square ABCD$ with vertices $A(-2, 3)$, $B(2, 2)$, $C(1, -2)$, and $D(-3, -1)$ is a *rectangle*, a *rhombus*, or a *square*.

$m\overline{AB} = \frac{-1}{4}$

$m\overline{CD} = \frac{-1}{4}$

$\overline{AD} - 4$

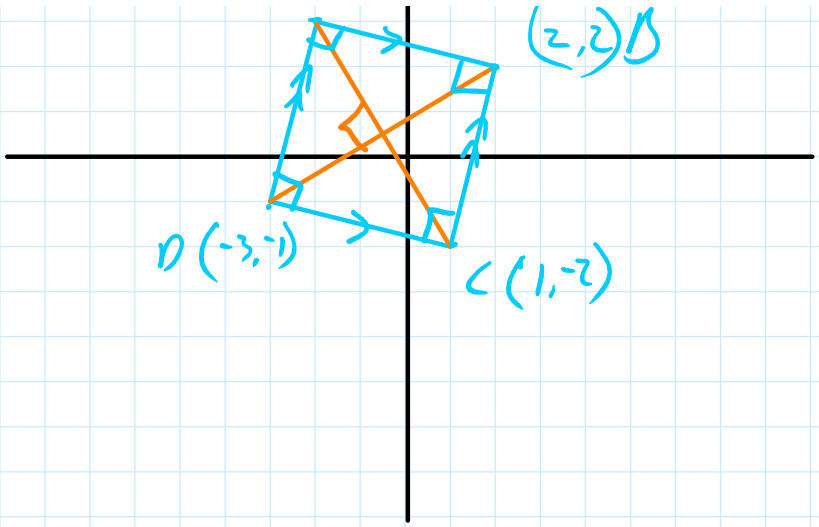


$m\overline{AD} = \frac{4}{1}$

$m\overline{BC} = \frac{4}{1}$

$m\overline{AC} = \frac{-5}{3}$

$m\overline{DB} = \frac{3}{5}$



Practice sec 7.4 pg. 393: 1-3A, 7-21EOO, 23-35EO, 43-57EOO