Geometry R – Mr. Bo
Unit 7 – Day 2 Notes

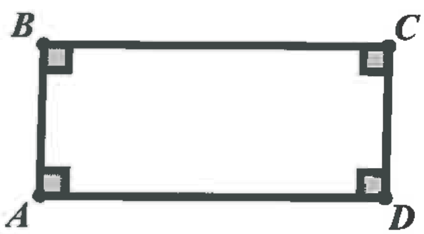
Name: notes.
Date: ____________

Special Parallelograms:
Rectangle – Rhombus – Square

Recall: State the 5 properties that can be used to identify a *parallelogram*:

1. opp. sides are //.
2. opp. sides are ≅
3. opp. ∠'s are ≅
4. consecutive ∠'s are supp.
5. Diagonals bisect each other.

Rectangle - A quadrilateral with 4 congruent angles (or 4 right angles).



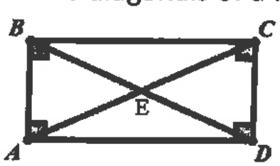
Pictured is **rectangle** ABCD. Based on the given definition of a rectangle, how do you know ABCD is also a *parallelogram*? Explain your reasoning.

the opp. ∠'s are ≅, thus ABCD must be a //-ogram.

(∠A ≅ ∠C and ∠B ≅ ∠D).

The Diagonals of a Rectangle:

1. The diagonals of a Rectangle bisect each other.

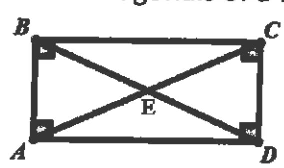


Given: Rectangle ABCD.
Explain why $\overline{BD}$ and $\overline{AC}$ bisect each other at E.

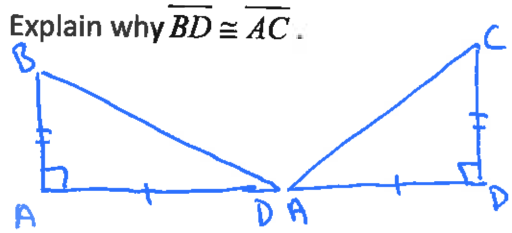
$\overline{BD}$ and $\overline{AC}$ bisect each other because ABCD is also a //-ogram.

(the diagonals of a //-ogram bisect each other)

2. The diagonals of a Rectangle are Congruent.



Given: Rectangle ABCD.
Explain why $\overline{BD} \cong \overline{AC}$.



△ABD ≅ △DCA by SAS.
So, $\overline{BD} \cong \overline{CA}$ by CPCTC.

Now that you know
1. $\overline{BD}$ and $\overline{AC}$ bisect each other at E

and

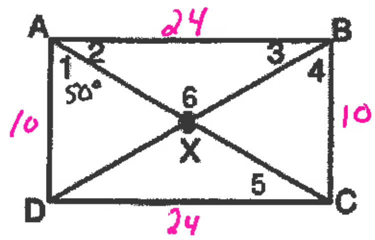
2. $\overline{BD} \cong \overline{AC}$

what conclusion can you make about $\overline{AE}, \overline{BE}, \overline{CE}$ *and* $\overline{DE}$? Explain your reasoning.

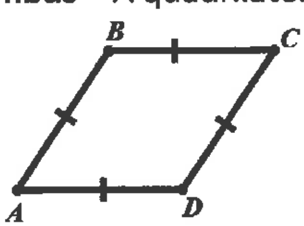
$\overline{AE} \cong \overline{BE} \cong \overline{CE} \cong \overline{DE}$ because halves of equals are equal.

Using the Properties of a Rectangle:

Find each value and state the supporting property that justifies your conclusion.

	Find the values	State the reasons why?
ABCD is a Rectangle. AB=24, BC=10, AC=26, m∠1=50°.  	a. DC = 24 AD = 10	opp. sides of a Rect are ≅.
	b. DB = 26	Diags. of a Rect are ≅.
	c. AX = 13 BX = 13	Diags of a Rect are ≅ and bisect each other.
	d. m∠2 = 40°	∠A = 90° and ∠1 and ∠2 are complementary.
	e. m∠3 = 40°	In △AXB, since AX = BX, then the ∠'s across. are also ≅.
	f. m∠6 = 180 − 80 = 100°	∠'s of a △ Sum to 180°.
	g. m∠5 = 40°	∠5 ≅ ∠2 because they are Alt. int ∠'s. and the opp sides of a rect are ∥.

Rhombus – A quadrilateral with 4 congruent sides.

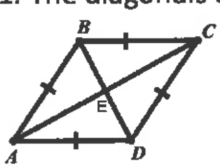


Pictured is **Rhombus** ABCD. Based on the given definition of a rhombus, how do you know ABCD is also a *parallelogram*? Explain your reasoning.

ABCD is also a ∥-ogram because its opposite sides are ≅.

Diagonals of a Rhombus:

1. The diagonals of a Rhombus bisect each other.

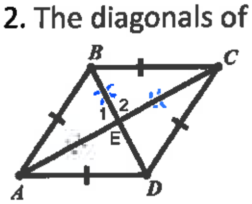


Given: Rhombus ABCD

Explain why $\overline{BD}$ and $\overline{AC}$ bisect each other at E.

Since ABCD is Also a ∥-ogram, the Diagonals bisect each other.

2. The diagonals of a Rhombus are Perpendicular.



Given: Rhombus ABCD

Explain why $\overline{BD} \perp \overline{AC}$.

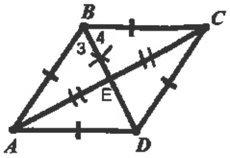
△ABE ≅ △CBE by SSS

∠1 ≅ ∠2 by CPCTC

∠1 supp ∠ as well.

2∠'s both ≅ + supp are rt ∠'s so, $\overline{AC} \perp \overline{BD}$.

3. The diagonals of a Rhombus bisect its angles.



Given: Rhombus ABCD

Explain why $\overline{BD}$ bisects $\angle ABC$.

$\triangle ABE \cong \triangle CBE$ by SSS

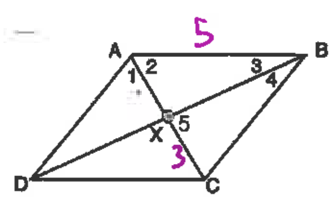
$\angle 3 \cong \angle 4$ by CPCTC

$\overline{BD}$ must bisect $\angle ABC$.

Using the Properties of a Rhombus:

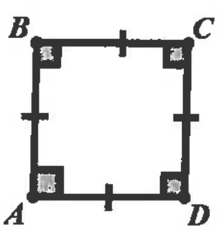
Find each value and state the supporting property that justifies your conclusion.

ABCD is a Rhombus.
AB=5, XC=3, m∠DAB=120°.



Find the values	State the reasons why?
a. DC = 5 AD = 5	Rhombus has 4 ≅ sides.
b. AX = 3 AC = 6	Diagonals of Rhombus bisect each other.
c. m∠2 = 60°	Diagonals of Rhombus bisects its ∠'s.
d. m∠ABC = 60°	Consec. ∠'s of Rhombus are supp.
e. m∠3 = 30°	Diags. of Rhombus bisect its ∠'s.
f. m∠5 = 90°	Diags of Rhombus are ⊥.
g. BX = 4	Pythagorean theorem. (△AXB is Rt).

Square – A quadrilateral with 4 congruent sides and 4 congruent angles.



1. Is a Square also a Parallelogram? Explain your reasoning.

A square is also a //-ogram because its opp. sides are ≅.

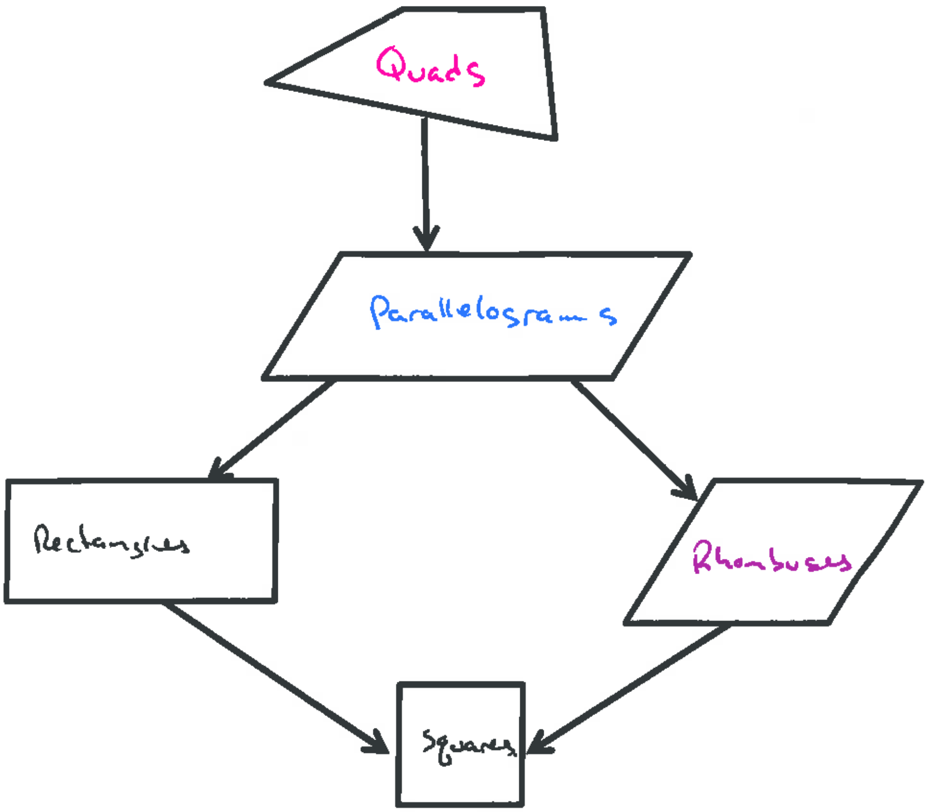
2. Is a Square also a Rectangle? Explain your reasoning.

A Square is also a Rectangle because it has 4 ≅ ∠'s.

3. Is a Square also a Rhombus? Explain your reasoning.

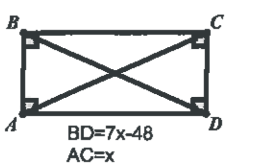
A Square is also a Rhombus because it has 4 ≅ sides.

Quadrilateral Family Tree



Examples: Find the value of x in each special parallelogram. Provide a reason to support how you found x.

1.



Diags of a Rect are ≅.

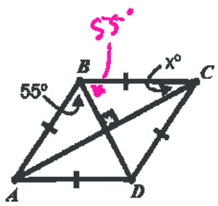
$BD = AC$

$7x - 48 = x$

$6x = 48$

$x = 8$

2.



- Diags of Rhombus bisect its ∠'s.
- Consecutive ∠'s of a Rhombus are Supp.

$m\angle ABC + m\angle BCD = 180$

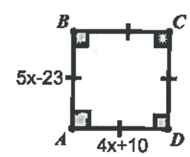
$(55+55) + (x+x) = 180$

$110 + 2x = 180$

$2x = 70$

$x = 35°$

3.



Square has 4 ≅ sides.

$AB = AD$

$5x - 23 = 4x + 10$

$\boxed{x = 33}$