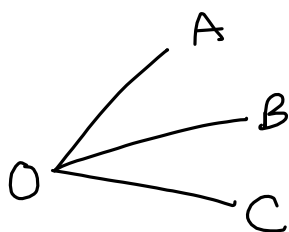**Ch 7 Review Problems pp. 292-295 #1-53 all - due Wednesday 01/25**

Def: A <u>parallelogram</u> is a quadrilateral whose opposite sides are parallel.

<u>Theorem 25</u>: The opposite sides and angles of a parallelogram are equal.

<u>Theorem 26</u>: The diagonals of a parallelogram bisect each other.

<u>Theorem 27</u>: A quadrilateral is a parallelogram, if its opposite sides are equal.
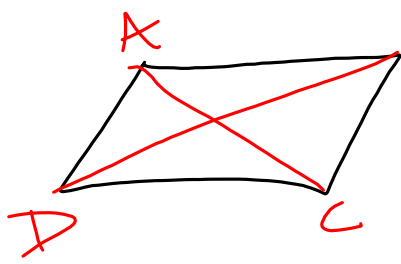
$$AOC = AOB + BOC$$
Betw. Rays Thm

$$AOC > AOB$$
Whole > Part

$$OA - OB - OC$$
Betw. Rays Def.

A   B

D   C

$AB = DC$ $AB \parallel DC$

$AD = BC$ $AD \parallel BC$

$AC \& BD$ bisect eachother

$\angle A = \angle C$ & $\angle B = \angle D$

$\angle A \& B$ are supp

$\angle D \& C$

$\angle A \& \angle D$, $\angle B \& \angle C$

Theorem 28: A quadrilateral is a parallelogram if its opposite angles are equal.

Given : Quadrilateral ABCD with $\angle A = \angle C$ & $\angle B = \angle D$

To Prove : ABCD is a parallelogram

Proof :

1. Draw diagonal BD   2 pts. define a line

2. $BD = BD$ reflexivity

3. $\angle ADB + \angle BDC = \angle D$ Betweeness of Rays Theorem
   $\angle ABD + \angle DBC = \angle B$

4. $\angle ADB + \angle A + \angle ABD = 180°$ Triangle Sum Theorem
   $\angle BDC + \angle DBC + \angle C = 180°$

5. $\angle ADB + \angle A + \angle ABD = \angle BDC + \angle DBC + \angle C$ Substitution

6. $\angle ADB + \angle C + \angle ABD = \angle BDC + \angle DBC + \angle C$ subst.

7. $\angle ADB + \angle ABD = \angle BDC + \angle DBC$ subtraction

8. $\angle ADB + \angle BDC = \angle ABD + \angle DBC$ substitution

9. $\angle ADB = \angle BDC + \angle DBC - \angle ABD$ subtr.

10. $\angle BDC + \angle DBC - \angle ABD + \angle BDC = \angle ABD + \angle DBC$ subst #9 into #8

11. $\angle BDC - \angle ABD + \angle BDC = \angle ABD$ Subtraction

12. $2\angle BDC = 2\angle ABD$ addition & simplification

13. $\angle BDC = \angle ABD$ division

14. $\triangle ABD \cong \triangle CDB$ AAS congruence

15. $AB = CD \& AD = BC$ Corresponding parts of $\cong \triangle$'s are $\cong$

16. ABCD is a parallelogram   quadrilaterals w/ equal opposite sides are parallelograms
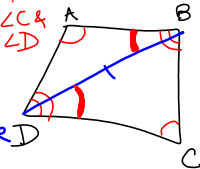
Theorem 29: A quadrilateral is a parallelogram if two opposite sides are both parallel and equal.

Theorem 30: A quadrilateral is a parallelogram if its diagonals bisect each other.

7.4 – Rectangles, Rhombuses, and Squares

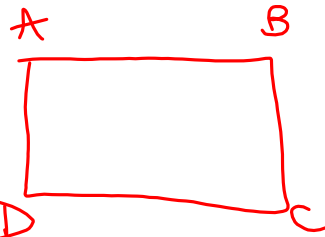Def: A <u>square</u> is a quadrilateral all of whose sides and angles are equal.

Every square is a rhombus.

Def: A <u>rhombus</u> is a quadrilateral all of whose sides are equal.

Theorem 31: All rectangles are parallelograms.
Given: ABCD is a rectangle.
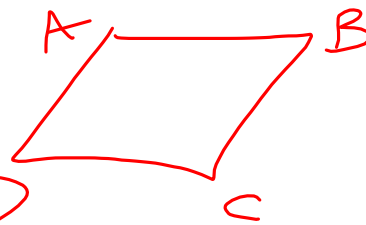*Prove:* ABCD is a parallelogram.

1. ∠A, ∠B, ∠C, ∠D   def'n of
   are right ∠'s   rectangle

2. ∠A = ∠C & ∠B = ∠D   all right
                        ∠'s are equal

3. ABCD is a parallelogram   a quadrilateral w/ equal
                              opposite ∠'s is a parallelogram

Theorem 32: All rhombuses are parallelograms.

Given: ABCD is a rhombus.

Prove: ABCD is a parallelogram.

1. AD = BC ; AB = CD   def'n
                        of
                        rhombus

2. ABCD is a parallelogram   quadrilateral w/ equal
                              opposite sides is a
                              parallelogram

Theorem 33: The diagonals of a rectangle are equal.

Given: ABCD is a rectangle.

Prove: AC=BD.

Theorem 34: The diagonals of a rhombus are perpendicular.

Given: ABCD is a rhombus.

Prove: AC   BD.