Homework #7 - Due Thursday, 14 January

Ch 7 Review, pp. 292-295 **#1-53**

Test #3 - Thurs, 14 Jan

Theorem 17: Equal corresponding angles mean that lines are parallel.
Corollary 1: Equal alternate interior angles mean that lines are parallel.
Corollary 2: Supplementary interior angles on the same side of a transversal mean that lines are parallel.
Corollary 3: In a plane, two lines perpendicular to a third line are parallel.

The Parallel Postulate – Through a point not on a line, there is exactly one line parallel to the given line.
Theorem 18: In a plane, two lines parallel to a third line are parallel to each other.

Theorem 19: Parallel lines form equal corresponding angles.
Corollary 1: Parallel lines form equal alternate interior angles.
Corollary 2: Parallel lines form supplementary interior angles on the same side of a transversal.
Corollary 3: In a plane, a line perpendicular to one of two parallel lines is also perpendicular to the other.

Theorem 20: The Triangle Sum Theorem – The sum of the angles of a triangle is 180°.
Corollary 1: If two angles of one triangle are equal to two angles of another triangle, the third angles are equal.
Corollary 2: The acute angles of a right triangle are complementary.
Corollary 3: Each angle of an equilateral triangle is 60°.

Theorem 21: An exterior angle of a triangle is equal to the sum of the remote interior angles.

Theorem 22: The AAS Theorem – If two angles and the side opposite one of them in one triangle are equal to the corresponding parts of another triangle, the triangles are congruent.

Theorem 23: The HL Theorem – If the hypotenuse and a leg of one right triangle are equal to the corresponding parts of another right triangle, the triangles are congruent.

SSS, SAS, AAS, ASA, HL

Def: A diagonal of a polygon is a line segment that connects any two nonconsecutive vertices.

Theorem 24: The sum of the angles of a quadrilateral is 360° .

Def: A rectangle is a quadrilateral each of whose angles is a right angle.

Corollary to Theorem 24: A quadrilateral is equiangular iff it is a rectangle.

In general, if a polygon has n sides, in terms of n,

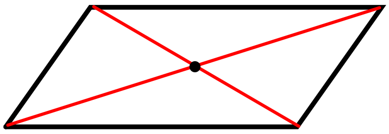
- n-3 diagonals can be drawn from one vertex
- these diagonals form n-2 triangles
- the sum of the angles of an n-gon is (n-2)*180°
- If the n-gon is equiangular, each angle measures (n-2)*180°/n

Def: A parallelogram is a quadrilateral whose opposite sides are parallel.

A figure has point symmetry if it looks exactly the same when it is rotated about a point.

Def: Two points are symmetric with respect to a point iff it is the midpoint of the line segment joining them.

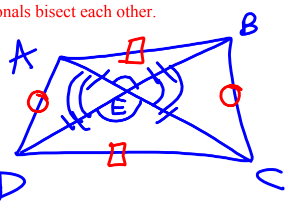
Parallelograms have point symmetry about the point in which their diagonals intersect.



Theorem 25: The opposite sides and angles of a parallelogram are equal.
Theorem 26: The diagonals of a parallelogram bisect each other.
Theorem 27: A quadrilateral is a parallelogram, if its opposite sides are equal.
Theorem 28: A quadrilateral is a parallelogram if its opposite angles are equal.
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.

Given: ABCD w/ diagonals AC & BD s.t. AC & BD bisect each other



Prove: ABCD is a parallelogram

Proof:

~~Given stuff~~	
1. AE = EC & DE = EB	(def) bisector divides segment into 2 equal parts
2. ∠AEB = ∠CED & ∠AED = ∠CEB	vertical ∠'s are equal
3. △AEB ≅ △CED & △AED ≅ △CEB	SAS congruences
4. AD = CB & AB = CD	corresponding parts of congruent △'s are =
5. ABCD is a parallelogram	quadrilateral w/ 2 pairs of opposite sides equal is a parallelogram

7.4 – Rectangles, Rhombuses, and Squares

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

Every square is a rhombus.

Def: A rhombus 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.

Proof:

1. $\angle A = \angle B = \angle C = \angle D$ — a quadrilateral is a rectangle iff it is equiangular
2. ABCD is a parallelogram — a quadrilateral is a parallelogram if its opposite $\angle$'s are $=$

Theorem 32: All rhombuses are parallelograms.

Given: ABCD is a rhombus.

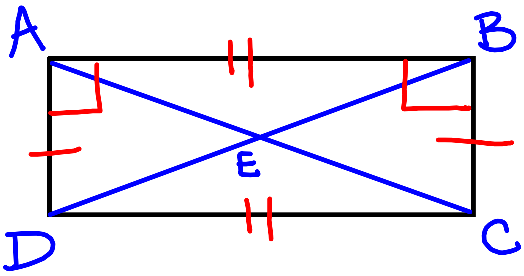
Prove: ABCD is a parallelogram.

1. $AB = BC = CD = DA$ — rhombus is a quadrilateral w/ all sides equal
2. ABCD is a parallelogram — quadrilateral is a parallelogram if its opposite sides are equal.

Theorem 33: The diagonals of a rectangle are equal.

Given: ABCD is a rectangle.

Prove: AC=BD.



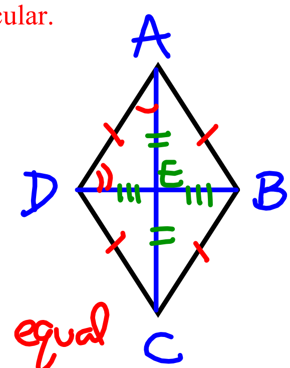
Proof :

1. ABCD is a rectangle — Given
2. $\angle A = \angle B$ — rectangles are equiangular
3. ABCD is a parallelogram — rectangles are parallelograms
4. $AB = DC$ & $AD = BC$ — opposite sides of a parallelogram are equal
5. $\triangle BAD \cong \triangle ABC$ — SAS congruence
6. $AC = BD$ — corresponding parts of congruent $\triangle$'s are equal

Theorem 34: The diagonals of a rhombus are perpendicular.

Given: ABCD is a rhombus.

Prove: $AC \perp BD$.



Why are $\angle DAE = \angle BAE$ & $\angle DEA = \angle BEC$

Proof :

1. $AB = BC = CD = AD$ — sides of a rhombus are equal
2. ABCD is a parallelogram — a rhombus is a parallelogram
3. $AE = EC$ & $DE = EB$ — diagonals of a parallelogram bisect each other
4. $AEB \cong AED \cong CEB \cong CDE$ — SSS congruence