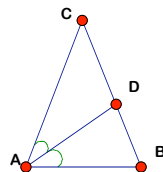


# Homework 4,

Due Wednesday, February 13

Problem 13.  $\triangle ABC$  is isosceles triangle,  $|AC|=|BC|$ .  $\angle C=36^\circ$  and  $AD$  is the angle bisector. Prove that  $\triangle BDA$  and  $\triangle ACD$  are isosceles triangles.



Problem 16.  $\triangle ABC$  is isosceles triangle,  $|AC|=|BC|$ .  $D$  and  $E$  are the midpoints of the sides  $AC$  and  $BC$ . Prove that  $DE \parallel AB$ .

Problem 17. Segments  $AC$  and  $BD$  intersect at the point  $M$  and  $M$  is the midpoint of both segments. Prove that lines  $AB$  and  $CD$  are parallel.

Problem 18. Point  $M$  is the midpoint of a segment with endpoints on two parallel lines.  $AB$  is another segment passing through  $M$  with endpoints on the same two lines. Prove that  $M$  is also the midpoint of  $AB$ .

Problem 20. Let lines  $n$  and  $m$  are parallel. Prove that if points  $A$  and  $B$  are on the line  $n$ , then the distance from the point  $A$  to the line  $m$  is equal to the distance from the point  $B$  to the line  $m$ . In other words points on the line  $n$  are equidistant.

Problem 25. Assume lines  $a$  and  $b$  are parallel and a line  $c$  intersects  $a$ . Prove that  $c$  intersects  $b$ .

Last Theorems and axioms that we learned.

## 5. Axioms about parallel lines.

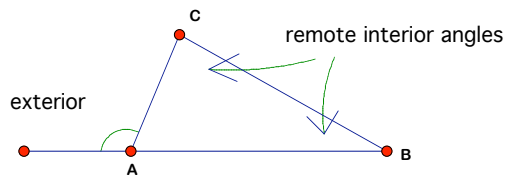
1. Through a given point it is always possible to draw only one line parallel to a given line.

Theorem 20 (1.4.6 from the book).  
The three angles in a triangle sum up to  $180^\circ$ .

**Definition:** *Exterior angle of a triangle* is formed when one of the sides is extended.

Theorem 18. If the corresponding (alternate interior) angles are equal, then the lines  $AC$  and  $BD$  are parallel.

Theorem 19. If lines  $AC$  and  $BD$  are parallel, then the corresponding (alternate interior) angles are equal.



Theorem 21: The exterior angle at  $A$  is equal to the sum of the two remote interior angles.

Theorem 22.(AAS) If two angles and a side of one triangle are equal to the corresponding parts of another triangle, then triangles are congruent.

Theorem 23.(HL) If the hypotenuse and a leg of one right triangle are equal to the corresponding parts of another right triangle, then the triangles are congruent.