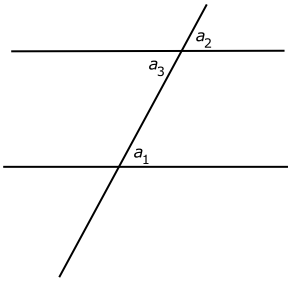
MATH 5: HANDOUT 27
GEOMETRY REVIEW.



Parallel lines and alternate angles

If one has two parallel lines and intersects both of them by a third line as shown in the figure to the right, then angles labeled by letters a_1, a_3 (alternate interior angles) will be equal. Conversely, if these two angles are equal, then the lines must be parallel.

Congruence tests for triangles

Two triangles are congruent if the corresponding sides are equal and corresponding angles are equal: $\triangle ABC \cong \triangle A'B'C'$ is the same as $AB = A'B'$, $BC = B'C'$, $AC = A'C'$, $\angle A = \angle A'$, $\angle B = \angle B'$, $\angle C = \angle C'$.

Axiom 1 (SSS Rule)**.** *If three sides of one triangle are equal to corresponding sides of another triangle, then the triangles are congruent.*

Axiom 2 (ASA Rule)**.** *If two angles and a side between them of one triangle are the same as two angles and the side between them in another triangle, then the triangles are congruent.*

Axiom 3 (SAS Rule)**.** *If two sides and an angle between them of one triangle are the same as two sides and an angle between them in another triangle, then the triangles are congruent.*

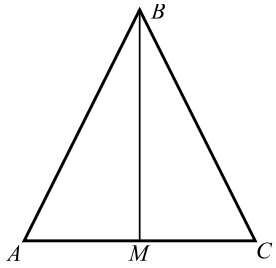
Sum of angles of a polygon

Sum of angles of a triangle is $180°$. Sum of angles of an n-gon is $(n-2) \times 180°$. For example, for a pentagon we get $3 \times 180° = 540°$.

Isosceles triangle

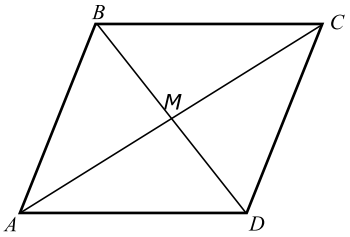
Let ABC be a triangle in which two sides are equal: $AB = BC$ (such a triangle is called *isosceles*). Let M be the midpoint of the side AC, i.e. $AM = MC$. Then

1. Triangles $\triangle ABM$ and $\triangle CBM$ are congruent.
2. Angles $\angle A$ and $\angle C$ are equal
3. $\angle AMB = 90°$



Parallelograms

Definition. A parallelogram is a quadrilateral in which opposite sides are parallel.



Properties:

1. In a parallelogram, opposite sides are equal. Conversely, if in a quadrilateral opposite sides are equal, then it is a parallelogram.
2. in a parallelogram, diagonally opposite angles are equal $\angle A = \angle C$, $\angle B = \angle D$
3. The intersection point M of the two diagonals is the midpoint for each of them.