

MATH 5: HANDOUT 21
GEOMETRY 1.

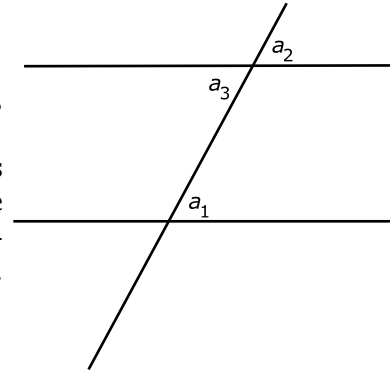
Today we are starting a new topic: geometry. We mostly reviewed previous material, namely:

1. Lines, angles; measurement of angles. Acute and obtuse angles.
2. Triangles. Sum of angles of a triangle is equal to 180. Opposite the larger angle is the larger side; if two angles are equal, then opposite sides are also equal.
3. Rectangles and squares. Opposite sides in a rectangle are equal.
4. Areas. Area of a rectangle with sides l, w is $l \times w$. Area of a right triangle with legs a, b is $\frac{1}{2}ab$.

and added some new material: parallel lines and parallelograms.

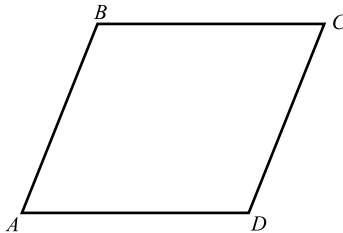
Definition: Parallel lines are lines which go “in the same direction”, without intersecting.

An important property of parallel lines is 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_2 will be equal. Conversely, if these two angles are equal, then the lines must be parallel.



Remind also that when two lines intersect, the two angles across from each other are equal; for example, in the figure above, $\angle a_2 = \angle a_3$ (such a pair of angles is called *vertical angles*). Thus, in for parallel lines intersected by a third line, angles a_1 and a_3 are also equal (such angles are called *alternate interior angles*). Again, this rule also works in the opposite direction: if we have two lines intersected by a third one, and alternate interior angles are equal, then the two lines are parallel. This is commonly used to prove that two lines are parallel.

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



Parallelograms have a number of interesting properties, which we will study later.