Revised Schedule: See web page

Chapter 10 Similarity

Similarity uses the idea of parallel projection.

Most theorems in book about parallel projection are "advanced". We won't study those in this course. The advanced theorems also use more complicated notation.

I will introduce a simpler notation that will work for our course.
Simpler Notation for Parallel Projection

Given two lines $L, M$ and a transversal $T$.

Suppose that some points are given on line $L$.
Points $A, B, C, \text{ etc.}$.
We will be interested in some special corresponding points $A', B', C'$, etc on line $M$.

Special in this way: line $\overrightarrow{AA'}$ is parallel to $T$

line $\overrightarrow{BB'}$ is parallel to $T$

etc
Point $A'$ is called "the parallel projection of point $A$ onto line $M$ in the direction of line $T$.

**Key Fact about Parallel Projection**

**Theorem 120** Parallel Projection in Euclidean Geometry preserves ratios of lengths of line segments.

That is, if $L, M$ are lines cut by transversal $T$ and $A, B, C, D$ are points on $L$ with $C \neq D$ and the corresponding parallel projections are $A', B', C', D'$ then \[
\frac{AB}{CD} = \frac{A'B'}{C'D'}
\]
Easy Corollary

Th. 121 (corollary) about line segment parallel to base of a triangle in Euclidean Geometry

In detail,

\[
\frac{AD}{AB} = \frac{AE}{AC}
\]

Interestingly, Theorem 122 Angle Bisector Theorem

\[
\frac{DA}{DC} = \frac{BA}{BC}
\]
Extreme Case

Isosceles triangle $BA = BC$

Another extreme case $BA << BC$

then $DA << DC$

You can study the proof of this, 122.