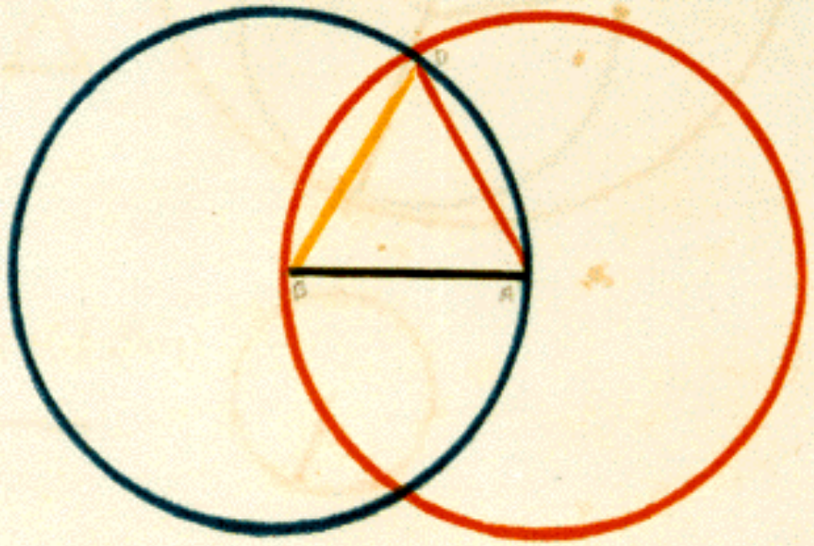
# Euclid's *Elements*

(circa 300 BC)

## PROPOSITION I. PROBLEM.



ON *a given finite ſtraight line* (——) *to deſcribe an equilateral triangle.*

Deſcribe ◯ and ◯ (poſtulate 3.); draw —— and —— (poſt. 1.).

then will △ be equilateral.

For —— = —— (def. 15.);

and —— = —— (def. 15.),

∴ —— = —— (axiom. 1.);

and therefore △ is the equilateral triangle required.

Q. E. D.

# Postulates — Definitions — Self-Evident Fact — Theorem — ?

**LINE POSTULATE:**
Let it be postulated it is possible to draw a straight line from any given point to any other given point

**CIRCLE POSTULATE:**
Let it be postulated it is possible to draw a circle with any center and radius

**?**

**SELF-EVIDENT FACT:** Things equal to the same thing are also equal to one another

**DEFINITION OF CIRCLE:** A circle is a plane figure contained by a single line called a *circumference*, such that all of the straight lines radiating towards the circumference from a single point lying inside the figure (called *center*) are equal to one another

**DEFINITION OF RADIUS:** Radius is any straight line that radiates from the center of a circle towards the circumference

**EQUILATERAL TRIANGLE THEOREM:**
Given any finite straight line, it is possible to construct/draw a triangle whose sides are all equal to one another (called an *equilateral triangle*)

# Construction/drawing steps

Draw a straight line from one given point to another given point and call the points A and B respectively

Draw a circle with center A and radius AB

Draw a circle with center B and radius BA

Draw a straight line from point A toward the point, call it C, where the two circles you have drawn intersect

Draw a straight line from point B toward the point, call it C, where the two two circles you have drawn intersect

# Reasoning Steps

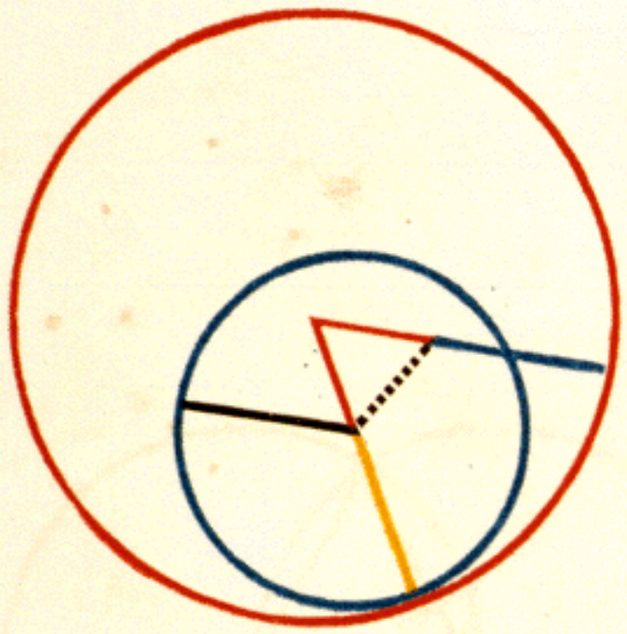
Side AB is equal to side AC

Side BA is equal to side BC

Side AC is equal to side BC

Given any finite straight line, it is possible to construct/draw a triangle whose sides are all equal to one another (also called an equilateral triangle)

All the sides in triangle ABC are equal to one another



FROM *a given point* (—— ), *to draw a ſtraight line equal to a given finite ſtraight line* (——— ).

Draw ---------- (poſt. 1.), deſcribe △ (pr. 1.), produce —— (poſt. 2.), deſcribe ◯ (poſt. 3.), and

(poſt. 3.); produce —— (poſt. 2.), then —— is the line required.

For ——— = ——— (def. 15.), and —— = —— (conſt.), ∴ ——— = ——— (ax. 3.), but (def. 15.) ——— = ——— = ———; ∴ ——— drawn from the given point ( —— ), is equal the given line ———.

Q. E. D.

**Ax. 3 (also called "common notion 3"):** If equals are subtracted from equals, then the remainders are equals.