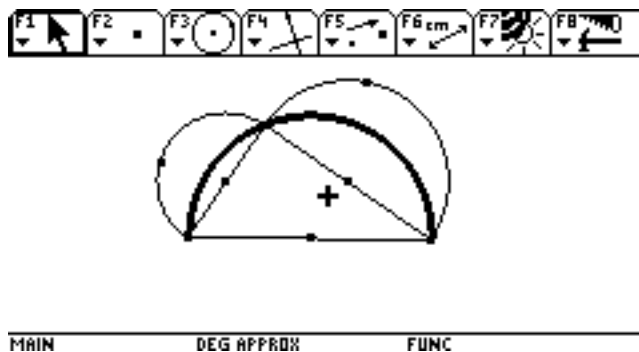


# VISIT THE RICH HISTORY OF GEOMETRY USING the TI-92

Roberta Koss  
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During the Golden Age of Greece, the intellectuals maintained that the study of geometry was the epitome of academic pursuits. The inscription above the doorway of Plato's Academy read "Let no man enter who is ignorant of geometry". The power of visualization and the TI-92 make it easy for us to introduce students to many of the famous theorems in the evolution of geometric thought. It also enables us to incorporate a sense of history and the beauty of mathematics.

The **Theorem of Pythagorus** is probably the most well-known idea in mathematics. We'll look at some extensions of this theorem such as the **Lunes of Hippocrates**.



Most courses include the study of the points of concurrency of the perpendicular bisectors, the angle bisectors, the medians, and the altitudes of a triangle. Greek mathematician Proclus first recorded that the altitudes are concurrent in the orthocenter. The orthocenter (often referred to as H) and the three vertices of the triangle have the property that a triangle formed by any three of these points will have the fourth point as its orthocenter. This fact was celebrated by Dwight Paine in his *Triangle Rhyme* in 1983:

Although the altitudes are three,  
Remarks my daughter Rachel,

One point'll lie on all of them:  
The orthocenter H' ll.

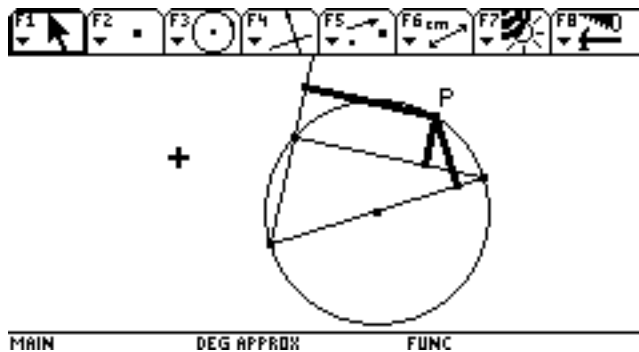
Other related ideas include:

**the Euler Line** In any triangle, the circumcenter, the orthocenter, and the centroid are collinear. The distance from the centroid to the orthocenter is twice the distance from the circumcenter to the centroid.

**the Nine Point Circle** In any triangle, the midpoints of the sides, the feet of the altitudes, and the midpoints of the segments joining the vertices to the orthocenter all lie on a circle.

While sometimes referred to as Euler's Nine Point Circle, the theorem was actually published in 1821 by two French mathematicians, Brianchon and Poncelet. Leonhard Euler, renowned Swiss mathematician, lived from 1707 to 1783.

**the Simson Line** The feet of the perpendiculars from any point on the circumcircle of a triangle to the sides of the triangle are collinear.

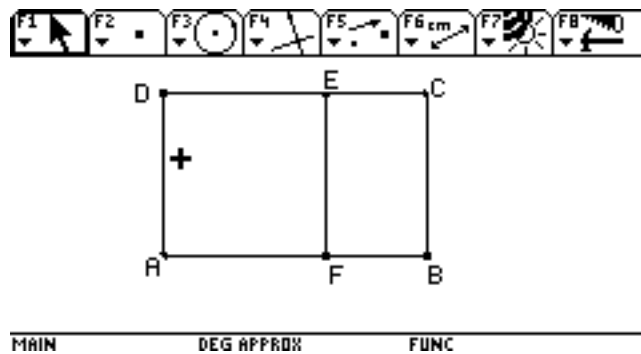


Scottish mathematician Robert Simson lived from 1687 to 1768 and was best known for his edition of Euclid's *Elements*.

Another theorem included in most geometry texts is the **Midsegment Theorem**: the segment joining the midpoints of any two sides of a triangle is parallel to and one-half the length of the third side. An interesting corollary is **Varignon's Theorem**: the quadrilateral formed by joining the midpoints of the consecutive sides of any quadrilateral is a parallelogram.

What do the paintings of Piet Mondrian, Georges Seurat, and Leonardo da Vinci have in common with ancient Greek, Egyptian, and Persian architecture? They all incorporate the **Golden Ratio**

or the **Divine Proportion**. A Golden Rectangle is one which can be dissected into a square and a rectangle similar to the original figure.



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