

§10.1

Chapter Ten

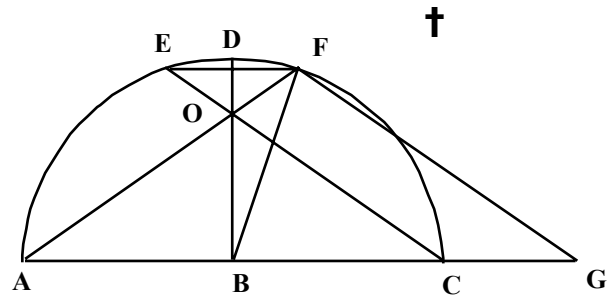
We are able therefore in accordance with the rules propounded above [to comply with the following]: Given the arc of any chord, to find the chord both of any multiples of the arc of any fractions. But any chords you wish found by the above methods, also give the squares of the chords of other arcs. And the squares give chords also, as is evident from the following propositions.

1. If the chord of any arc whatsoever is added to the diameter, the sum is the square of the chord of the same arc increased by half the complement to the semicircle. As the chord of 36 degrees of which the complement 144, and of this half 72, the sum of the arcs is 108 degrees. Or the arc of the square of the chord composed of the quadrant and from half the given arc. As for the Chord 36:0': 061803398874989484824.

The arc composed from the quadrant 90:0': and from half the arc given 18:0': The square of the chord of 108:0': 2618033988.

Let AC be the diameter of the circle, FE the chord of 36:0': to which CG is equal; I assert AG to be the square of the line AF of the subtending arc ADF, 108:0': For the triangles BAF, FAG are equiangular. Thus

because EF, CG are equal and parallel from the construction and the proposition, the Angles ECA, FGA are equal to the Angle BAO, and between themselves. Therefore AB, AF, AG are continued proportionals. And as the radius is unity from the proposition, AB is the side and AG the square of the same side.

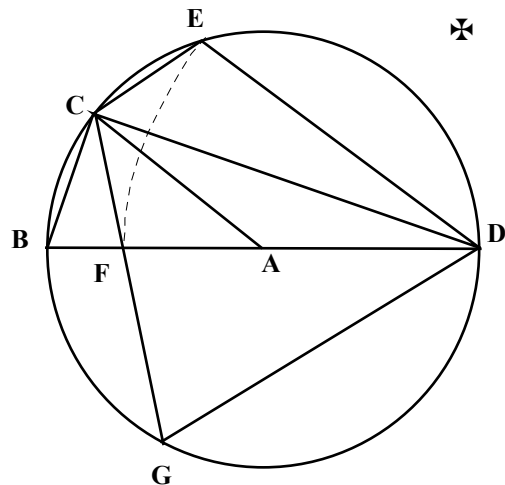


[Figure 10-1]

2. If the chord of any arc whatsoever is taken away from the diameter, the remainder is the square of the chord of half the complement to the semicircle.

Let DE, DF be equal, and from the arc EB bisected in C the line CD is drawn : CE, CF are equal; and the triangles ACB, CBF with equal angles and equal legs; and the angles ACB, CBF, BFC are equal. AB, BC, BF are therefore continued proportionals, and AB unity, BC the side, and BF the square.

Let DE or DF be the chord of 117:0': 1705280328708184, of which the complement to the semicircle 63:0': of which the half 31:30': Of which the square of the chord is 0294719671291816. And the chord of 31:30': itself 0542880899730149. [This approach resembles the work in Chapter Three].



[Table 10-2]

3. With the difference of the diameter and the square of the chord of the arc given, the chord is in excess or deficient to the double of the arc given to the semicircle. For if the double of the arc is greater than the semicircle[†], AF the arc 108: the double 216. The excess over the semicircle 36. AG the square of the chord AF; CG is equal to the chord EF, 36:0': And if the double arc is smaller than the semicircle^{*}, BC 31:30': BE the double arc 63:0': BF the square of the chord BC. DF is equal to the chord DE the arc 117:0': of the complement to the semicircle.