





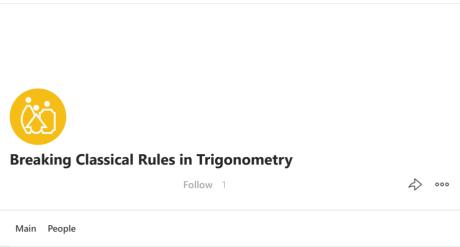








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Trigonometric Ratios by School Student: Arc-Line Method

New method for determination of trigonometric ratios

New terminologies: Arc-Line method, supplementary chord, power-base (2^n) , first chord $(\frac{A}{2n})$.

Skill-requirement: General trigonometric knowledge (school-level knowledge is enough). Non-scientific calculator requires.

Time requirement for study: Half of an hour.

Accuracy: User-defined accuracy

Scholars using trigonometric values usually refer calculator or trigonometric table or computer for their trigonometric ratios of desired angle. They cannot compute those ratios themselves. Here is Arc-Line method of determination of trigonometric ratios for ANY angle in the question. In this blog, I have used Sin A only.

The Method:

Step 1: Take arbitrary angle (A) in radian measure.

Step 2: Define your appropriate accuracy (precision level of accuracy) in power-base of 2^n . Recommended accuracy is 10+digits after decimal, for this value of n requires 16+. Its rule is 'Higher power-base, higher accuracy'.

Step 3: Prepare a table with four columns by n+1 rows.

- 1. In the first column, first input is $\frac{A}{2^n}$. From second row to n+1, double of earlier angle; i.e. $\frac{A}{2^{n-1}}$, $\frac{A}{2^{n-2}}$, $\frac{A}{2^{n-3}}$, , $\frac{A}{4}$, $\frac{A}{2}$, A.
- 2. In the second column, first input is just $\frac{A}{2^n}$. This is chord (a) for $\frac{A}{2^n}$. From second to n+1 row, it is the product of chord (a) and supplementary chord (b) from earlier row.
- 3. In the third column, find the supplementary chord (b) using $\sqrt{4-a^2}$.
- 4. Fourth column is Sine of the angle ($\sin A'$) in that row. Half of product of a and b will be Sine of angle in row. Therefore, Sin $\frac{A}{2^n}$ = ab/2 in the first row; and so on.

Here is the example of new method (named as Arc-Line method). We are taking example for Sin 1 degree = 0.017453293 radian with power-base n=7 (2^7). In this example, both value of radian and power-base have compromised. We need to take more accurate value of radian (in fact π) as well as power-base (at least 2^{16})

First chord is 0.017453293/ 128 = 0.000136354

