

Exact Trigonometry Table for all Angles

**[Using Precise –Rewritten
method]**

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Introduction

We can compute exact trigonometric values using Precise –Rewritten method. The detail of the Precise –Rewritten method, its basis, proof of method and examples of exact values of all integer angles and polygon has described either in Exact Values in Trigonometry: Five New Methods (Vol 1) or in Precise –Rewritten Method: Exact Values in Trigonometry (Vol 2). In this brief works, list the exact values of trigonometry mainly Sine of all integer angles and polygon up to 24 –gon has described.

Precise –Rewritten method is based on chord (notation as ‘a’) and supplementary chord (notation as ‘b’). We compute chord (a) of double angle of given angle. From that chord (a), compute supplementary chord (b) using:

$$b = \sqrt{4 - a^2}$$

Because of easy pattern of Precise-Rewritten method, ‘b’ will have just sign changes after the first radical from negative ‘-ve’ to positive ‘+ve’.

Trigonometric Formulae

Based on academic, technical and practical use, there are six main trigonometric ratios. There are variety of ways to establish the relations. As we already discussed, Precise –Rewritten method of exact value of trigonometry is based on chord (a), supplementary chord (b) and their product (ab).

Main relations:

- i. $\sin A = ab/2$
- ii. $\csc A = 2/ab$
- iii. $\cos A = 1 - a^2/2$
- iv. $\sec A = 2/(2 - a^2)$
- v. $\tan A = ab/(2 - a^2)$
- vi. $\cot A = (2 - a^2)/ab$

Verse and Coverse relations:

Practically in less use, there are further six trigonometric ratios. They are two in each sector of

Verse –based, Coverse –based and Ex –based. Their chord –based formulae are as follows:

$$\text{vii. Versin } A = a^2/2$$

$$\text{viii. Vercos } A = b^2/2$$

$$\text{ix. Coversin } A = 1 - ab/2$$

$$\text{x. Covercos } A = 1 - ab/2$$

$$\text{xi. Exsec } A = a^2/(2 - a^2)$$

$$\text{xii. Excsc } A = (2 - ab)/ab$$

Haverse and Hacoverse relations:

Practically almost no use, there are further four trigonometric ratios. They are half of Verse –based and Coverse –based formula. Their chord –based formulae are as follows:

$$\text{xiii. Haversine} = a^2/4$$

$$\text{xiv. Havercosine} = b^2/4$$

xv. $\text{Hacoversine} = (2 - ab)/4$

xvi. $\text{Hacovercosine} = (2 + ab)/4$

If we know the length of chord, half of that chord ($a/2$) will be the Sine of half of angle representing that chord (not included above). This is the magical development of determination of Sine of an angle since last 2000 years.

Exact Trigonometric Values

Following is the list of Sine of integer angles (A). All of the result of Sin A has divided by 2. Double of Sin A is chord (a) of double angle (2A).

For example, $\sin 1^\circ$ is $\frac{1}{2} \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - + \sqrt{2}}}}}}}}}}}$

[Please care the sign of repetition has underlined. Closing brackets are collapsed for easy.]

Double angle for 1° is 2° and chord (a) for 2° is $\sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - + \sqrt{2}}}}}}}}}}}$.

What's about supplementary chord (b) for 2° ?

This is simple, just change the first sign (which is –ve in all case) into +ve. Therefore, supplementary chord

$$\text{for } 2^\circ \text{ is } \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}}}}}{\sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}$$

From these ‘a’ and ‘b’, we can compute any trigonometric ratios as given in the formulae list above.

What’s about the complementary angle? The answer is simple; it is based on supplementary chord (b). Therefore, Sin 89° is $\frac{1}{2} \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}}}}}}}{\sqrt{2}}}$.

$$\text{Sin } 1^\circ = \frac{1}{2} \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}}}}}{\sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}}}$$

[Please care the sign of repetition has underlined.]

All integer angles Sin 1° – Sin 45°

[Please care the sign of repetition has underlined. Closing brackets have collapsed by ‘]’ for easy.]

$$A^\circ \quad \text{Sin } A^\circ$$

$$1^\circ \quad \frac{1}{2} \frac{\sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}}}}}{\sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}}}}$$

$$23 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}}}}}}}}$$

$$24 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}$$

$$25 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}$$

$$26 \quad \frac{1}{2} \sqrt{2 - \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}$$

$$27 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}$$

$$28 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}} + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}$$

$$29 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}{\sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}$$

$$30 \quad \frac{1}{2} \sqrt{2 - \sqrt{2}}$$

$$31 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}} + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}} - \sqrt{2}}}}$$

$$32 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}} + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}$$

- 33 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}}$
- 34 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}}}}}}$
- 35 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}}$
- 36 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}$
- 37 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}}}}$
- 38 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}}}}$
- 39 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}$
- 40 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}$
- 41 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}}}}}}$
- 42 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}$
- 43 $\frac{1}{2} \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}}}}}}}$

$$44 \quad \frac{1}{2} \sqrt{2 - \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}} - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}]}$$

$$45 \quad \frac{1}{2} \sqrt{2}$$

$$46 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}} - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}]}$$

$$47 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 + \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}} - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}]}$$

$$48 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}]}$$

$$49 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 + \frac{\sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}} + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}]}$$

$$50 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}]}$$

$$51 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}]}$$

$$52 \quad \frac{1}{2} \sqrt{2 + \frac{\sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}} + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}]}$$

$$53 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 + \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}} - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}]}$$

$$54 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}]}$$

- 55 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}}}$
- 56 $\frac{1}{2} \sqrt{2 + \frac{\sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}{\sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}$
- 57 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}}$
- 58 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}}}{\sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}$
- 59 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}}}}}$
- 60 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2}}}$
- 61 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}}}}}$
- 62 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \frac{\sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}{\sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}$
- 63 $\frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}$
- 64 $\frac{1}{2} \sqrt{2 + \frac{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}}}{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}$

$$65 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}]$$

$$66 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}]$$

$$67 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}} - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}]}$$

$$68 \quad \frac{1}{2} \sqrt{2 + \frac{\sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}}}{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}]}$$

$$69 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}} + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}]$$

Easy alternative is $\frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}} - \sqrt{2 - \sqrt{2}}}]}$

$$70 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}]}$$

$$71 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}}}}}} - \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}}}}}]}$$

$$72 \quad \frac{1}{2} + \sqrt{2 - \sqrt{2}}}]}$$

$$73 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2 + \sqrt{2}}}}}}}} + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2}}}}}}}]}$$

$$74 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \frac{\sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2}}{\sqrt{2 + \sqrt{2} - \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2}}}}}$$

$$75 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}}$$

$$76 \quad \frac{1}{2} \sqrt{2 + \frac{\sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2}}{\sqrt{2 + \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2}}}}$$

$$77 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \frac{\sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2}}{\sqrt{2} - \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} - \sqrt{2}}}}$$

$$78 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2} - \sqrt{2} + \sqrt{2}}}}$$

$$79 \quad \frac{\sqrt{2} + \sqrt{2} + \sqrt{2} + \frac{\sqrt{2} - \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2}}{\sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2}}}$$

$$80 \quad \frac{1}{2} + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2} - \sqrt{2}}}}$$

$$81 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2} - \sqrt{2}}}}$$

$$82 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \frac{\sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2}}{\sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2} + \sqrt{2} + \sqrt{2}}}}$$

$$83 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \frac{\sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2}}{\sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} - \sqrt{2} - \sqrt{2} - \sqrt{2}}}}$$

$$84 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2} - \sqrt{2} - \sqrt{2}}}}$$

$$85 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2}}}]}}$$

$$86 \quad \frac{\sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}}}}}}}}}}{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}$$

$$87 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2}}}]}}}$$

$$88 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}}}}}}}}}}{\sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}$$

$$89 \quad \frac{1}{2} \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}}}}}}}}}}{\sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2 - \sqrt{2 - \sqrt{2 + \sqrt{2}}}]}}}}}}}}$$

$$90^\circ \quad \frac{1}{2} 2 = 1$$

[Please care the sign of repetition has underlined. Closing brackets have collapsed by ‘]’ for easy.]

Other trigonometric ratios of angle A

To determination of Cosine of an angle (Cos A), we can either use the formula given above or just reversing the order of angle. Relation between Sine and Cosine is reversal in first quadrant of a circle. For example, Sin

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