Geometrical Method of Determination of the Value of Pi (π)

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Abstract
The value of an irrational number pi (π) is determined from the ancient times up to the modern super computer era. It is found to be irrational number. We give here geometrical method of determination of Pi (π) and we determind it as 3.141592653. This perticualer value is named as “Goba" and the relation between Circumference of Circle and its radius is fixed as Circumference of Circle = 2⊖$r_{s.}$

Keywords
Value of Pi; Value of Goba; Geometrical method; Arc radius; Straight radius; Circle; Circumference of circle.

I. INTRODUCTION

History of pi: pi or π has a very long history. The history of the value of pi with the help of the old generation to the modern super computer as follows, 1). The value of pi given by Vayupuran, Mahabharat, old Babaolian, Egipshian Papayari, Baudhyan sulyabsutra, Baible, Talmud, Chaupai and Bramhaghupt is 3 , 2). Baudhyan 3.088, 3). Aryabhatta I 3.1416, 4). Ayapoloniyas 3.141666…., 5). Tyatvarthyardhigam Formula: $C=\sqrt{10D^2}$,6). Jain value: $\sqrt{10}$, 7). Tyolemy 3.141666…., 8). Archimedes: $\frac{22}{7}$, 9). Veersen C=3D+(16D+16)/113, 10). Golsara 3.14159292… , 11). Aryabhatta II $\frac{22}{7}$ or 3.1416666…, 12). Bhashkarachyarya, Yaakub ibn Tarik, Lalya, Alkhvarizami 3.1416 , 13). Righter 3.2 , 14). Japanese scholar 3.14159292…., 15). Shrinivas Ramanujan 3.1415926538…., 16). Yogi in 1970 3.20, 17). Rajan Mahadevan in 1984 3.14159265358979323846…., 18). In the last today’s super computer has given the value up to billions of places after decimal point but it is incomplete therefore the values of pi (π) is irrational. ([1], [2], [3], [5], [6]).

II. MATHEMATICAL FORMULATION

Alternative Method to Determine of Pi (π)
I determined the value of Pi (π) by using geometrical construction of circle.

A1. The construction of formula:
The construction of formula is made via Dynamic + Static concept or via assertion. The diagram is show:

We define the dynamic value + static value as multiper of the measure of following diagram is divided in to three parts as follows,

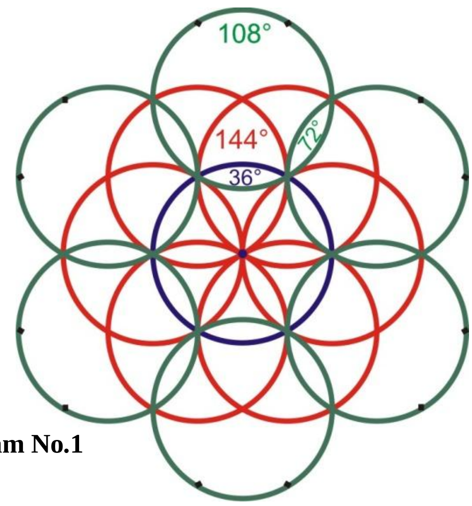


Diagram No.1

Detail of the definitions and values in the diagrams and all various types of methods of construction are given in the reference. ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Straight Radius: - Straight line segment joint centre of the circle and centre of the firstly constructed circle on the circumference of the original circle is called straight radius. **And its value is taken as 2° + 2° = 4°.** ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Measure of straight radius: - Distance between two apex of the measure of straight radius is called "Measure of straight radius" **and it is in 4^0 degree measure.** ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Measure of straight radius = It is sum of the measure of straight radius in clockwise direction
And anticlockwise direction
= $(2^0) + (2^0) = 4^0$ Measure of straight radius

Diagram No.2

Arc Radius: - An arular line segment jointing centre of the circle and centre of the firstly constructed circle on the circumference of the original circle is called arc radius. **And its value is taken as 3°+ 3° =6°.** OR The segment of circumference of a circle means An (Arc) arcular line segment joining measure of centre of a circle and measure of centre on the circumference of a circle and the distance between the two measures of center are equal to straight radius, in clockwise and anti clockwise direction and which divide the circumference of the original circle in to six equal parts is called "Arc Radius" of circle.

OR

Length of arc segment of circumference of circle is equal to radius then that segment of circumference of circle is called "Arc radius".

OR

The segment of the circumference of a circle whose length (distance) equal to straight radius its segment of the circumference of a circle is called "Arc Radius". ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Measure of arc radius:- Distance between two apex of the measure of arc radius is called "Measure of arc radius" **and it is in 6^0 degree measure.** ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Measure of arc radius = It is sum of the measure of arc radius in clockwise direction
And anticlockwise direction
= $(3^0) + (3^0) = 6^0$ Measure of arc radius

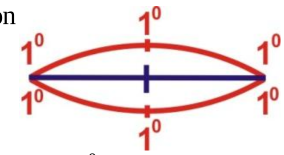


Diagram No.3

Circle: - Around the measure of centre of circle, up to the equil distance of radius means 6^0 measure of centre of circle of construction means up to circumference of circle completely circular and in the one plane of diagram is called circle. **And its value is taken as 6° x 6° = 36°.**

OR

A circle is a locus of a point in the plane such that its distance from a fixed point is always constant. Constant distance is called radius and fixed point is called centre.

OR

The circle is a locus of a point such that it distance from fixed point is always constant, constant distance is called radius and fixed point is called centre of the circle. ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Measure of circle: - Measure of plane is called measure of circle. OR Measure around the centre of circle is called measure of circle. **And it is in Measure of 36^0.** ([2], [3], [4], [5], [6], [7], [8], [10], [13], [14]).

Center of circle: - The fixed point at the middle of the circle is called its centre.

OR

The place at the centre of a circle is called the centre of circle.

Measure of centre: - Measure of the fixed point at the middle of the circle is called its measure of centre.
And measure of centre of circle is 1^0 one Degree.

Interior all arc radius along with blue circumference of circle = 6 + 6 + 12 =
24 arc radius or outer 24 arc radius of circle of first construction (Part No.1)
6 arc radius has 1 centre of circle hence how many centre of circle of 24 arc radius
24 ÷ 6 = 4 centres of circle these are outside of first red construction.

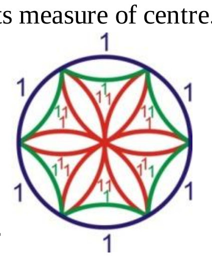


Diagram No.4

(Part No.2) Arc radius from green arc radius up to the original centre of circle
= 6 + 12 = 18 centre of circle of this radius = 18 ÷ 6 = 3 centre of circles.

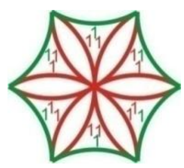
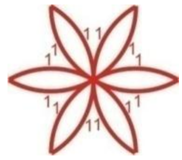


Diagram No.5

(Part No.3) How many measure of Centre of circle of 12 arc radius
= 12 + 6 = 2 Centre of circles.

Diagram No.6



The three parts of the diagram is as above. From this measure of 1 arc radius is 6^0 therefore measure of three parts is (Part No.1) 24 Arc radius **x** 6^0 = 144^0 (Part No.2) 18 Arc radius **x** 6^0 = 108^0 (Part No.3) 12 Arc radius **x** 6^0 = 72^0

What is mean by dynamic value? Multiplication of the measure of above three parts.

Dynamic value =144 **x** 108 **x** 72 = 1119744^0 ÷ 36^0 measure of circle = 31104 Dynamic value of Half Circumference of circle.

What is mean by static value? Sum of the measure of above three parts.

Static value =144 + 108 + 72 = 324^0 Static value of Half Circumference of circle
Sum of the values Dynamic + Static = 31104 + 324^0 = 31428 this total is the value of Half Circumference of circle.
The total value of Circumference of circle = 31428 **x** 12 ÷ 6 = 31428 ÷ 2 = 62856 total value

Diameter = (6 + 6 + 12 ÷ 6 = 4 Measure of centre of circle), Diameter = 1 + 2 + 1 = 4, Diameter = (1 + 3 + 3 + 3 = 4 index of 10) = 10^4 = 10000 Measure of radius 4 index of 10, Diameter 10000 **x** 2 = 20000 Measure of diameter
Goba = 62856 ÷ 20000 = 3.1428 First value of Goba as per Dynamic + Static.
(Second value of Goba = 3.1428 - 0.0012 = 3.1416)
Second value of Goba as per Dynamic + Static
62856 This is the total value of 6 arc radius of original circumference of circle therefore how many value of one arc radius = 62856 ÷ 6 = 10476 From this value 4 measure of centre of circle outside of first construction of circumference of circle shuld be substructed = 10476 - 4 = 10472 This is multipled by 6 arc radius, 10472 **x** 6 = 62832 This is the total second value of Goba as well as Circumference of circle.
Hence the value of goba = 62832 ÷ 20000 = 3.1416 This is the second value of Goba, as per Dynamic + Static of second value of Half Circumference of circle.

A2. To solve this formula what is the relation between arc radius and straight radius? This is important to search this relation, because arc radius and straight radius are in proportional.

How many power or index of 10^0 for measure of radius?
First, Outside of the original circumference of circle + Measure of centre of circle of second construction is 10^0 measure of radius is power or index.

10^0 Measure of radius of power or index = $10^{\frac{24 \text{ Arc radius} + 30 \text{ Arc radius}}{6 \text{ Arc radius}}} = 10^9$

Measure of radius = 10^9 = 10 x 10 x 10 x 10 x 10 x 10 x 10 x 10 x 10 = 1000000000^0
= 1000000000^0 One billion measure of radius ([3], [5], [6]).

The extreme limit of straight radius is one hundred crore or one billion straight radius and it is 3 stages.

The three stages follow as:

Straight Radius = 10^9 = 10^4 x 10^3 x 10^2 Three Stages
10^4 x 10000 First Stage
10^3x 1000 Second Stage
10^2 x 100 Third Stage

Straight Radius = 10000 x 1000 x 100 = 1000000000 One Hundred Crore Straight Radius or One Billion Straight Radius.
This is extreme limit of radius. There is no bigger radius then this. The arc radius is in proportion with Straight radius. If radius is one hundred crore degrees then what is the measure of are radius? Are radius is bigger than radius because are radius is a curve.

Diagram No.7

Straight Radius = r_s , Arc Radius = r_a , Straight Diameter = d_s , Arc Diameter = d_a , Length = ℓ

A3. Ratio of arc radius to straight radius

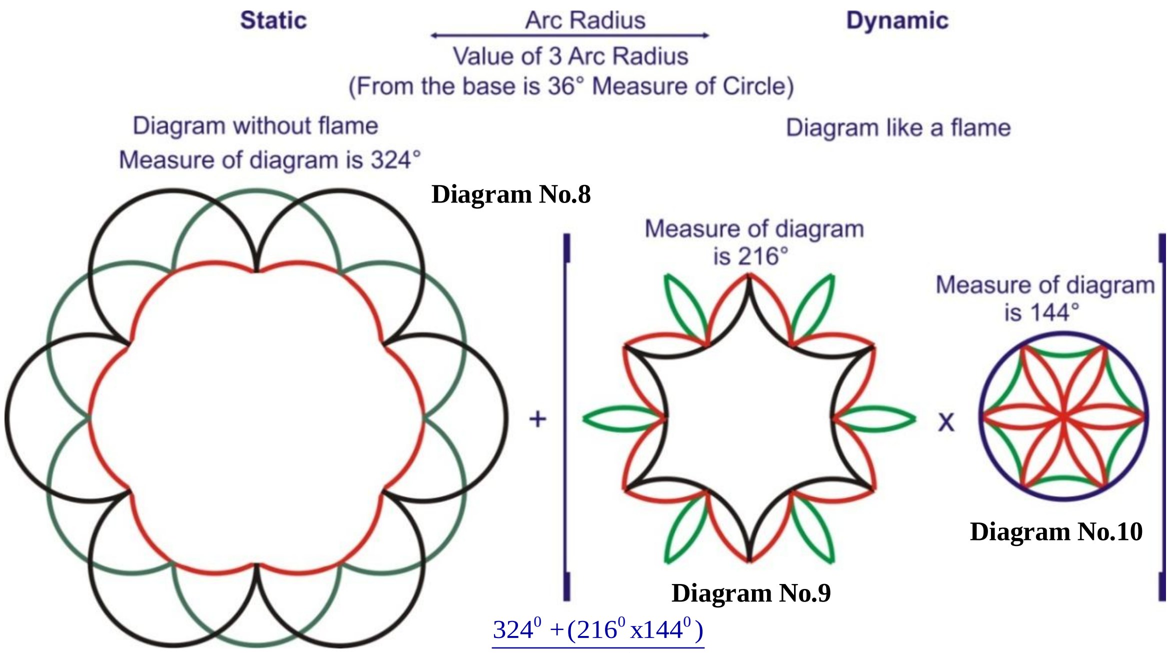


Diagram No.8

Diagram No.9

Diagram No.10

$$\frac{324^0+(216^0 x144^0)}{10000^0}$$

$$=\frac{324^0+31104^0}{10000^0}$$

$$\text{Ratio} = \frac{\text{Arc radius}}{\text{Radius}} = \frac{31428^0}{10000^0} \text{ Value of 3 arc radius}$$

$$=\frac{31428^0 x\left(\frac{144^0+72^0+108^0}{36^0}\right)}{10000^0} = \frac{31428^0 x \frac{324^0}{36^0}}{10000^0}$$

$$=\frac{31428^0 x9^0}{1000^0}$$

$$=\frac{282852^0}{10000^0} \text{ Value of 27 arc radius}$$

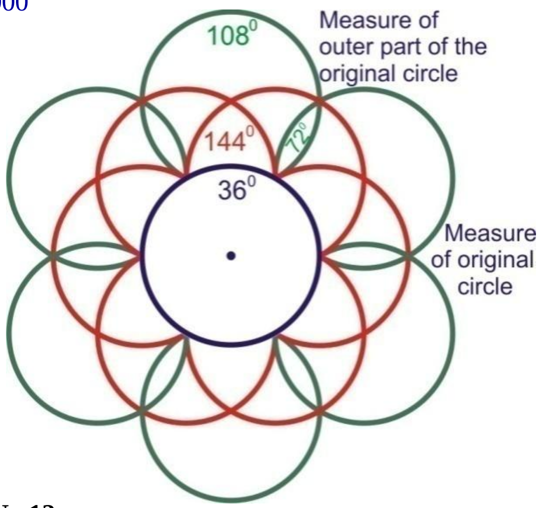


Diagram No.11

$$=\frac{282852^0-(72^0 x36^0)}{10000^0}$$

$$=\frac{282852^0-108^0}{10000^0}$$

$$=\frac{282744^0}{10000^0} \text{ 27 arc radius}$$

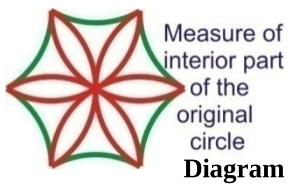


Diagram No.12

$$=\frac{282744^0 \div \frac{324^0}{36^0}}{10000^0} = \frac{282744^0 \div 9^0}{10000^0}$$

$$=\frac{31416^0}{10000^0} \text{ Value of 3 arc radius.}$$ Here the first stage of straight radius 10^4 is complete.

$$=\frac{31416^0 x1000^0}{10000^0 x1000^0}$$ The second stage 10^3 of straight radius and arc radius starts

$$= \frac{31416000^0}{10000000^0} \text{ Value of three arc radius}$$

Diagram No.13

$$= \frac{31416000^0 \text{x} (\frac{36^0 + 36^0 + 72^0}{36^0})}{10000000^0}$$

$$= \frac{31416000^0 \text{x} \frac{144^0}{36^0}}{10000000^0} = \frac{31416000^0 \text{x4Circle}}{10000000^0}$$

$$= \frac{125664000^0}{10000000^0} \text{ Value of 12 arc radius}$$

$$= \frac{125664000^0 - [144^0 + 108^0 + 72^0 + 12^0(6^0 + 6^0)]}{10000000^0}$$

$$= \frac{125664000^0 - 336^0}{10000000^0}$$

$$= \frac{125663664^0}{10000000^0} \text{ Value of 12 arc radius}$$

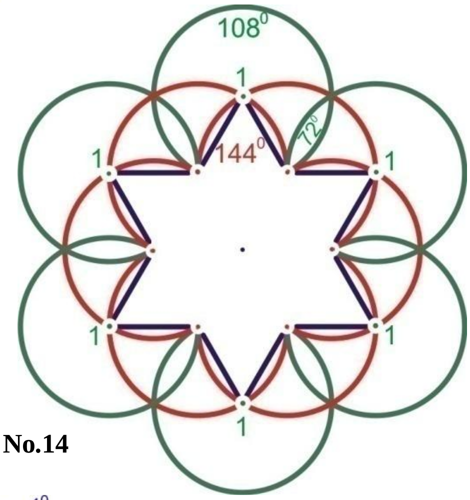


Diagram No.14

$$= \frac{125663664^0 + (36^0 + 6^0)}{10000000^0}$$

$$= \frac{125663664^0 + 42^0}{10000000^0} = \frac{125663706^0}{10000000^0}$$

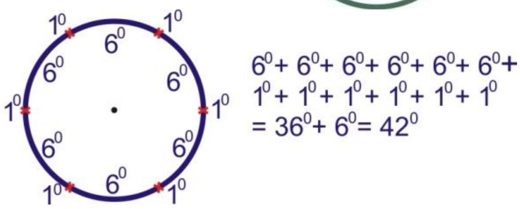


Diagram No.15

$$= \frac{125663706^0 \div 12}{10000000^0}$$

Diagram No.16

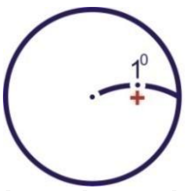
Value of 12 arc radius. Therefore, how many value of (1) one arc radius?

$= \frac{10471975.5^0}{10000000^0}$ Here the first stage of straight radius 10^4 and the second stage 10^3 of straight radius are complete.

$= \frac{10471975.5^0 \text{x} 100^0}{10000000^0 \text{x} 100^0}$ Here the third stage of radius 10^2 is complete. Radius is complete.

$$= \frac{1047197550^0}{1000000000^0}$$

$$= \frac{1047197550^0 + 1^0}{1000000000^0}$$



When the original arc radius is created then it is divided in to equal part from the centre point of the arc radius. That centre point means 1^0.

Diagram No.17

$= \frac{1047197551^0}{1000000000^0}$ The value of one arc radius and a straight radius is complete.

A4. Formula of Arc Radius:

According to construction No. 1:-
Method No. 1
Arc Radius = [[[[[[[[[[[[[[[[[[72° x 144° x 2° + 216°] x 6° ÷ 2°] ÷ 6°] x 36°] - 144°] ÷ 6°] x 1000°] ÷ 2°] - 72°] x 2°] ÷ 4^0] - 6°] x 4°] x 2°] + 42°] ÷ 2°] ÷ 6^0] x 100°] + 1°] = 1047197551°

Method No. 2
Arc Radius = [[[[[[[[[[72° x 144° x 2° + 216°] ÷ 2° x 36°] **-** 144°] ÷ 6° x 1000° ÷ 2°] **-** 72°] **-** 12°] x 4°] + 42°] ÷ 12° x 100°] + 1°] = 1047197551°

As per construction No. 2:-
Method No. 3 (A)
Arc Radius = [[[[[[[[[[144° x 108° x 72°] ÷ 36°] + 324°] x 9°] **-** 108°] ÷ 9° x 1000° x 4°] **-** 336°] + 42°] ÷ 12° x 100°] + 1°] =1047197551°

Method No. 3 (B)
Arc Radius = [[[[[[[[[[144° x 108° x 72°] ÷ 36°] + 324°] x 9°] **-** 108°] ÷ 9° x 1000° x 4°] **-** 336°] + 42°] ÷ 2° ÷ 6° x 100°] + 1°] = 1047197551°

Method No. 4
Arc Radius = [[[[[[72° x 144° + 108°] **-** 4°] x 1000° x 12°] – 336°] + 42°] ÷ 12° x 100°] + 1°] = 1047197551°

As per construction No. 3:-
Method No.5
Arc Radius = [[[[[[[[[216° x 144°] + 324°] x 9°] **-** 108°] ÷ 9°] x 1000° x 4°] **-** 336°] + 42°] ÷ 12° x 100°] + 1°] =1047197551°

Method No. 6
Arc Radius = [[[[[[[[72° x 72° x 6°] +324°] x 9°] **-** 108°] ÷ 9° x 1000° x 4°] **-** 336°] + 42°] ÷ 12° x 100°] + 1°] =1047197551°

A5. ⊖ = The formula of goba is self-evident and impotent. As per construction number one (1):**-**

[[[[[[[[[[[[[[[[[[[[72 x 144 x 2 + 216] x 6 ÷ 2] ÷ 6] x 36] – 144] ÷ 6] x 1000] ÷ 2] – 72] x 2] ÷ 4] – 6] x 4] x 2] + 42] ÷ 2] ÷ 6] x 100] + 1] x 6] = 6283185306 circumference of circle
―――――――――――――――――――――――――――――――――
2 (10000 x 1000 x 100) = 2 (10^4 x 10^3 x 10^2) = 2000000000 Diameter

= 3.141592653 ⊖ = The value of Goba

Signs and digits in this formula are as according to the following. The value of one arc radius:**-**
Dynamic value **72^0** (Initial, Interior degree of circle, 12 Arc Radius x 6^0 Measure of Arc radius = 72^0) **x 144^0** (Last or Terminal, Outside degree of circle, 24 Arc Radius x 6^0 Measure of Arc radius = 144^0) **x 2^0** (12 ÷ 6 = 2 Multipal) **+ 216^0** (72^0 Initial + 144^0 Last or Terminal = 216^0, 6 multipal circumference of circle of Static value) **x 6^0 ÷ 2^0** (12 ÷ 6 = 2 Multipal) = 62856 (This is the first value of Circumference of circle, This is the first value of 6 arc radius means Circumference of circle therefore how many value of one arc radius) **÷ 6^0** = 10476 **x 36^0** (For 6 circle of 36 arc radius 4^0 should be subtracted from one arc radius therefore how many for 36 arc radius = 36 x 4^0 = 144^0 Should be subtracted) = 377136 **– 144^0** (36 x 4^0 = 144^0) = 376992 (This is the value of 6 Circumference of circle or the value of 36 arc radius) **÷ 6^0** (The value of 1 circle) = 62832 (This is the second value of Circumference of circle, This is the value of 6 arc radius therefore how many value of one arc radius = 62832 ÷ 6 = 10472 This is the value of one arc radius) **x 1000^0** = 62832000 (This is the third value of Circumference of circle) **÷ 2^0** (12 ÷ 6 = 2 Multipal) = 31416000 **– 72^0** (Initial, Interior degree of circle] 12 Arc Radius x 6^0 Measure of Arc radius = 72^0) = 31415928 **x 2^0** = 62831856 (This is the fourth value of Circumference of circle) **÷ 4^0** (24 ÷ 6 = 4) = 15707964 **– 6^0** (Centre of circle should be subtracted 6 time) = 15707958 **x 4^0** (¼ Multipal Circumference of circle) = 62831832 **x 2^0** (12 ÷ 6 = 2 Multipal) = 125663664 (This is the fifth value of Circumference of circle) **+ 42^0** (36^0 + 6^0 = 42^0) = 125663706 **÷ 2^0** = 62831853 (This is the sixth value of Circumference of circle, This is the value of 6 arc radius therefore how many value of one arc radius) **÷ 6^0** Arc Radius = 10471975.5 **x 100^0** ($10^{12/6}$ = 10^2 = 100) = 1047197550 **+ 1^0** (1^0 of original center of circle) = 1047197551 (This is the value of one arc radius therefore how many value of six arc radius) = 1047197551^0 **x 6** Arc Radius = 6283185306^0 (This is the last value of Circumference of circle, This is the value of six arc radius)
Hence the goba = Goba =⊖ = 6283185306**^{0}** ÷ 2000000000**^{0}** = 3.141592653**^{0}** formula is completed.
(As above formula of goba is created) As per sign and digit in the formula of goba is as above.

A6. Second construction:

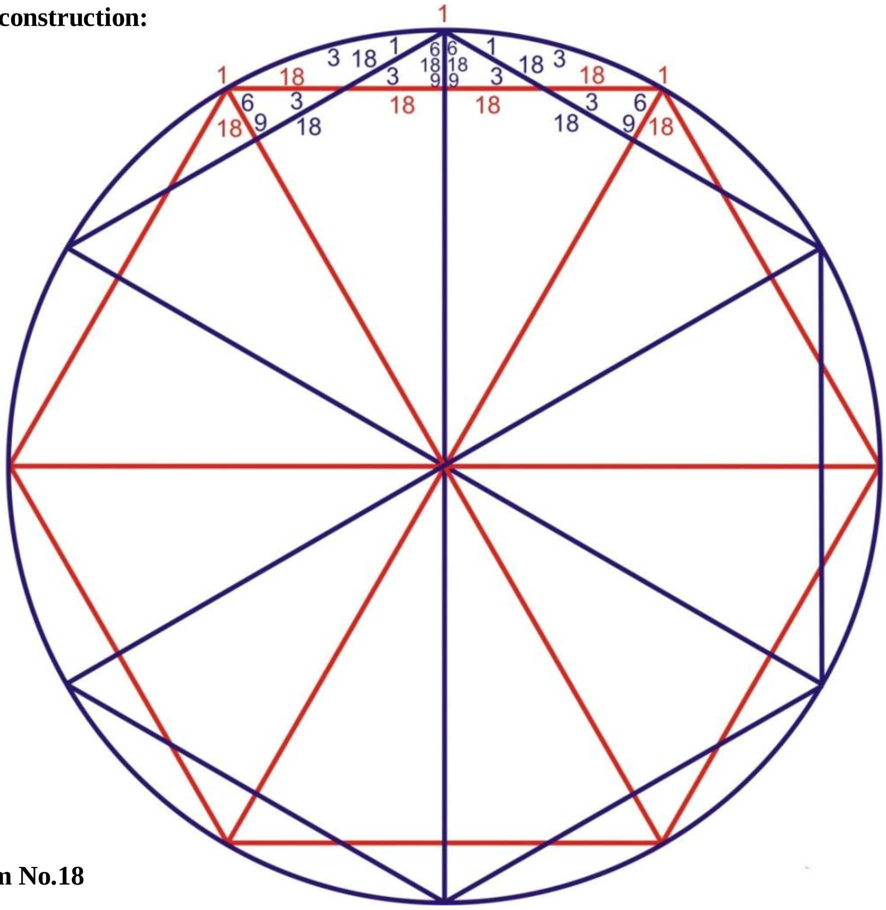


Diagram No.18

$$\text{Radius} = \odot^{3x3} = \bullet\bigcirc^{9} = [10^{1+1+1+1} x 10^{1+1+1} x 10^{1+1}] = 10^{9} = 10^{4} x 10^{3} x 10^{2} = 1000000000^{0}$$

One billion or 100 crores radius is finite, radius is not infinite.

Arc Radius

Static + **Dynamic**

$3^0 x 18^0 + 3^0 x 18^0 = 54^0 + 54^0$

$= 108^0$

$(18^0 + 18^0 + 18^0 + 3^0 + 6^0 + 9^0) x (18^0 + 18^0 + 18^0 + 3^0 + 6^0 + 9^0)$

$+ (18^0 + 18^0 + 18^0 + 3^0 + 6^0 + 9^0) x (18^0 + 18^0 + 18^0 + 3^0 + 6^0 + 9^0)$

$= (72^0 x 72^0) + (72^0 x 72^0) = 72^0 x 72^0 + 72^0 x 72^0$

$= 5184^0 + 5184^0 = 10368^0$

$108^0 + 10368^0$

Arc Radius = 10476^0

$10476^0 - 1^0 - 1^0 - 1^0 - 1^0$

$= 10472^0$ Arc Radius 10^4 up to the radius

10472^0 x 10^{1+1+1} (x The next 10^3 radius start from here)

$= 10472^0$ x 10^3 = 10472^0 x 10^0 x 10^0 x 10^0

$=10472000^0$ Arc Radius

10472000^0 x 12 Arc Radius = 125664000^0 Value of 12 Arc Radius

125664000^0 – [(Half Circumference of circle)^2 = (18^0 x 18^0) + (12^0)] 12 times the centre of circle must be subtracted from the circumference of circle

$125664000^0 - (324^0 + 12^0) = 125664000^0 - 336^0 = 125663664^0$ Add in it measure of circle $36^0 + 6^0$ degree arc radius

$=125663664^0 + 42^0 = 125663706^0$ Value of 12 Arc Radius

The value of one Arc Radius

$125663706^0 \div 12$ Arc Radius $= 10471975.5^0$ Arc Radius

$10471975.5^0 \times 10^{1+1}$ (x The radius is equal to 10^2)

$=10471975.5^0 \times 10^2$

$=10471975.5^0 \times 100^0$

$=1047197550^0$Arc Radius

$1047197550^0 + 1^0$ (Centre point of original arc radius of circle)

$=1047197551^0$ Arc radius is completely limited

Ratio

Straight Radius 1000000000 : 1047197551 Arc radius

$$\frac{\text{Arc Radius}}{\text{Straight Radius}} = \frac{1047197551}{1000000000} = 1.047197551$$

Straight Radius 1 : 1.047197551 Arc Radius

Arc radius = 1.047197551 × Straight Radius **and Straight radius** = 1.047197551 ÷ Arc radius ([3],[4],[5],[12]).

Circumference of circle = 6 Arc Radius = 6 x 1.047197551 = 6.283185306 Circumference of circle

Diameter = 2 Radius = 1 x 2 = 2 Radius

$$\text{Formula of Goba} = \ominus = \frac{\text{Circumference of circle}}{\text{Diameter}} = \frac{\text{Circumference of circle}}{\text{Straight Diameter}} = \frac{\text{6 Arc Radius}}{\text{2 Straight Radius}} =$$

$$= \frac{6\text{x}1.047197551^0}{2^0} = \frac{6.283185306^0}{2^0} = 3.141592653 \text{ Constant of Goba}\left([1],[2],[3],[4],[5],[6],[14]\right).$$

Arc radius is proportional to straight radius. Therefore, circumference of circle is proportional to diameter.

III. COMPARISON OF 3.141592653 PI MEANS GOBA VALUE WITH 22/7

22/7 Pi (π)

22/7 = 3.142857142857143

This Pi (π) value is incomplete.

3.141592653 Goba ($\ominus$)

6 x 1.047197551 Value of one arc radius = 6.283185306 Circumference of circle

6.283185306 ÷ 2 Straight radius = 3.141592653

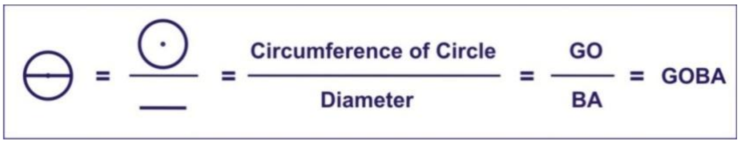
This Pi (π) means Goba ($\ominus$) value is complete.

22/7 is a maximum approximate value, which is 3.142857142857143 our present determination of the value of pi is 3.141592653 and this is appropriate value of pi we call designate this value as Goba in the honours of **Go**davari and **Ba**purao parent of researcher and my father Late Mr. Shantaram Bapurao Janorkar with this Goba the formula of circumference of circle became circumference of circle = $2\ominus r_s$ therefore Goba = circumference of circle / diameter.

For, circumference of circle = 6λ (Lambda) therefore λ (Lambda) = $\ominus r_s/3$ ([17]).

The symbol of Goba:

Goba:



IV. CONCLUSIONS

Mathematics (Geometrical) method it is a good alternative method for determination of Pi (π). 3.141592653 This particular value we designate as Goba ($\ominus$). It is in the range of value of pi (π).

V. ACKNOWLEDGMENT

Moreover, to establish this research scientifically, renowned mathematician, Honourable Prof. Dr.T.M. Karade, (D.Sc., D.Sc.), Hon. Prof. Dr. M. T. Teli, Hon. Prof. Dr.B.S. Rajput, Prof. Dr. Shriram B. Patil, Prof. Dr. Kamel

Lahmar (Algeria), AFRICA, Prof. Dr. Kishor S. Adhav, (D.Sc.), Prof. Dr.J.N. Salunke, Prof. Dr. S. D. Katore, Prof. Dr. M. B. Dhakne and Prof. Dr. D. T. Solanke, gave me guidance and still they are doing so from time to time for which I am grateful to them.

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