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To Judge the Correct-Ness of the New Pi Value of Circle By Deriving The Exact Diagonal Length Of The Inscribed Square

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ABSTRACT : *Circle and square are soul and body of the subject of Geometry. All celestial bodies in the Cosmos are spherical in shape. Four equidistant tangents on a circle will give rise to a square. A circle can be inscribed in a square too. Thus, circle and square are two inseperable geometrical entities. π is a fundamental mathematical constant. The world believes 3.14159265358… as π value for the last 2000 years. Yet it is an approximate value. Continuous search for its exact value is going on, even now. God has been kind. The exact π value is not a myth. It has become real with the discovery of* $\frac{14-\sqrt{2}}{4}$. *It is a very tough job to convince the world that the new finding is the real π value. In this paper,* ***the exact length of the diagonal*** *of the inscribed square form the length of an* ***arc*** *of the superscribed circle is obtained as a proof.*

KEYWORDS: *Circle, circumference, diameter, diagonal, perimeter, square*

I. INTRODUCTION

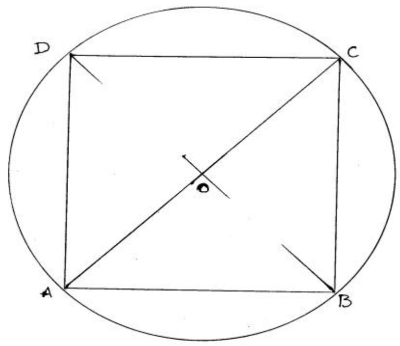
The geometrical constant, called π, is as old as human civilization. In the ancient days, contributions on π was very admirable from the Eastern parts of the World. The Founding Father of Mathematics: **Hippocrates of Chios** (450 BC) has not touched the value of π. But his work on the nature of circular entities such as squaring of lunes, semicircle and full circle is unparalled in the History of Mathematics.The present π value, 3.14159265358… could not understood **Hippocrates'** work and its greatness. What is the reason ? This number is not the π of the circle. It is the value of the polygon. It was derived using Pythagorean theorem. Pythagorean theorem gives exact length to a hypotenuse which is a straight line. Circumference of a circle is not a straight line. It is a curvature. Hence, 3.14159265358… of polygon has failed to understand the greatness of **Hippocrates**. In other words, 3.14159265358… is not a π number at all.

After a long waiting of 2000 years by trillions of scholars **NATURE** has revealed its true length of a circumference of circle and its π value. The value is $\frac{14-\sqrt{2}}{4}$ = 3.14644660942… derived from Gayatri method. It was discovered in March 1998. This worker is the first and fortunate humble man to see this fundamental truth, and at the same time, made this author responsible to reveal to the whole world, its total personality. He was cautioned by the Nature, through **Inner Voice**, further, not to shirk his responsibility till the end, till the world welcomes it, and continue to search speck by speck naturally, **respecting the Cosmic mind of the Nature,** with indomitable determination, and fight single handedly against the conservative attitude and die like a warrior defeated, if situation of "reluctance to acceptance" still persistsFrom the remote past to the present, the period of study of π is divided into **two periods**: the period of geometrical dependence in the derivation of π value and the 2nd period from 1660 AD onwards till today, the period of dependence on infinite series,

dissociating totally geometrical analysis in the derivation of π value. In the present and second period, the number 3.14159265358… is considered **as a number** only and nothing to do with the definition of "the ratio of circumference and diameter of a circle". The paradox is, geometry is forgotten in the derivation of π value but searched for the same, in squaring of a circle. Finally, this number 3.14159265358… has gained four characteristics: 1. Though it is a polygon number, established itself as a π number of circle. 2. Though an approximate number it ruled the world for many centuries as a final value. 3. Though it doesn't belong to a circle has commented 'squaring of circle' as an unsolved geometrical problem. 4. Though it has gained a status of transcendental number with the definition of *"…the fact that π cannot be calculated by a combination of the operations of addition, subtraction, multiplication, division, and square root extraction…"* (Ref.1) is derived actually in Exhaustion method, applying the Pythagorean theorem, and invariably with the involvement of $\sqrt{3}$. Further, the moment this number discared the association of Geometry, it has started a new relationship in

Euler's formula $e^{i\pi}+1 = 0$ with **unrelated** numbers which are themselves approximate numbers. **C.L.F. Lindeman** (1882) has called π number as a transcendental number based on Euler's formula. Here again, there is a discrepancy in choosing π, in the Euler's formula. In the formula, π means π radians 180^0 and **not**, π constant 3.14… Are they both, π radians and π constant are identical ? π constant is **divine**, whereas π radians equal to 180^0 is, human creation and **convenience**. In the Euler's formula π radians 180^0 is involved and the resultant status of transcendence has been applied to π constant. Let us rewright $e^{i\pi} + 1 = 0$ as $e^{\sqrt{-1}\times 3.14}+1=0$. Is it right and acceptable ?It may not be wrong in calling that 3.14159265358… is a transcendental number but it is definitely wrong when π number is called a transcendental number and with a consequential immediate statement "squaring of a circle" is impossible. The major objection is, the very definition of π is "the ratio of circumference and diameter of a circle". So, this discrepancy led to the conclusion that 3.14159265358… is not, infact, a π number.In its support, we have the work of **Hipporcrates**. **Hippocrates** had squared a circle even before any text book on Mathematics was born; His text book is the basis of **Euclid's Elements** too. As **Hippocrates** did square the circle it implied π an algebraic number. Further, **Lindemann** is **also right** in calling 3.14159265358… as transcendental number and not right, **if he calls** π number as transcendental. Here, there is a clarity of opinion thus. 3.14159265358… is a polygon number (and attributed to circle).
In this paper the diagonal length is obtained from the **actual** length of the circumference of the circle.

II. PROCEDURE



Draw a square ABCD. Draw two diagonals AC and BD. 'O' is the centre.
AB = Side = a; AC = BD = diameter = $\sqrt{2}a$

Draw a circle with centre 'O' and with radius $\frac{d}{2} = \frac{\text{diameter}(d)}{2} = \frac{\sqrt{2}a}{2}$

Diameter = AC = $\sqrt{2}a$ = d
Perimeter of ABCD square = 4 x a = 4a

$1/4^{th}$ of the circumference CB = $\frac{\pi d}{4} = \frac{\pi\times\sqrt{2}a}{4}$

where d = diameter = diagonal = $\sqrt{2}a$ of the ABCD square.

[1] Let us find out $1/4^{th}$ of circumference of circle CB, with the present π value, 3.14159265358…

[2] $\frac{\pi d}{4} = \frac{\pi\sqrt{2}a}{4} = \frac{3.14159265358\times\sqrt{2}a}{4} = \left(\frac{1.11072073453}{4}\right)a$

[3] where diameter of the circle is $\sqrt{2}a$

[4] Let us use the following formula to get the length of the diagonal (known of course i.e., $\sqrt{2}a$) from the above value.

[5] $\frac{\text{Perimeter of the square}}{\text{Half of 7 times of side of square} - \frac{1}{4}\text{th of diagonal}}$

[6] $= \frac{4a}{\frac{7a}{2} - \frac{\sqrt{2}a}{4}} = \frac{4}{\frac{7}{2} - \frac{\sqrt{2}}{4}} = \frac{4}{\frac{14-\sqrt{2}}{4}} = \frac{16}{14-\sqrt{2}}$

[7] In the 3rd step, let us multiply the above value with the 1/4th of the circumference of the circle, to give the diagonal AC of the square ABCD.

[8] $\frac{3.14159265358 \times \sqrt{2}a}{4} \times \frac{16}{14-\sqrt{2}}$

[9] $= \frac{1.11072073453 \times a}{4} \times 1.27127534534$ = 1.41203188536… = (1.41203188536)a

[10] The $\sqrt{2}$ value is 1.41421356237…

[11] It is clear therefore, that the π value 3.14159265358… does not give exact length of the diagonal AC of ABCD square whose value is $\sqrt{2}a$ = 1.41421356237.

[12] Now, **let us repeat** the above steps with the new π value = $\frac{14-\sqrt{2}}{4}$

[13] $\frac{\pi d}{4} = \frac{\pi\sqrt{2}a}{4} = \frac{14-\sqrt{2}}{4} \times \sqrt{2}a \times \frac{1}{4} = \left\{\frac{\left(14-\sqrt{2}\right)\sqrt{2}}{16}\right\}a$

[14] = 1/4th of Circumference of circle CB

[15] $\frac{\text{Perimeter of the square}}{\text{Half of 7 times of side of square} - \frac{1}{4}\text{th of diagonal}}$

a. $= \frac{4a}{\frac{7a}{2} - \frac{\sqrt{2}a}{4}} = \frac{16}{14-\sqrt{2}}$

[16] 3rd Step: Multiplication of values of 4 & 5 S. Nos

[17] $= = \left\{\frac{\left(14-\sqrt{2}\right)\sqrt{2}}{16}\right\}a \times \frac{16}{14-\sqrt{2}} = \sqrt{2}a$

[18] As the exact length of the diagonal AC of square ABCD equal to $\sqrt{2}a$ is obtained with the new π value, so, $\frac{14-\sqrt{2}}{4}$ is the real π value.

III. CONCLUSION

In circle, there are circumference, radius and diameter. In square, there are perimeter, diagonal and side. When a circle is superscribed with the square, circumference, side, diagonal and perimeter of square co-exist in an interesting relationship. In this paper, this relationship is studied and the diagonal length is obtained from the arc of the circumference. This is possible only when the exact length of the circumference is known. A wrong length of circumference obtained using a wrong π value gives only wrong length of diagonal.

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