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Comparison Between Current Value of pi & New Value of pi π

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Current value of pi π 3.14159265358… & new value of pi π (17 – 8√3),
Approximate 3.14359353944…
Different 0.00200088586…
Using method ($a^2 – b^2$)

ABSTRACT

In this paper, I show that the comparison between the current approximate value of pi (π) and its exact value raises several questions. It is generally believed that the value of pi is irrational and transcendental, meaning that it cannot be expressed as an exact finite decimal value. It is also considered impossible to obtain the area of a square equal to the area of a given circle using conventional geometrical methods.

Even today, these ideas are widely accepted throughout the world. However, I claim that solutions to all these problems have now been found.

The number (17−8√3) is also an irrational number. However, pi (π) is generally considered to be transcendental. When the value of (17−8√3) is entered into a computer calculator, its result is also displayed up to as many decimal places as required.

Introduction:

Comparison

s. r.	Current value of pi π	New value of pi π
1	3.14159265358… (a number with 314 trillion digit)	Exact (17 – 8√3) & Approximate 3.14359353944…
2	A line segment of this length cannot be drawn.	A line segment of this length can be drawn.
3	To discover this value, the n side's polygon method with n sides was used. This method has no end.	There is no need to use the *n*-sided polygon method.
4	Transcendental number	Algebraic number
5	Exact solutions to all equations cannot be obtained. There are infinitely many such equations. for example π = 3.141592653… And (4 – π) = 0.858407346… Therefore π + (4 – π) = 3.999999999…	Exact solutions to all equations can be obtained. for example π = (17 – 8√3) (4 – π) = 4 – (17 – 8√3) = (8√3 – 13) Therefore π + (4 – π) = (17 – 8√3) + (8√3 – 13) = 4
6	Squaring the circle impossible	Squaring the circle possible
7	Finding c/d is difficult because the final digits cannot be counted, and an algebraic method is not available.	$a/r^2 = π$ can be studied using an algebraic method. There is no need to determine the final digit. Such a method has been found.

A paper titled *Proof of Errors in the Value of Pi (π)* has been written using this method. By applying the difference of squares method (a^2-b^2) it is possible to obtain a result equal to the value of any given pi (π). The main question in this method is determining the appropriate value of **b**.

If an algebraic formula for this problem can be derived, I explain how it is obtained in this paper. First, let us briefly understand the method.

First, a sheet of graph paper is taken, and squares of different sizes are cut out from it. Then, smaller squares of different dimensions are cut from these square sheets. After cutting the squares, the areas of both the cut-out square and the remaining portion of the original square are calculated separately.

For example, if a square measuring 12×12 is taken, its area is:

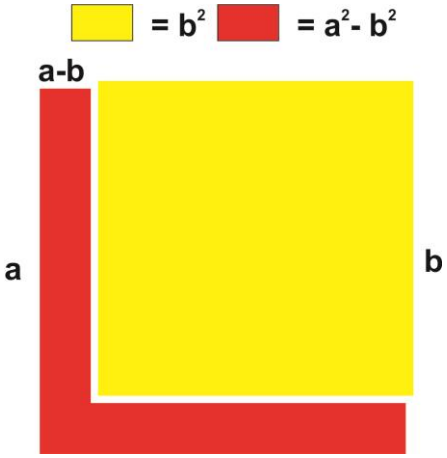
12×12=144

If a smaller square measuring 9×9 is cut out of it, the areas of the two resulting portions are:

Area of the cut-out square: 9×9=81

Area of the remaining portion: 144−81=63

Using this method, we studied the areas obtained by cutting squares of different dimensions from larger squares.



Next, we began studying the total area of the combined figure formed by taking the two resulting pieces, colouring them in different colours, and placing them one over the other, as shown below.

Let us understand this using an algebraic method.

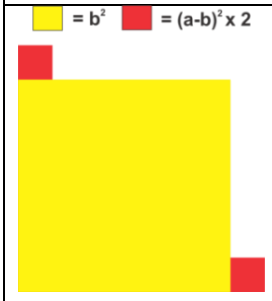
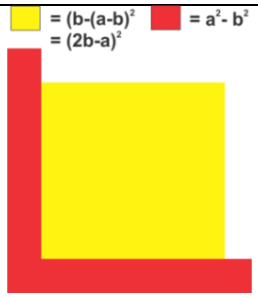
Suppose we take a square sheet of paper with side length **a** and cut out a smaller square with side length **b**.

The areas of the two resulting portions are:

Area of the smaller square = b^2

Area of the remaining portion = a^2-b^2

Next, place the smaller square on the red strip to form the resulting figure. Let us examine the total area of this figure from both the front and the back using an algebraic method.

Front side	**Back side**
	
Area of Front side **$b^2 + [(a - b)^2 \times 2]$**	**Area of Back side** **$(a^2 - b^2) + [b - (a - b)^2$**

Front side	**Back side**
= $b^2 + 2(a^2 + b^2 – 2ab)$ **= $2a^2 + 3b^2 – 4ab$**	**= $(2b – a)^2] (a^2 – b^2) + (2b – a)^2$** **= $(a^2 – b^2) + (4b^2 + a^2 – 4ab)$** **= $2a^2 + 3b^2 – 4ab$**

The areas of the front and back sides obtained using both the methods described above are equal. We have already seen this. Now, let us understand this method with a numerical example.

Example:

Take a square measuring 30×30, whose area is:

30×30=900

Now, cut out a smaller square measuring 26×26 from this larger square. The area of the remaining strip will be:

900−676=224

1. Calculation of the front-side area

Now, place the 26×26 square on the L-shaped strip. After placing it, the total area of the resulting figure will consist of:

Area of the smaller square = 676

Area of the two remaining 4×4 squares in the L-shaped strip:

2(4×4)=2(16)=32

Therefore, the total front-side area is:

676+32=708

However, using both of these methods, the calculated areas appear to be equal. But there is a difference between the two methods.

In the first method, after cutting out the square and placing it on the L-shaped strip, the areas of the two remaining squares in the L-shaped strip add up to **32**.

In the second method, when the L-shaped strip is placed over the cut-out square, the area of the remaining square inside that square is **484**.

Thus, the difference between these areas is: 484−450=34

Here, 450 is half the area of the original square (900/2). Therefore, the difference between the calculated areas is 32 and 34. This difference should not occur if both methods are expected to produce equal results.

Why does this difference arise? This can also be demonstrated geometrically.

To investigate this, let us solve the above example using the currently accepted value of pi (π) and the proposed new value, and compare the differences in the results. We will also examine which value produces equal results.

In this example, we have taken a square measuring 30×30. Its side length is 30, and the radius of the corresponding circle is 15.

To obtain a result using the currently accepted value, we need to multiply 15 by **1.731213544336….** To obtain a result using the proposed new value, we need to multiply 15 by **1.7320508075….**

These calculations give us the side length of the smaller square (b).

Taking these values and rounding the figures as shown above, we get:

Using the currently accepted value:

15×1.731213544336…=25.9682031649…

Using the proposed new value:

15×1.7320508075…=25.980762113…

These are the respective side lengths of the smaller square (b).

a = 30 then b = …

Current value of pi front side	**New value of pi front side**
b = 25.9682031649… **b² = 674.347575613…** **(a – b) = 30 – 25.9682031649…** **= 4.0317968351…** **(a – b)² x 2** **4.0317968351…² x 2 = 16.2553857195… x 2 16.2553857195… x 2 = 32.510771439… 674.347575613… + 32.510771439… = 706.858347052…** **706.858347052…/15² = 3.1415926535…**	**b = 25.980762113…** **b² = 674.99999…** **(a – b) = 30 – 25.980762113…** **= 4.0192378866…** **(a – b)² x 2** **4.0192378866…² x 2 = 16.154273189… x 2 16.154273189… x2 = 32.308546378… 674.99999… + 32.308546378… = 707.308546377…** **707.308546377…/ 15² = 3.1435935394…**
Back side **(a² - b²)** **30² - 25.9682031649…² = 225.652424387…+ (2b – a)² + [(25.9682031649… x 2) – 30]² = 51.9364063298… - 30 = 21.9364063298…** **21.9364063298…² = 481.205922666…** **(2b – a)² - 2r² 481.205922666… + 225.652424387… = 706.858347053… 706.858347052…/15² = 3.1415926535… 481.205922666… - 450 = 31.205922666…**	**Back side :** **(a² - b²)** **30² - 25.9807621134…² = 225.000000001… + (2b – a)² = [(25.9807621134… x 2) – 30]² (51.9615242268… - 30)² = 21.9615242268…² 21.9615242268…²** **= 482.2308546364…** **(2b – a)² - 2r²** **482.2308546364… + 225.000000001…** **= 707.308546377…** **707.308546377…/ 15² = 3.1435935394… 482.2308546364… - 450 = 32.308546364…**

If the value of **b** is taken according to the currently accepted value of pi (π), the results are different. However, if the proposed new value is used, the results are equal.

This is because the following equation is expected to produce equal results:

$2(a-b)^2 = (2b-a)^2-2$

Therefore, let us determine the value of **b** that satisfies this equation.

The side length of the original square is **a**, which represents the diameter of the circle. Therefore, the radius of the circle is a/2.

Based on this radius, we need to determine the appropriate value of **b** so that both methods produce equal results.

If a = 2 then b =?

Front side	**Back side**
(2 – b)² x 2 **= (4 + b² - 4b) x 2** **= (8 + 2b² - 8b)**	**(2b – 2)² - 2** **= (4b² + 4 – 8b) – 2** **= (4b² + 2 – 8b)**

(8 + 2b² - 8b) = (4b² + 2 – 8b)

(8 + 2b² - 8b) - (4b² + 2 – 8b) = 0

= 6 – 2b² = 0

= 3 – b² = 0

Then b = √3

Now, substitute the values of **a** and **b** into the formula $2a^2+3b^2-4ab$, which represents the area obtained using both the front-side and back-side methods in the first two figures.

If a = 2r then b = √3r

$2a^2 + 3b^2 – 4ab$

$= 2(2^2) + 3(\sqrt{3}^2) – 4(2\sqrt{3})$

$= (8 + 9) – 8\sqrt{3}$

$= (17 – 8\sqrt{3})$

Thus, the resulting value is $17-8\sqrt{3}$, which is an irrational number.

Mathematical clarification: This calculation establishes the algebraic value of the expression. It does not, by itself, establish that this value is equal to π or that it provides an exact geometrical solution to the circle-squaring problem.

I have demonstrated that the same result can be obtained using several different geometrical methods. I have also shown that the same result can be obtained using algebraic equations.

Several examples of algebraic equations have been provided, demonstrating that each example produces the same result through thirty different methods.

Similarly, I have demonstrated that the same result can be obtained by adding and subtracting the areas of different geometrical figures. I have also provided the corresponding formulas.

Using these formulas, an infinite number of examples can be created.

Let us look at one simple example of this.

Area of 1 inscribed dodecagon + area of 2 circumscribed dodecagon

$= 3r^2 + 2(24 – 12\sqrt{3})\, r^2$

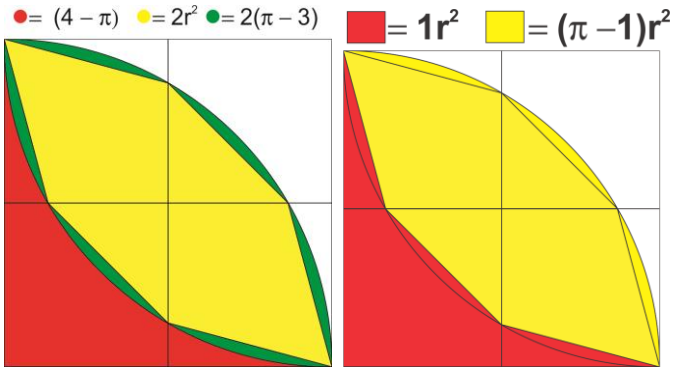
$= 3(17 – 8\sqrt{3})\, r^2$

Using this new value, it is possible to construct a square whose area is equal to the area of a circle. It is also possible to construct a circle whose area is equal to that of any given square. In other words, circles with integer-valued areas can be constructed.

I am aware that the values 22/7 and 355/113 are close approximations to π. However, even when these approximate values are used, it is possible to construct a square whose area is equal to the area of a circle.

Supporting work

To understand why both results should be equal, please refer to the figures below



In the first figure above, the green portions on both sides are equal in area.

If the green portion on the left is combined with the red portion, the resulting area is $1r^2$.

If the green portion on the right is combined with the yellow portion, the resulting area is $2r^2$+green portion.

The green portion included in $1r^2$ is equal in area to the green portion included in $2r^2$+green portion

Therefore, both sides should produce equal results. However, equal results are not obtained when using the currently accepted value of pi (π).

Now, let us examine some numerical examples of the above method.

Take any value of **a**, divide it by 2, and multiply the result by **1.7312135443362…** to obtain the value of **b**. If we round off the figures as described above, we obtain results using the currently accepted value of pi (π).

I have created many examples using this method in Excel. Here are some examples in which the value of **b** is rounded to the nearest whole number.

Example:

Let us take the side of the original square as 186.

According to the method described above:

(186÷2)×1.7312135443362… =161.002859622…

Thus, the calculated value is approximately 161. If we take the side of the smaller square as **b = 161**, it is slightly smaller than the calculated value. We then round off the figures as described above.

a = 186 & b = 161 a^2 = 35596 b^2 = 25921

Front side	**Back side**
= b^2 + [(a – b)² × 2]	**= (a^2 − b^2) + (2b – a)²]**
= 25921 + (186 – 161)² x 2	**= (35596 – 25921) + [(2 x 161) – 186]²**
= 25921 + (25^2 x 2)	**= 8675 + (322 – 186)²**
= 25921 + (625 x 2)	**= 8675 + 136^2**
= 27171	**= 8675 + 18496**
	= 27171

Results:

If a = diameter = 186, then 186/2 = 93 radius

Area of figure = 27171

(27171/93^2) = 27171/8649

= 3.14151925078… < π, because 161 < 161.002859622…

b^2 = 25921 < 25947 = $3r^2$

[(a – b)² × 2] = 1250

(2b – a)² − $2r^2$ = 18496 – 17298 = 1198

1250 > 1198

Another Example:

Let us take a square with side length **692**. From this square, we need to cut out a smaller square with side length **b**.

Using the formula described above:

(692÷2)×1.7312135443362…=598.99988633…

The calculated value is approximately 599. Therefore, we take the nearest whole number, **b = 599**, and round off the figures as described above.

Given:

a=692,b=599

The respective square areas are:

a^2=692^2=478864

b^2 =599^2 =358801

a = 692, b = 599 a^2 = 478864, b^2 = 358801

Front side	**Back side**
= b^2 + [(a – b)² × 2]	**= (a^2 − b^2) + (2b – a)²**
= 358801 + (692 – 599)² x 2	**= (378864 – 358801) + [(2 x 599) – 692]²**
= 358801 + (93^2 x 2)	**= 120063 + (1198 – 692)²**
= 358801 + (8649 x 2)	**= 120063 + 506^2**
= 376099	**= 120063 + 256036**
	= 376099

Results:

If a = diameter = 692 then 692/2 = 346 radius

Area of figure = 376099

(376099/346^2) = 376099/119716

= 3.1415934378… > π, because 599 > 598.99988633…

b^2 = 358801 < 359148 = $3r^2$

[(a – b)² × 2] = 17298

(2b – a)² − $2r^2$ = 256036 – 239432 = 16604

17298 > 16604

Conclusion

In both the examples given above, the combined areas of the two smaller outer squares are greater than the result obtained by subtracting $2r^2$ from the area of the larger inner square.

Therefore, the results are not equal.

To obtain equal results, the value of **b** must be taken as exactly 30 times the radius, rather than using the rounded approximate value.

In other words:

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