

# Intuitions and Serendipity: The $\pi$ Case.

Roberto Brusa  
High School Diploma  
Mechanical Expert Chief Technician  
Olgiate Olona, Varese, ITALY

**Abstract:- Aim of this research is to show the need to follow the intuitions to create solid foundations on which to base Growth, Knowledge, Awareness, and ultimately Wisdom, starting from the teachings of the past, always present also in the future.**

**Keywords:-**  $\pi$  , Pythagoras, second, sexagesimal, sin, tan, escape speed.

## I. INTRODUCTION

In [2] it is reported: "" The Vedic experience ..... not only provides "information" on notions of the past, but truly

"In-forms" the present allowing this dimension to manifest itself, revealing it as a effective constitutive part of man's personality.

Not only my individual past is present in me; the history of man has also accumulated in the cave of my heart, to use an Upanishadic expression; or, to express the same thought in another way, it is present in the dendrites of my nervous system, in the molecules of DNA "".

At the age of 5, instinct made me run away from kindergarten twice, the first with a friend and without any premeditation, taking advantage of a series of events, which we can associate with chance, combination, or fleeting moment.

The second alone, consciously, with a strategy that allowed me to pass all the checks I was subjected to, a real escape plan.

After I managed to get my feet out of the kindergarten, I came back from the same escape route without anyone noticing, or at least that's what I think; if not, it means that they allowed me to follow my instincts so that I could understand, and for that I thank them.

Since that moment, I have no longer felt the need to flee.

At school, another desire to escape arose unexpectedly: escaping from the Earth.

I do not remember exactly at what age it happened, but I was still a teenager, and I was attending the evening course for the achievement of the Diploma of Mechanical Expert.

Again, a probable solution appeared in my mind, lightning fast and unexpected.

After more than 50 years from the first intuition, a second solution took shape in my mind, always in an unexpected and sudden way, like a flash.

Two different solutions to the same problem: the Escape Speed.

## II. METHOD

The first intuition, arising from the knowledge of the Pythagorean Theorem on the right triangle and from Earth's Gravity concept, was to relate the Terrestrial Radius, or TR, and Earth's Gravity value = 9.81.

The idea was that:

$$\text{Hypotenuse} = \text{TR} + 9.81$$

$$\text{Greater cathetus} = \text{TR}$$

By applying the Pythagorean Theorem, I would have obtained the value of the minor cathetus, which would have been the solution of my problem, that is, the Escape Speed from the Earth, or ES.

Nowadays I can say that 9.81 is the Instantaneous Speed of a falling body without friction after 1 second of time.

In those time for me was only a number, a concept.

Making this calculation:

$$\sqrt{[(\text{TR} + 9.81)^2 - \text{TR}^2]} = \text{ES},$$

the result was: ES = ~ 11.2 km/sec.

For me it ceased to be a problem: I had found a solution.

I would remember that I am talking about a teenager, with knowledge limited to those of middle school or the first years of superior school, and that today I would not be able to calculate the square root manually, but only with the aid of a calculator.

In 1980, having started to use CAD, Computer Aided Design systems, in the field of aeronautical structural design, I was able to verify graphically the correctness of the result obtained previously: finally, I had a worksheet of 508 meters on each side, with numerical values available in double precision.

In the year 2022, more than 50 years later, a new solution to the same problem unexpectedly materialized in my mind:

$$2\pi\text{TR} / 3600 = \text{ES}$$

The number "3600" represents the number of seconds that make up an hour, i.e., 60 seconds multiplied by 60 minutes.

Result:  $ES = \sim 11.2 \text{ km/sec}$

But as usual, the intuition, generated by the unconscious work of the mind, made me pause to look more deeply these two solutions to the problem.

In second intuition, Earth Gravity was no longer necessary, so it was a step forward, having one less variable to manage, besides it is also simpler and more immediate in the calculation because there are no square roots.

At this point, we can begin to represent the two equalities:

$$\sqrt{[(TR + 9.81)^2 - TR^2]} = ES$$

$$2\pi TR / 3600 = ES$$

and analyze them more in depth.

In the second intuition, regarding the numerical value of 3600 seconds, there is a fundamental association:

1 Second of time represent a Sexagesimal angle of  $0.1^\circ$ .

The two trigonometric values associated with this angle are:

$\tan(0.1^\circ)$ , corresponding to a polygon circumscribed to the circumference,

$\sin(0.1^\circ)$ , corresponding to a polygon inscribed in the circumference.

Therefore

$$\sqrt{[(RT+9.81)^2 - RT^2]} = RT \cdot \tan(0.1^\circ)$$

$$RT \cdot \tan(0.1^\circ) = 2\pi RT / 3600$$

Simplifying and reducing we obtain:

$$\pi = 1800 \cdot \tan(0.1^\circ)$$

$$\pi = 3.1415958435398$$

But is also valid:

$$\sqrt{[RT^2 - (RT \cdot \cos(0.1^\circ))^2]} = RT \cdot \sin(0.1^\circ)$$

$$RT \cdot \sin(0.1^\circ) = 2\pi RT / 3600$$

Simplifying and reducing we obtain:

$$\pi = 1800 \cdot \sin(0.1^\circ)$$

$$\pi = 3.1415910586169$$

It can be clearly seen that the values of  $\pi$  correspond up to the 5th decimal digit, and that with " $\tan(0.1^\circ)$ " an excess value is obtained, while with " $\sin(0.1^\circ)$ " a value in defect is obtained.

Adding the two equations, we can write:

$$2\pi = 1800 \cdot [\tan(0.1^\circ) + \sin(0.1^\circ)]$$

$$\pi = 900 \cdot [\tan(0.1^\circ) + \sin(0.1^\circ)]$$

$$\pi = 3.1415934510786$$

The final equation can be also represented by the following definition:

$$\pi = 900 \cdot 10^n \cdot [\tan(0.1^\circ / 10^n) + \sin(0.1^\circ / 10^n)]$$

with values of "n" from Zero ÷ Infinity

With a value "n" = 5, the identical value is obtained up to the 13th decimal place, automatically supplied by a calculator.

The Fundamental relationships that bind "sin"; "cos"; "tan" of a generic angle is represented by:

$$\sin^2 + \cos^2 = 1$$

$$1 - \cos^2 = \sin^2$$

$$\sqrt{1 - \cos^2} = \sin$$

and represent the Pythagorean Theorem in dimensionless form, with the values:

$$1 = \text{Hypotenuse. "sin" and "cos"} = \text{catheti.}$$

### III. CONCLUSIONS

If the solution of a problem can be represented with two or more distinct equations, it means that there is a bond of equality between them.

If the solution to a problem other than the original one arises from this equality, the importance of the concept of Serendipity, understood as the Vital Impulse of Knowledge, is evident.

The meaning of this work is linked only to an intimate need for Harmony between Intuition, Demonstration, Verification, in a continuous and Vital Process of Inner Awareness.

In [1] I found several similarities with this state of mind:

"Highlighting the origin before things ..... hidden from our eyes by bulky superstructures bristling with arduous difficulties and which instead seems to reveal itself without any effort and with the charm of surprising simplicity".

I conclude by always reporting from [1]:

"When something scares you, take its measurements. You will realize that it's a very small thing after all.

### REFERENCES

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