The Circle-Line Constant

Shivam jha
K.S.V University, Delhi, India

Abstract:-
Background: Circle-line constant, one of the hidden constant in circle till now. Basically it is the ratio of the radius of a circle to a line whose end points are present in the middle of another line (the end points of this line are present at the end of a circle's 1/4th circumference [see fig I]) and middle of the 1/4th circle's circumference (see fig I). Since, no one has worked on this constant and that's why this paper will introduce a new constant in mathematics.
Material and methods: In this simple mathematical paper work study, a right-angled triangle was drawn. From the middle of the hypotenuse of that triangle to the middle of the circle's 1/4th circumference, a line was drawn named (k). This distance (k) was directly proportional to the radius (r) of the circle, if we convert 1/4th circumference into a complete circle [see fig II].
Results: Whenever and whatever length of the circle was drawn, its radius to distance (k) ratio was (3.3----). And this result shows us that a constant can be used to remove that proportionality.
Conclusion: To remove the proportionality between radius of the circle and distance (k), constant , Φ can be used.

Keyword:- *Circle-line.*

I. INTRODUCTION

The following is my first paper on the subject. I hope that whoever reading this paper will take this as the beginning of a beginner, and would like it. As the name suggests, this paper is a mathematical paper, about basic geometry. Geometry is a very deep branch of mathematics. The study of geometry has been going on since time immemorial. From **Euclid** [2] to **Newton** [3], we have got a thousands of facts in geometry. But still many more are left. May be there are infinite. And I am going to write one such fact in my following paper. In this paper, I will talk about a constant which is hidden in the circle just as like was the constant π. And will try to describe the uses of that constant in the real world. And these all are the purposes of writing this paper.

II. MATERIAL AND METHODS

The paper does not consists of any special material. As it is a mathematical paper, it is done by simple mathematical paper work. The paper template idea has been taken from **Scribbr** [4] and **YourDictionary** [5] .

- **Study Design:** Simple mathematical work.
- **Study Location:** The study is done at New Delhi, Delhi, India.
- **Study Duration:** November 2021 to March 2022 (4 months).
- **Methods:** First, a 1/4th circumference of a circle of (radius=x units) was drawn and then the two ends of that 1/4th circumference of the circle were joined. And it let be imagined (As this paper is based on theoretical ideas it can be just imagined, we cannot perform a theoretical idea in the real world) that a person is standing exactly between the two ends. Let name the point on which the person is standing be (p). As you can see by fig. (I).

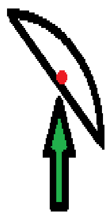

Fig (I) A person as point (p) standing between a line surrounded by 1/4th circumference of a circle.

Then, the person starts walking at velocity= (v). The line on which the person is standing on is increasing if the person goes in the forward direction and decreases if the person walks in the backward direction at rate (x). Here, (x) is a variable which may be anything. Here, a question rises, at what rate does the distance between point (p) and the point next after it (Let's say this point {u}) increases or decreases? To find this distance (k), fig (I) was converted into fig (II):

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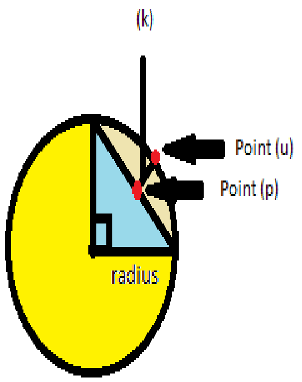

fig (II) Point (p) as the centre of the hypotenuse of a right-angled triangle surrounded by a circle.

As you can see by fig (II) that we can represent the line on which the person is standing as the hypotenuse of a right-angled triangle, in which its perpendicular is equals to its base (because from any point on the circumference of the circle to its centre is equal which is its radius), if we convert the 1/4th of the circle's circumference into a full 4/4th circle's circumference. By doing this we can also convert the hypotenuse of the circle into a side of rhombus or square (depend on the view of the observer). That is shown in fig (III):

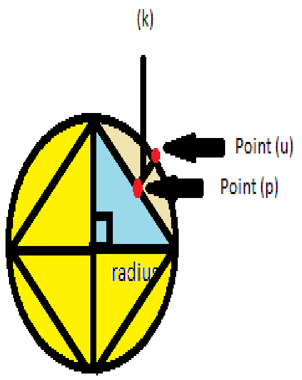

Fig (III) A square or rhombus (depend on the view of the observer) surrounded by a circle.

As you can see in this figure, the diameter of the circle is diagonal of square or rhombus. What is the purpose of converting line into these shapes is that we can find cases in which square or rhombus is increasing or decreasing with a circle surrounded by it. After doing a brief research on these figures, I have got incredible results.

III. RESULT

After doing study on the subject, Results found were great. Whenever the ratio between the radius (r) of the circle and distance (k) has taken, it was always be (3.33----). So, r/k=Φ. (Here, Φ is the ratio between (r) and (k). One example of which is fig (II) above. In fig (II), the radius of the circle is 1.5 and distance (k) is 0.45. So, (1.5/ 0.45=3.33----). As you can see that Φ is a rational (repeating terminating number), which can be written as (10/3). By finding Φ, we can also find radius of the circle and distance (k) too. k=r/Φ and r=k.Φ . By finding (k), you can also find expanding (k).

$$\overrightarrow{k} = \overrightarrow{r} / \Phi$$

Here, (k) with right arrow over it is expanding (k) and (r) with right arrow over it is expanding (r).

And by the same way, we can find contracting (k).

$$\overleftarrow{k} = \overleftarrow{r} / \Phi$$

Here, (k) with left arrow over it is contracting (k) and (r) with left arrow over it is contracting (r).

By the same way, the results in the case of square or rhombus have been founded.

$$\overrightarrow{k} = \overrightarrow{d} / 2 / \Phi$$

Here, (k) with right arrow over it is expanding (k) in either square or rhombus and (d) with right arrow over it is expanding diagonal of either square or rhombus.

And by the same way, we can find contracting (k).

$$\overleftarrow{k} = \overleftarrow{d} / 2 / \Phi$$

Here, (k) with left arrow over it is contacting (k) in either square or rhombus and (d) with left arrow over it is contracting diagonal of either square or rhombus.

First two formulas above is about expanding and contracting (k) in a line surrounded by a circle. (Here, the line should be a hypotenuse of a right-angled triangle, in which two radius are in such a way that there interior parts should have 1/4th area of the whole circle). (see fig II). It should be noted that point (p) and point (u) are exactly at 45° from the centre of the circle.

Second two formulas above is about expanding and contracting (k) in a square's or rhombus's any one side. Here, diagonal of either rhombus or square is the diameter of the circle. (see fig III). It should be noted that point (p) and point (u) are exactly at 45° from the centre of the circle.

IV. DISCUSSION

This whole study is based on a constant. Actually, it is important because in even day-to-day life, we may find cases, in which (a) is directly proportional to (b). And to remove this proportionality, the study may be useful. Because as we know any proportionality can be remove using a constant . Many mathematicians and physicists have worked and even still working on such constants. And one such constant of mathematical geometry has been figured out through this paper.

V. CONCLUSION

Distance (k) is directly proportional to (r). [$k \propto r$]. To remove this proportionality, constant (Φ) can be used.

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