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Another Equation with Circles

(The Concentric Circle Derivation)

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Abstract:- Math is fun and so is geometry and drawing plus coloring. I had been completing my office work till late tonight. I took a break and decided to experiment with my favorite geometry, the science of circles. I just discovered an easy equation anyone could find. The below is an attempt to create more Math so that someday we realize and have courage to invent more math than we know or our ancestors had preserved for us.

Keywords:- *concentric circles, lines, intersection point.*

I. INTRODUCTION

What is a circle? It is a curve equidistant from the center. Why is the curve equidistant from the Center. I am running straight or I know I m creating a curve. Why would I wish to be equidistant? Can the center be exchanged with the circumference?

Let's try doing that:

Today if I exchange the positions of sky and earth, I don't know where to go. If we imagine the centroid to behave as the curve for ten seconds say. The centroid does not move. Can the dot see the circle or is it blind? What is the dot for? The dot is equidistant from the circumference also. So, the center is also the circumference in one context. if you change the position of the dot, the position of the circle changes. Only difference is the circumference provides flexibility to the dot, that anywhere the dot sets its eye, the curve looks similar. If sky didn't have clouds, our scientists could have called the sky circular. So we have a setup here: the immovable dot is important for the equidistant dot to cover the immovable dot from all sides without fail. We can have two dots and draw circle out of any one. But the question is are two dots required? We have two dots. We can draw a line connecting the dots. Why don't we have a bridge between earth and Mars then through nature. Maybe for that to happen both should have been identical in all aspects. Secondly we can draw a circle out of two dots using either one as the Center. But circles will be two different ones. And they shall intersect each other. Thirdly we can converge the two dots to a single dot. Fourthly we can move both the dots away as far as we wish. Fifth if any one dot disappears which is impossible by nature we are left with single dot. What is the reason why out of nothing creation occurs? Do we separate the dots from a single dot? Or a single dot already Comprises of many dots? In the quest to find these answers we come across many equations. In this paper I did the same thing.

A. The Experiments

Let me draw a circle- The Figure:1 looks like a circle pretty much

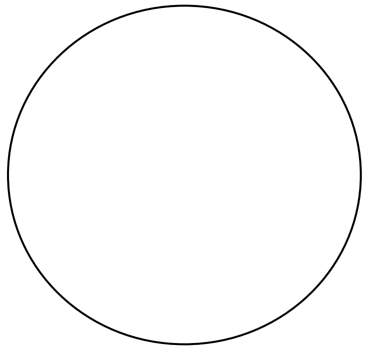

Fig 1

Now we can have three dots (.) in and around this circle as displayed in Figure2 as in:

A. Outside the circle
B. On the circle
C. Inside the circle

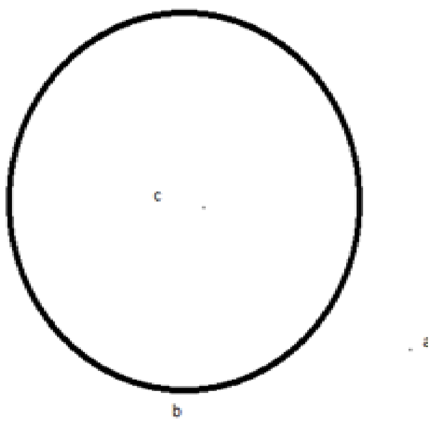

Fig 2

Please Note: Point "C" is not essentially the centre of the circle. It is just a point inside the circle.

Now we have 3 unique areas wherein we have three points. Till here we cannot derive any equation as far as I have observed.

Now let us consider point "B" as the intersection point of a concentric circle inside this circle and a much smaller circle than Figure 2{Please Note: Radii of the circles do no matter for now. We just need two concentric circles with a common intersection point "b"}.

The below Figure 3 shows two concentric circles with common intersection point "B"

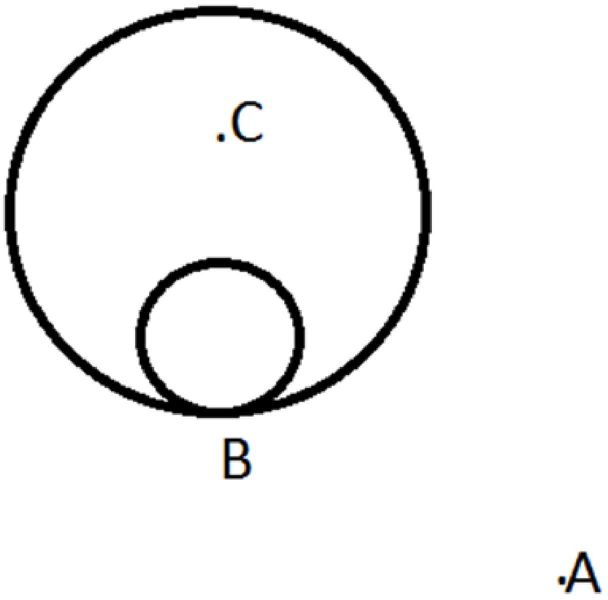

Fig 3

In the above Figure 3, let us attempt to count the number of points –we have 3 points of the bigger circle. We can locate more areas now since we have a concentric circle.

We can consider a point , "d" on the inner concentric circle, "e" inside the inner concentric circle and "f" an independent point on the outer circle as in Figure4:

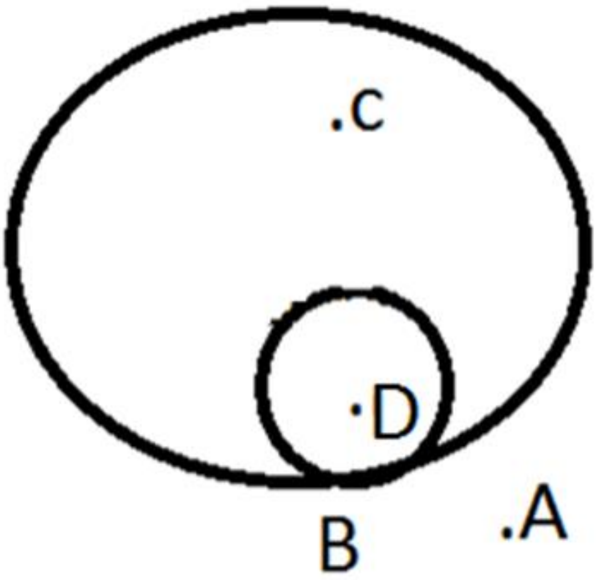

Fig 4

Let us check with three circles now as shown in Figure 5:

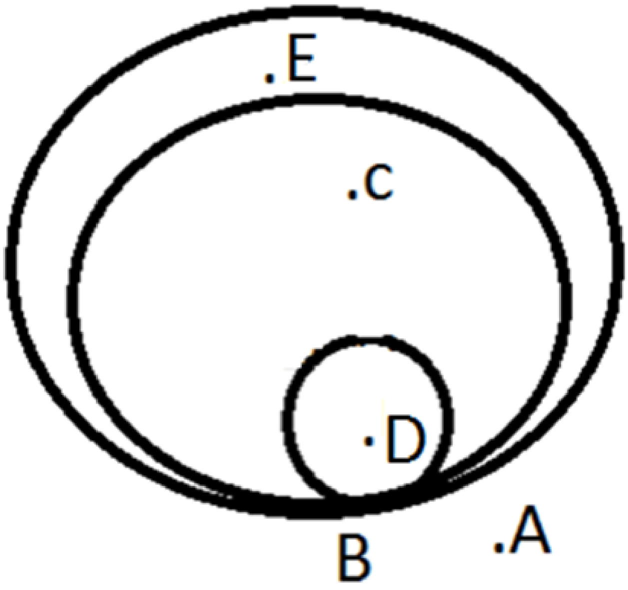

Fig 5

Now let us try to join the points so that we might bump upon an equation.

Let us redraw Figure 4 and join the dots in this diagram.

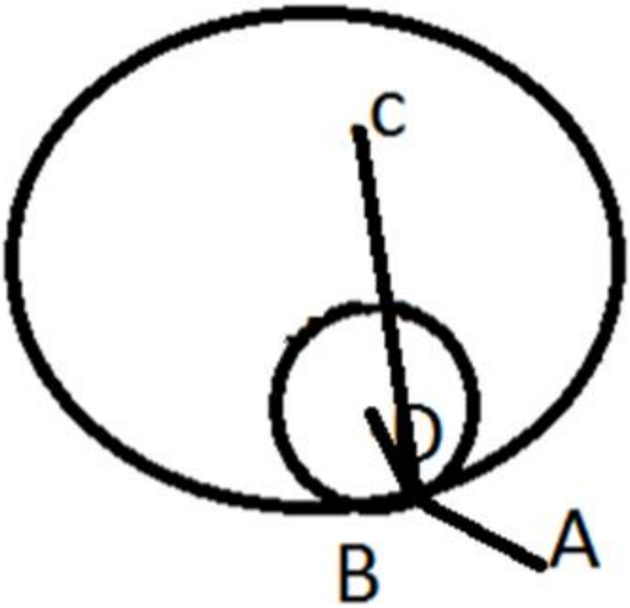

Fig 6

In Figure6, we found three lines:
1. BA
2. BD
3. BC

So, if Circles=2, we get Lines=2n-1 where n=no of circles

Let us redraw Figure 5 and join the dots in this diagram.

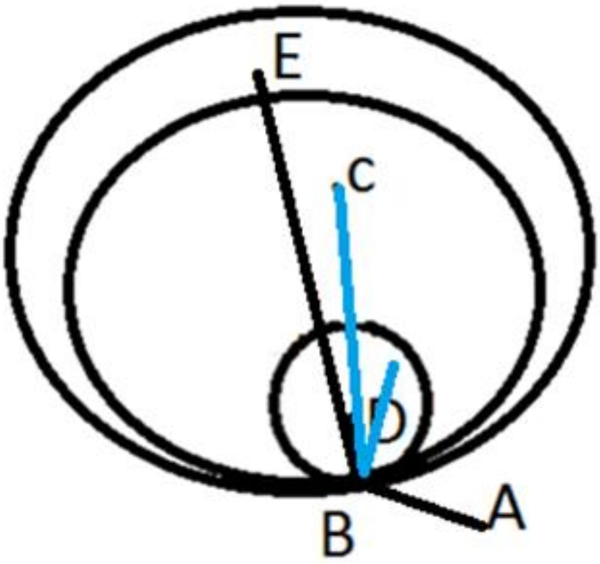

Fig 7

In Figure7, we found 4 lines:
1. BA
2. BD
3. BC
4. BE

So, if Circles=3, we get Lines=2n-2 where n=no of circles

Even here we did not find a unique equation.
Let us now stick to our Figure2 rule. When we have a circle , it has three areas outside, inside and on it. Let us then consider a point unique on the circle excluding the common point "B".

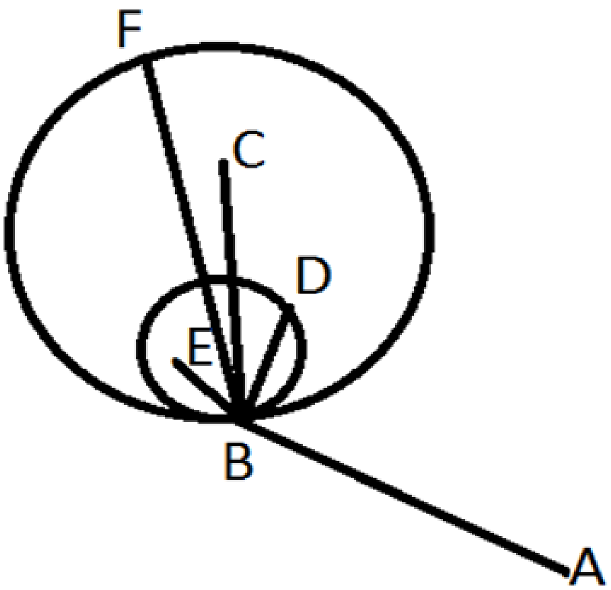

Figure 8

Through Figure8, we see that we get 5 lines =2*2+1=5

Let us consider for three circles through Figure 9:

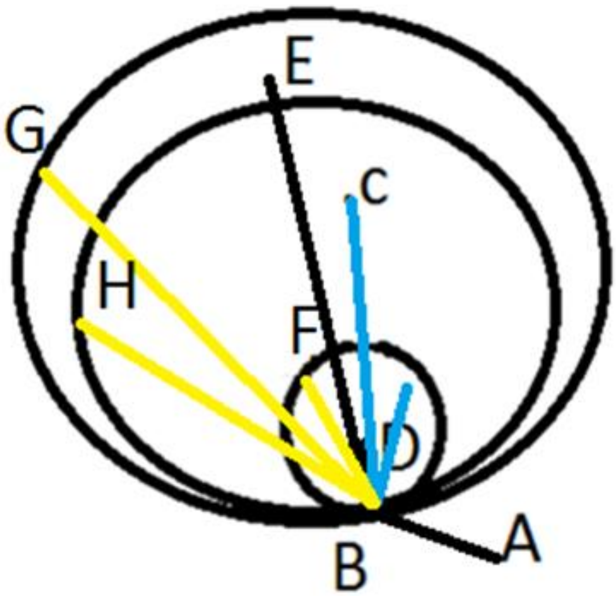

Figure 9

If there are 3 circles, we will get 7 lines =2*3+1

So, we can conclude that if we have concentric circles with a common intersection point(here "B"), then we can draw (2n+1) lines wherein n=Number of circles through the common point "B" . The lines are not tangents. They connect the common point "B" to the three areas of each circle(on the circles, inside the circles and outside the circles)

Hence, Lines=2n+1 wherein n=Number of circles

➢ *Equations*

Number of lines if the external area is not counted separately for each concentric circle=2n+1
Number of lines if every circle has an extra external point outside the biggest circle=2n+2

REFERENCES

[1]. The circles chapter of the "Learn Geometry" app in PlayStore.