Obtaining the perimeter and area of shapes with a new method and getting the environment of the ellipse with the proposed method

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ABSTRACT

A newly proposed method for obtaining the circumference and area obtained with this proposed method of the elliptical environment

1.Introduction

Inside any shape, can infinitely draw the same body concentric until the distance between two points of the width or length of form is zero. The sum of the whole circumference of these shapes is equal to the area of the Primary body.

Axiom1.1

Every shape has a perimeter on a two-dimensional surface, and this perimeter can be made into a smooth line segment.

Axiom1.2

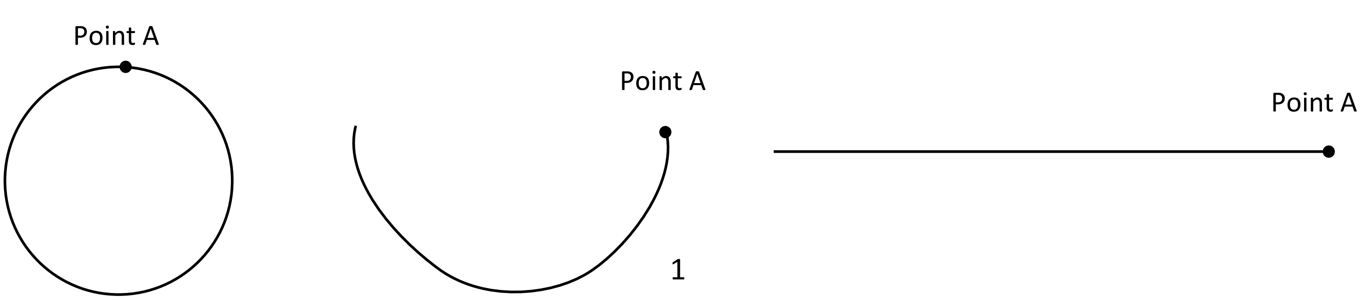
Inside any shape, can infinitely draw the same body concentric until the distance between two points of the width or length of form is zero

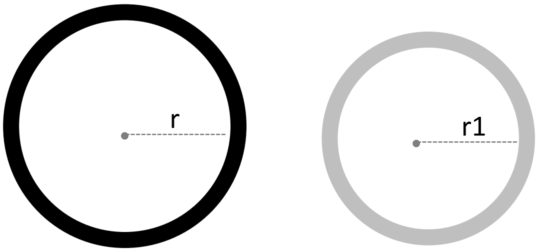
Axiom1.3

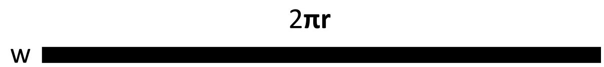
Inside a shape, if we place an infinite number of line segments with a width of zero so that the line segments do not overlap and do not protrude from the shape, the total area of all these line segments is equal to the entire scope of the body.

2. Theory

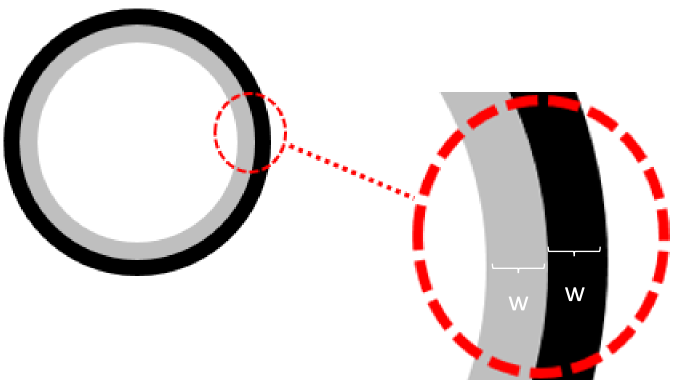
According to the second principle, we open the shape's perimeter and cut it into a line. A line segment has a definite length and a width of zero. Now we assume in theory that the line has a Width zero, and we examine this theory in the form of a circle.



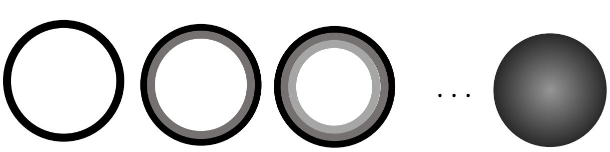




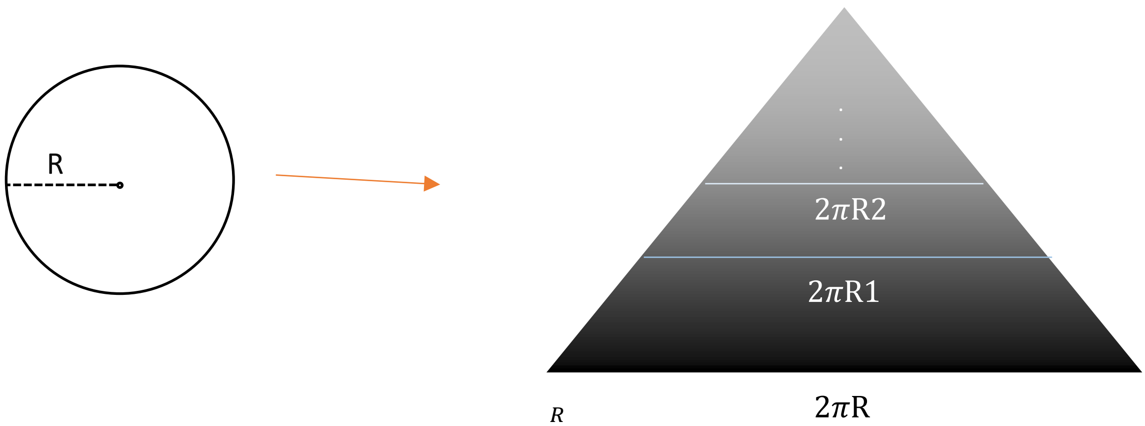
$$r1 = \lim_{w \to 0} r - w = r$$



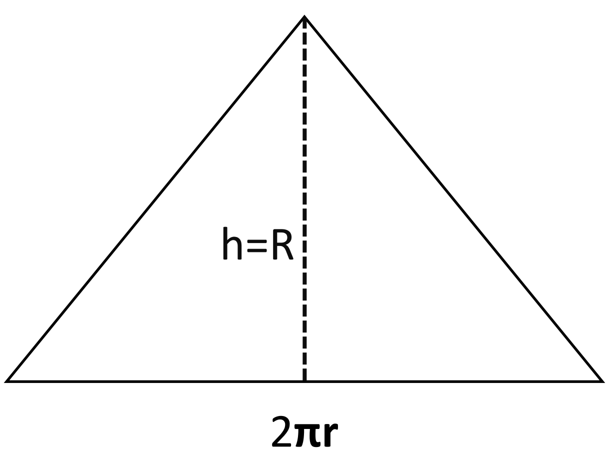
If infinitely the circle decreases as it is radiated and its whole circumference is tangent to all its previous shape until we reach the central point which is a circle with zero radius.



Now, as in Figure 1, open all the perimeters of the circles and stack them in order



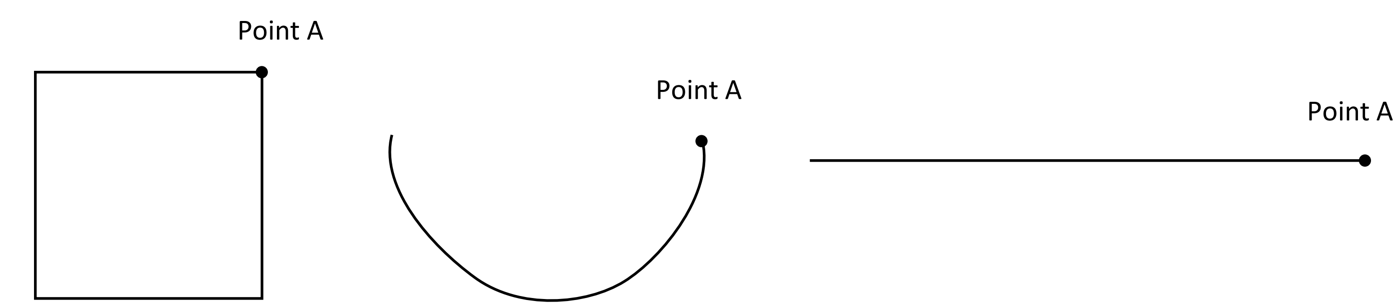
$$A = \sum_{r=0}^{R} 2\pi \mathrm{r}$$

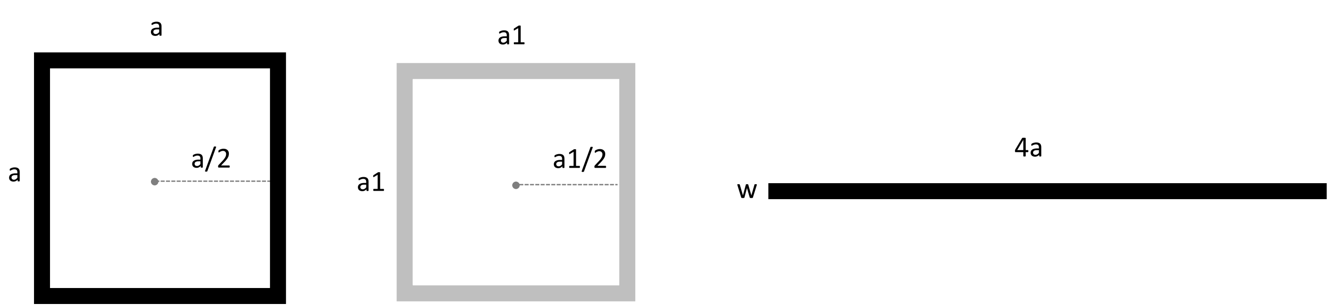


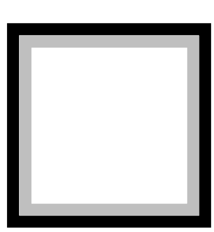
$$\text{Area} = \mathbf{2\pi r} \times r \times 1/2 = \mathbf{\pi r^2}$$

Because the circumference of a circle is a linear relationship, when the circumference is open, we put all the circles together on top of each other to form a triangle. And according to Principle 3, the sum of all these environments is equal to the area So we conclude that the area of the triangle is equal to the area of the circles.

This method in the square is as follows:

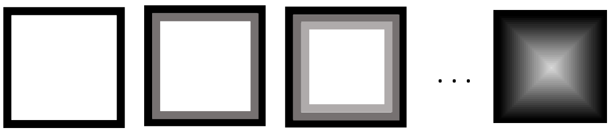




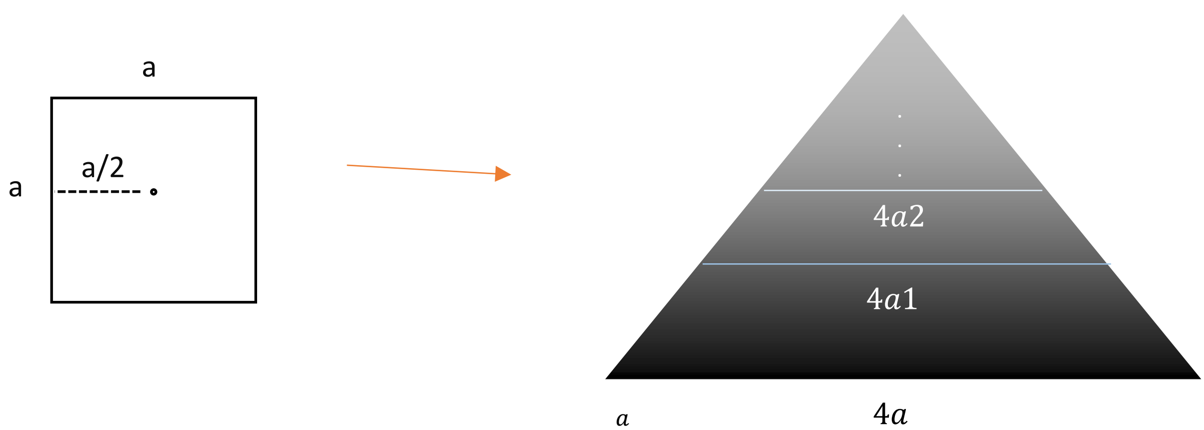


$$a1/2 = \lim_{W \to 0} a/2 - w = a/2$$

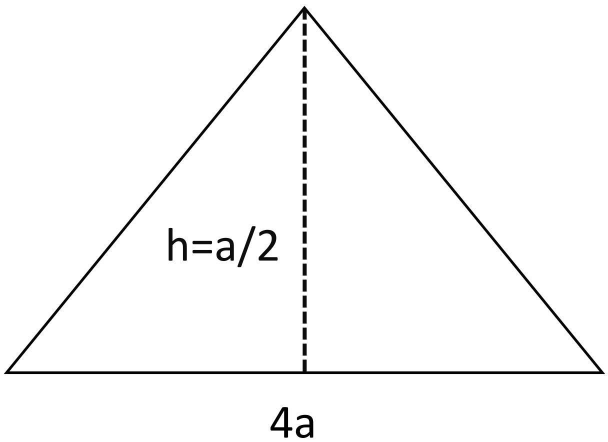
If we draw squares inside each other in such a way that its side decreases and its whole circumference are tangent to its previous shape until we reach the central point where the square is on the zero side



Now, as in Figure x, we open all the perimeter of the squares and put them on top of each other in order.



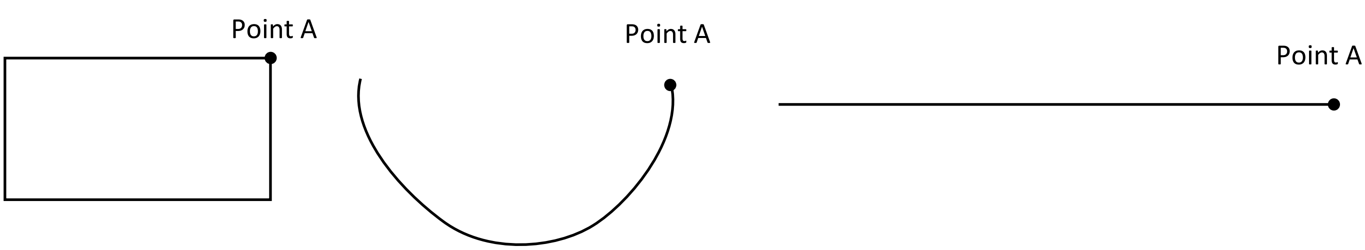
$$A = \sum_{r=0}^{a} 4a$$

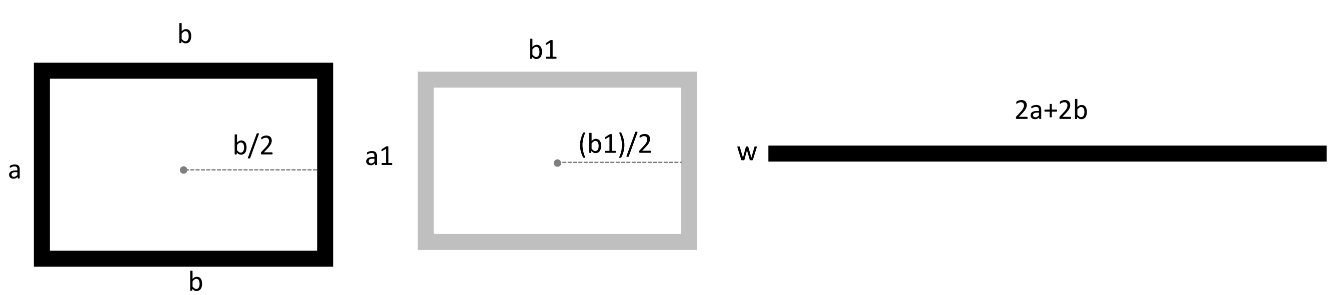


Area = 4a × a/2 × 1/2 = $\mathbf{a}^2$

Because the perimeter of a square is a linear relationship when the perimeter is opened, we put all the squares together on top of each other to form a triangle. According to Principle 3, the sum of all these environments is equal to the area. So we conclude that the area of a triangle is equal to the area of a square

We examine this method in a rectangle:



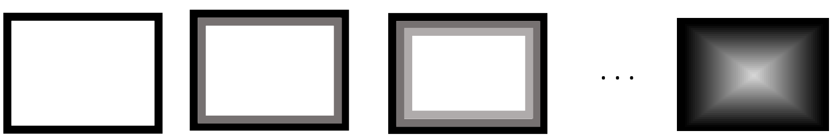


a

$$b1/2 = \lim_{W \to 0} b/2 - w = b/2$$

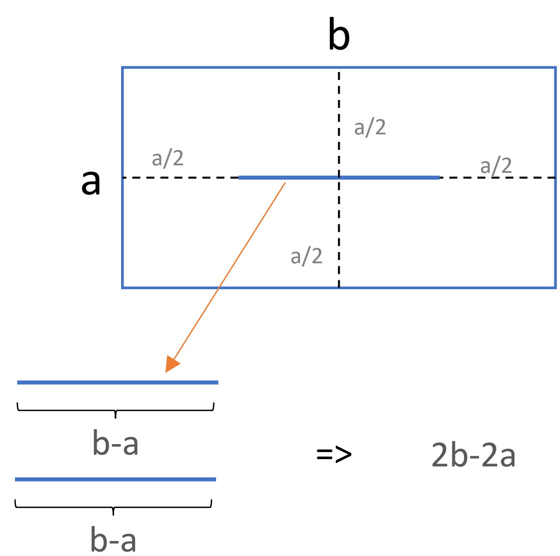
In a rectangular shape, as we go along, we reduce the body by one unit of width and one unit of length until the width ends and only the line of length remains.

Infinitely draw a rectangle so that a small unit decreases in width and length. Its entire circumference is tangent to the whole circumference of its previous shape until we reach the center point where a rectangle with a width of zero and two lines remains.

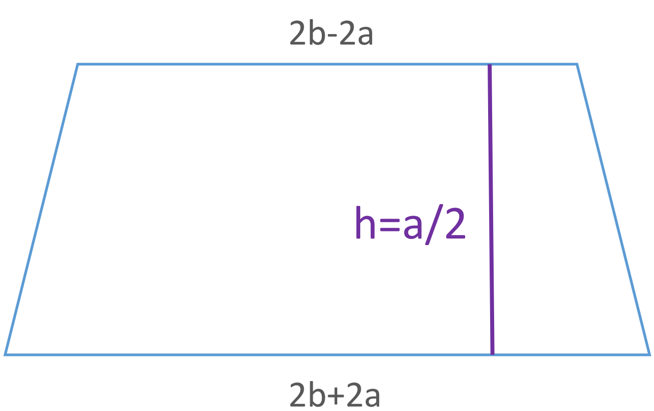


Now, like Figure x, open all the perimeters of the rectangles and stack them in order.

In the form of a rectangle, unlike a square and a circle, when the shapes inside shrink in the same way and reach the center, because as the width decreases, the same amount decreases from the length, and when the width becomes zero, some length remains, which is in the form of a line pattern. It comes



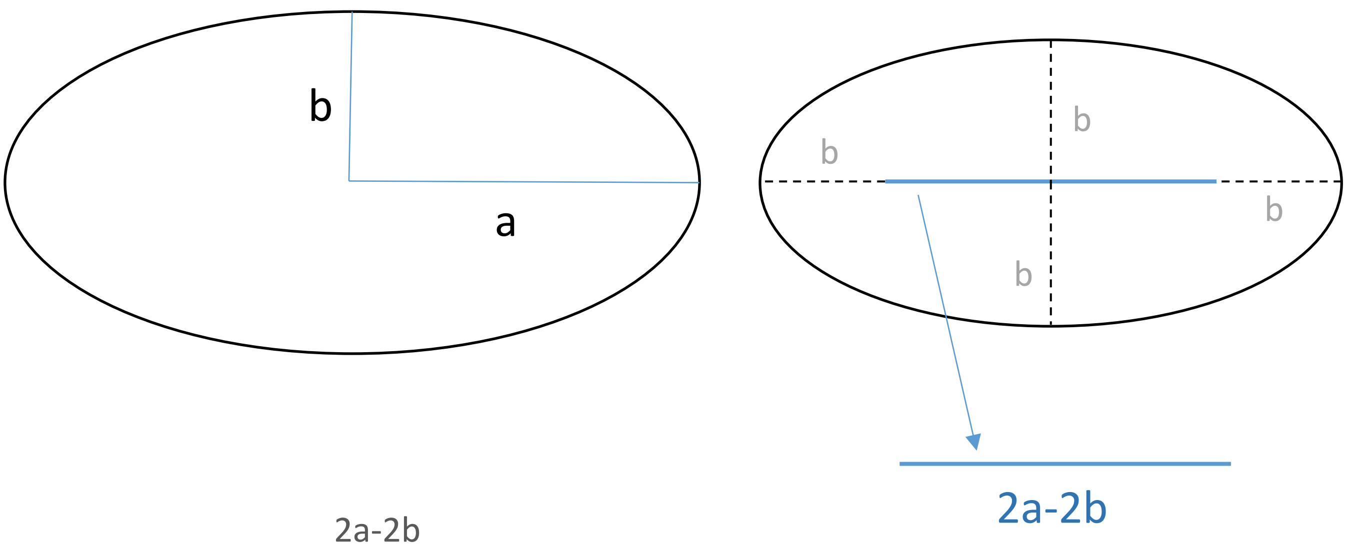
When the perimeter of all the rectangles is arranged in order, a trapezoidal shape is created.

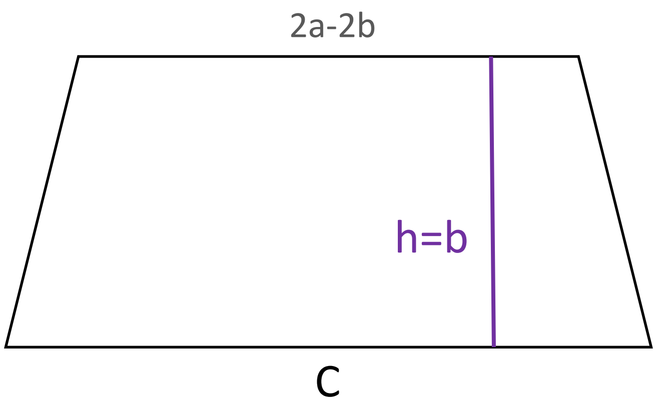


$$\text{Area} = \frac{(2b+2a)+(2b-2a)}{2} \times a/2 = a \times b$$

The elliptical environment has not been solved yet, and now we want to get the elliptical environment with this method:

a > b





(circumference)
C = ?

We know that the area of an ellipse is equal to: $A = \pi ab$

$$\text{Area} = \frac{C + 2a-2b}{2} \times b = \pi ab \Rightarrow \boxed{C = 2\pi a - 2a + 2b}$$

Circumference of eclipse

And if a = b, which becomes 2πa when placed in the above formula, which is precisely equal to the circle's circumference.

There are several approximate methods for calculating an ellipse's circumference, one of which we want to compare numerically with my proposed method:

$$C \approx \pi(a+b)\left(3\frac{(a-b)^2}{(a+b)^2\left(\sqrt{-3\frac{(a-b)^2}{(a+b)^2}+4}+10\right)}+1\right)$$

A	B	≈Circumference
2	1	≈9.69
10	2	≈42.02
121	7	≈487.01
300	190	≈1558.84
400	399	≈2510.13
749	649	≈4397.5
11	11	≈69.12

$$C = 2\pi a - 2a + 2b$$

A	B	Circumference
2	1	10.566370614359172
10	2	46.83185307179586
121	7	532.26542216873
300	190	1664.9555921538758
400	399	2511.2741228718346
749	649	4506.10579507751
11	11	69.11503837897544