Series of odd squares = Progression of multiples of 8

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Summary: 1. Introduction. - 2. Materials and methods. - 3. Results and Discussion.

1. Introduction.

This article shows that the series of odd square numbers is equal to the progression of the numbers of 8.

This research begins from the series of squares which is equal to the progression of odd numbers and with the same reasoning, obtain that adding the multiples of 8 to the odd numbers multiplied by themselves the square of the next odd number.

The succession is: 1(1*1)+8 = 9(3*3)+16 = 25(5*5)+24 = 49(7*7)+32 = 81(9*9) ... etc.

2. Materials and methods.

To prove that the sequence of odd squares is equal to the progression of multiples of 8 it is enough to calculate the difference between two consecutive odd squares. It is considered that (2x+1) is an odd number therefore his next is (2x+3) consequentially It get:

$(2x+3)^2 - (2x+1)^2 = 4x^2+12x+9 - 4x^2 - 4x -1 = 8x+8 \rightarrow 8(x+1)$

$(2x+5)^2 -(2x+3)^2 =4x^2 +20x+25 - 4x^2-12x -9= 8x+16\rightarrow 8(x+2)$

at this point can be done with the verification if the procedure is correct.

$(2x+1)(2x+1)+8x+8 = (2x+3)(2x+3)$

$4x^2 +4x+1+8x+8 = 4x^2 +12x+9 \rightarrow 4x^2 +12x+9 = 4x^2 +12x+9 \rightarrow 0=0$

this means that any value of x satisfies the equation. $\forall\ x \in R$

3. Results and Discussion.

In conclusion with the proof and with the verification It is obtained that the difference between the (2x + 3)-th square and the (2x + 1)-th square is 8x + 8 → 8(x+1)

If you want to generalize, there is need to make one more observation: after calculating the succession of the differences of consecutive squares, one can calculate the sequence of the differences in the consecutive terms of the latter and to realize that it obtain a sequence constantly equal to 8.

This chapter concludes the article in which It has been examined a property of number theory, in the specific the series of odd squares which is equal to the progression of multiples of 8.