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Special Rectangles and Narcissistic Numbers of Order 3 And 4

G.Janaki[1], P.Saranya[2]
[1,2]Department of Mathematics, Cauvery College for women, Trichy-620018

Abstract— We search for infinitely many rectangles such that $x^2 + y^2 + 3A - S^2 + k^2 + SK =$ ***Narcissistic numbers of order 3 and 4 respectively, in which x, y represents the length and breadth of the rectangle.***
Also the total number of rectangles satisfying the relation under consideration as well as primitive and non-primitive rectangles are also present.
Keywords—Rectangle, Narcissistic numbers of order 3 and 4, primitive,non-primitive.

I. INTRODUCTION

The older term for number theory is arithmetic, which was superseded as number theory by early twentieth century. The first historical find of an arithmetical nature is a fragment of a table, the broken clay tablet containing a list of Pythagorean triples. Since then the finding continues.
For more ideas and interesting facts one can refer [1].In [2] one can get ideas on pairs of rectangles dealing with non-zero integral pairs representing the length and breadth of rectangle. [3,4] has been studied for knowledge on rectangles in connection with perfect squares , Niven numbers and kepriker triples.[5-10] was referred for connections between Special rectangles and polygonal numbers, jarasandha numbers and dhuruva numbers
Recently in [11,12] special pythagorean triangles in connections with Narcissistic numbers are obtained.
In this communication, we search for infinitely many rectangles such that $x^2 + y^2 + 3A - S^2 + k^2 + SK =$ Narcissistic numbers of order 3 and 4 respectively, in which x,y represents the length and breadth of the rectangle.
Also the total number of rectangles satisfying the relation under consideration as well as primitive and non-primitive rectangles are also present.

II. NOTATIONS

A-Area of the rectangle
S-Semi-perimeter of the rectangle

III. BASIC DEFINITIONS

Definition 1:Narcissistic Numbers
An n-digit number which is the sum of nth power of its digits is called an n-narcissistic number. It is also known as Armstrong number.
Definition 2:Primitive Rectangle
A rectangle is said to be primitive if the generators u,v are of opposite parity and gcd(u,v) = 1, where
$x = u + v; y = u - v$ *and* $u > v > 0$

IV. METHOD OF ANALYSIS

Let x, y be two non-zero distinct positive integers representing the length and breadth of a rectangle R.Let $k \geq 0$ be any given integer.
The problem under consideration is to solve the equation

$x^2 + y^2 + 3A - S^2 + k^2 + Sk =$ Narcissistic Number (1)

To solve (1),let us introduce the linear transformation x = u + v and y = u - v (u > v > 0) (2)

Therfore (1) reduces to

$(u + k)^2 - v^2 =$ Narcissist ic Number (3)

Case1:
Consider the 3rd order Narcissistic Number 153.

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Therefore (3) becomes,

$(u+k)^2 - v^2 = 153$

Applying the method of factorization, we have

u+k	13	27	77
v	4	24	76

From the above mentioned values, the following results are observed.

TABLE I

k	No.of Rectangles related to 153	Observations
0	3	2 rectangles are primitive and one is non-primitive.
1,2	2	For k = 1,both the rectangles are non-primitive. For k = 2,both the rectangles are primitive.
3-8	1	For k = 3,5,7,8, the rectangles are non- primitive. For k = 4,6, the rectangles are primitive.

Case2:

Consider the 3rd order Narcissistic Number 371.

Therefore (3) becomes,

$(u+k)^2 - v^2 = 371$

Applying the method of factorization, we have

u+k	30	186
v	23	185

From the above mentioned values, the following results are observed.

TABLE II

k	No.of Rectangles related to 371	Observations
0	2	Both the rectangles are primitive
1-6	1	For k = 1,3,5, the rectangles are non-primitive For k = 2,4,6, the rectangles are primitive.

Case3:

Consider the 3rd order Narcissistic Number 407.

Therefore (3) becomes,

$(u+k)^2 - v^2 = 407$

Applying the method of factorization, we have

u+k	24	204
v	13	203

From the above mentioned values, the following results are observed.

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TABLE III

k	No.of Rectangles related to 407	Observations
0	2	Both the rectangles are primitive
1-10	1	For k = 1,3,5,7,9, the rectangles are non-primitive For k = 2,4,6,8,10, the rectangles are primitive.

Case 4:

Consider the 4th order Narcissistic Number 8208.

Therefore (3) becomes,

$$(u+k)^2 - v^2 = 8208$$

Applying the method of factorization, we have

u+k	92	93	103	127	132	183	237	348	517	687	1028	2053
v	16	21	49	89	96	159	219	336	509	681	1024	2051

From the above mentioned values, the following results are observed.

TABLE IV

k	No.of Rectangles related to 8208	Observations
0,1	12	For k = 0 , all the rectangles are non-primitive For k = 1 , all the rectangles are primitive
2,3	11	For k = 2 , all the rectangles are non-primitive For k = 3 , there are 5 primitive and 6 non-primitive rectangles
4,5	10	For k = 4 , all the rectangles are non-primitive For k = 5 , there are 8 primitive and 2 non-primitive rectangles
6,7	9	For k = 6 , all the rectangles are non-primitive For k = 7 , all the rectangles are primitive
8-11	8	For k = 8,10 all the rectangles are non-primitive For k = 9 , there are 3 primitive and 5 non-primitive rectangles For k = 11 all the rectangles are primitive
12-17	7	For k = 12,14,16 all the rectangles are non-primitive For k = 13,17 all the rectangles are primitive For k = 15,there are 3 primitive and 4 non-primitive rectangles
18-23	6	For k = 18,20,22 all the rectangles are non-primitive For k = 19,23there are 5 primitive and 1 non-primitive rectangles For k = 21,there are 3 primitive and 3 non-primitive rectangles
24-35	5	For k = 24,26,28,30,32,34 all the rectangles are non-primitive For k = 25,29,31,35 all the rectangles are primitive For k = 27,there are 3 primitive and2 non-primitive rectangles For k = 33,there are 2 primitive and 3 non-primitive rectangles
36,37	4	For k = 36, all the rectangles are non-primitive For k = 37, there are 3 primitive and 1 non-primitive rectangles
38-53	3	For k = 38,40,42,44,46,48,50,52 all the rectangles are non-primitive For k = 41,43,49,53 all the rectangles are primitive

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		For k = 39,45,47,51 there are 2 primitive and 1 non-primitive rectangles
54-71	2	For k = 54,56,58,60,62,64,66,68,70 all the rectangles are non-primitive For k = 55,59,61,67,71 all the rectangles are primitive For k = 57,63,65,69 there are 1 primitive and 1 non-primitive rectangles
72-75	1	For k = 72,74 the rectangles is non-primitive For k = 73,75 the rectangles is primitive

V. CONCLUSION

To conclude, one may search for the connections between the rectangles and Narcissistic numbers of higher order and other number patterns.

REFERENCES

[1] Dickson L. E., (1952) History of Theory of Numbers, Vol. 11, Chelsea Publishing Company, New York.
[2] J. N. Kapur, Dhuruva numbers, Fascinating world of Mathematics and Mathematical sciences, Trust society, Vol 17, 1997.
[3] M. A. Gopalan and A. Vijayasankar, "Observations on a Pythagorean problem", Acta Ciencia Indica, Vol.XXXVI M, No 4, 517-520, 2010.
[4] M. A. Gopalan, A. Gnanam and G. Janaki, "A Remarkable Pythagorean problem", Acta Ciencia Indica, Vol.XXXIII M, No 4, 1429-1434, 2007
[5] M. A. Gopalan and A. Gnanam, "Pythagorean triangles and Polygonal numbers", International Journal of Mathematical Sciences, Vol 9, No. 1-2, 211-215, 2010
[6] M. A. Gopalan and G. Janaki, "Pythagorean triangle with perimeter as Pentagonal number", Antartica J. Math., Vol 5(2), 15-18, 2008
[7] M. A. Gopalan and G. Janaki, "Pythagorean triangle with nasty number as a leg", Journal of Applied Mathematical Analysis and Applications, Vol 4, No 1-2, 13-17, 2008
[8] G.Janaki and S.Vidhya, "Rectangle with area as a special polygonal number", International Journal of Engineering Research, Vol-4, Issue-1, 88-91, 2016
[9] G.Janaki and C.Saranya, "Special Pairs of Pythagorean Triangles and Jarasandha Numbers", American International Journal of Research in Science, Technology, Engineering & Mathematics, issue-13, 118-120, Dec 2015-Feb 2016
[10] M. A. Gopalan, Vidhyalakshmi.S and Shanthi, "A connection between rectangle and dhuruva Numbers of digits 3 and 5", International Journal of Recent Scientific Research Vol. 7, Issue, 2, pp. 9234-9236, March, 2016
[11] G.Janaki and P.Saranya, "Special pairs of Pythagorean triangles and narcissistic number", International Journal of Multidisciplinary Research and Development, Volume 3; Issue 4; April 2016; Page No. 106-108
[12] G.Janaki and P.Saranya, "Special Pythagorean Triangles in Connection with the Narcissistic Numbers of Order 3 and 4", American International Journal of Research in Science, Technology, Engineering & Mathematics, Volume-2, Issue 14, March-May 2016.

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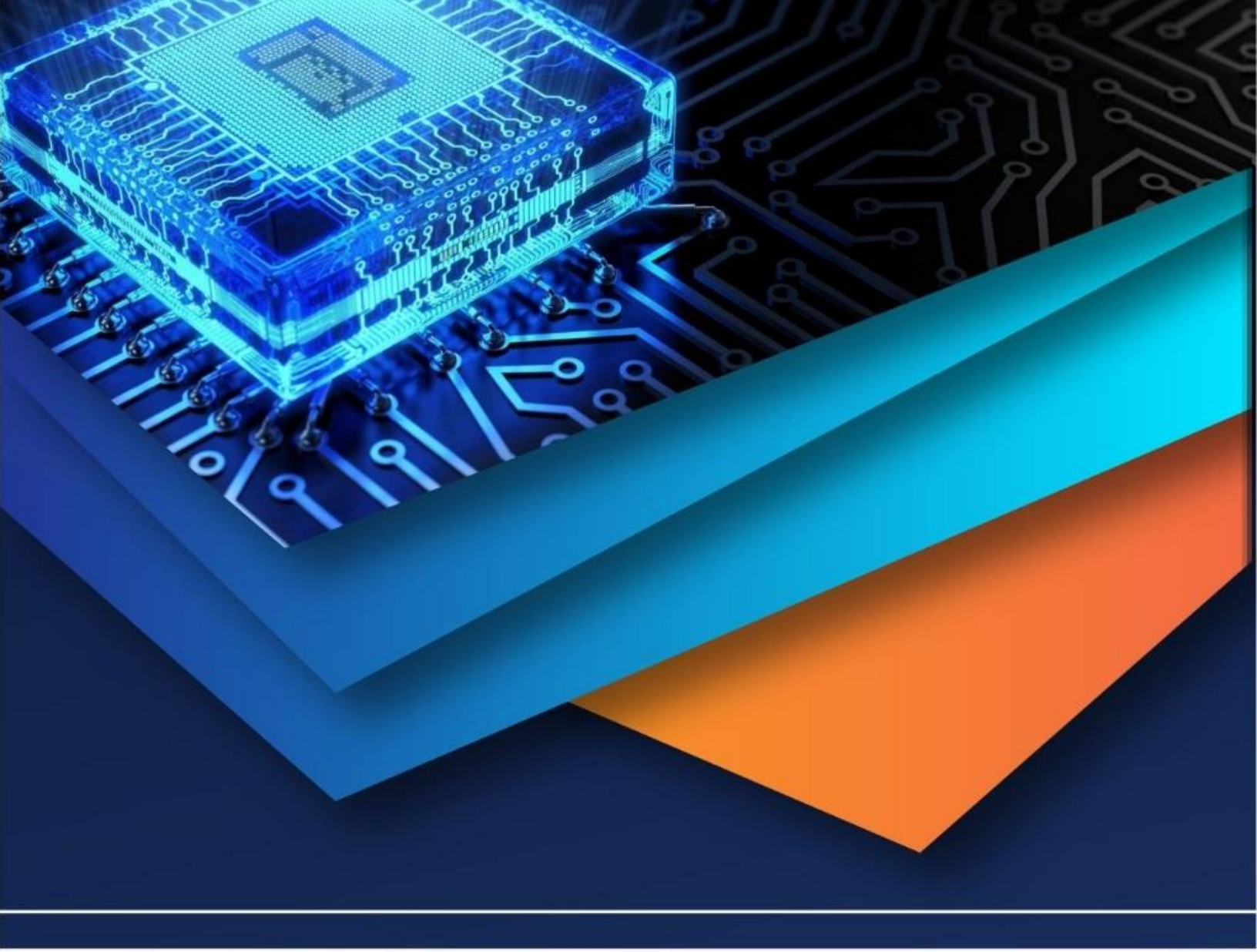

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