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Parametric forms for Pythagorean Triples and Congruent numbers

Padmaprabha H.G.N.L.[1*],Shanthidevi K.C.N.[2],

[1]*Hakmana Road, Nadugala, Matara, Sri Lanka.*
[2]*Department of Mathematics, University of Ruhuna, Matara, Sri Lanka*

In this paper it is obtained someparametric forms for Pythagorean Triples and Congruent numbers. First it is obtained the positive rational solution set of the Pythagoras equation as $\left(x, \frac{x^2-k^2}{2k}, \frac{x^2+k^2}{2k}\right)$ where $x, k(<x)$ are positive rational numbers. Consequently, it can be obtained a parametric form for positive Pythagorean Triples as $\left(x, \frac{x^2-l^2}{2l}, \frac{x^2+l^2}{2l}\right)$ where $x = ll'$ for some positive integer l'. Here l is even when x is even. A Congruent number is a positive integer that is the area of a right triangle with three rational number sides. Therefore it can be considered a right triangle which is has area $n \in \mathbb{N}$ with rational number sides $\left(x, \frac{x^2-k^2}{2k}, \frac{x^2+k^2}{2k}\right)$ where $x, k(<x)$ are positive rational numbers. Then $n = \frac{1}{2}x\left(\frac{x^2-k^2}{2k}\right)$. Considering $x = \frac{p}{q}$ where both $p, q\ (q \neq 0)$ are positive integers and $\gcd(p, q) = 1$and using a parametric form for Pythagorean Triples $\left(x, \frac{x^2-l^2}{2l}, \frac{x^2+l^2}{2l}\right)$ it can be obtain a parametric form for Congruent numbers as integers of the form$\frac{p^4-l^2}{4lq^2}$ where l is a positive factor of p.

Keywords: *Pythagoras equation, Pythagorean Triples, Congruent numbers.*

*Corresponding Author: mathlasitha@hotmail.com