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Project Number

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Project Title

A Corollary to the Pythagorean Theorem: Using Simple Algorithms to Predict Pythagorean Triples

Abstract

Objectives/Goals
The goal of this study was to find a better way to determine all Pythagorean Triples, and test them using computer code written using these equations. Current methods to determine Triples are quite cumbersome and complex, and require 2 arbitrary numbers to determine 3 associated numbers called Pythagorean triples.

Methods/Materials
Started with known, small integer numbers to develop simple equations to show the Pythagorean relationship, and the relationship of numbers within EACH set of Triples. Then, these equations were re-arranged to display a possible trend for solving larger numbers. This lead to developing a NOVEL and unique equation that generated ALL possible Pythagorean Triples. Many have called this a breakthrough of sorts in number theory. All previous methods required 2 arbitrary numbers to generate one or more sets of triples. Our method requires ONLY one number to generate the triples, not one set, but all sets of Pythagorean triples for that number.

Results
The NOVEL equation thus developed yielded four surprising results. (1) It successfully generated solutions for any and all large numbers (2) It produced not one, but ALL possible Pythagorean Triples for a given number (3) It REVEALED a way to determine the maximum possible triples that could be generated starting from a single given value (4) It also generated non-integer solutions that met the Pythagorean equation, which was easily eliminated using the computer code.

Conclusions/Discussion
The solution worked for any and all numbers. The computer code was used to eliminate non-integer solutions. This has wide applications in cryptography and cybersecurity.

Summary Statement

We discovered a novel and unique approach in solving a mathematical problem in number theory that generates Pythagorean triples

Help Received

None. We discovered, formulated and tested our own mathematical equations.