Analysis of Pythagorean Triples and a Generating Formula

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The purpose of this investigation is to identify patterns, if any exist, among primitive Pythagorean triples so that a triple, given an initial value, can be found. Specifically, the researcher wanted to find a formula that depends on only one parameter, instead of two like the generalized formulas. The problem established is: "Will there be a pattern among families of primitive Pythagorean triples that will allow the researcher to find a formula that can generate them?"; the researcher expects to find patterns among families of Pythagorean triples and a formula to generate them. A list of triples was observed, and the researcher selected triples where the difference between "b" and "c" was 1 or 2. In the methodology, the researcher obtained two formulas to find Pythagorean triples where the difference between "b" and "c" be 1 or 2. The use of the formulas depends on the parity of the initial value. Using algebraic proof in the results section, the researcher proved the validity of these formulas. The researcher observed that using these formulas, you can generate infinite Pythagorean triples regardless of whether they are primitive or not; however, you cannot get all the possible triples. The researcher additionally analyzed lists of triples to find what percentage of the Pythagorean triples can be found using these formulas. The hypothesis was accepted; the researcher found patterns among the Pythagorean triples. These formulas can be applied to engineering and architecture, in order to approximate the necessary measurements for the construction of structures.

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