Conservation in Dynamic Labeling of Polygons

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This research is a study of dynamic graph labeling on the vertices of a polygon. We start the labeling by using a set of integers and continually perform the following operation: choose the label of a vertex and replace it by the linear combination of the labels from its adjacent vertices. There exists a number such that, if all labels remain unchanged after any operation under modulo by that number, then the stable representation of the labels is called a Congruence Conservation Form, and the number we take for congruence is referred to as the corresponding Congruence Conservation Number. In this research proposal, by using a mathematical model and solving particular congruence equations, we are able to obtain many interesting Congruence Conservation Forms and their corresponding numbers. Moreover, we discover the secret hidden inside this special type of labeling. As a consequence of this study, we have developed three ways to construct the Congruence Conservation Forms. Surprisingly, we also find a series of new sequences which are derived from the Congruence Conservation Number. As a matter of fact, they are closely related to the well-known sequences such as Lucas sequence etc., and the congruence properties of these new sequences can be explained by the Congruence Conservation Form. In the final part of this study, we conclude it with showing the fact that the set of labels used in a Congruence Conservation Form does form a cyclic group under multiplication operation.

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