1077-H1-426   **Kenneth L Price*** (`pricek@uwosh.edu`), Department of Mathematics, University of Wisconsin Oshkosh, 800 Algoma Boulevard, Oshkosh, WI 54901. *Arrowgrams.*

An arrowgram is a type of puzzle based on the transitive relation, directed graphs, and groups. To solve the puzzle a group element is assigned to each arrow of a directed graph. This is called a grading and the group element assigned to an arrow is called its grade.

Grades for some arrows are given. The rest of the arrows are assigned grades using a rule which is based on transitivity. Arrowgrams also contain secret messages. The words are formed by pairs of letters which stand for the arrows. The puzzle is solved when every arrow is graded and the secret message is revealed.

To describe the transitivity rule we say vertices X, Y, and Z form a transitive triple if there are arrows from X to Y, from Y to Z, and from X to Z. The arrow from X to Z is the hypotenuse. The arrows from X to Y and from Y to Z are the legs. We use additive notation for the group operation and require the sum of the grades of the legs to equal the grade of the hypotenuse in every transitive triple.

This talk will cover answers to some mathematical questions related to the construction of arrowgrams. How many arrows have to be given grades? Which arrows can be used? Can the same set of arrows be used for different groups? Examples of arrowgrams will also be provided. (Received August 31, 2011)

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