RAINBOW LOGIC

OBJECTIVE

This is an exercise developed by the Family Math program to give the students practice in communicating their deductive thinking and spatial reasoning. Students must deduce through a series of questions the pattern of a 3x3 color grid. The grid is constructed using rules about the permissible ways in which squares may be placed. Within those rules the group must discuss and decide on the best questions to ask of the Grid Designer.

MATERIALS:

Colored paper squares for each player
4 each of each of 4 colors (more than needed for solution)
3x3 grids

PROCEDURE

For the first round, the teacher may be the Grid Designer. A group can be selected to demonstrate the exercise. The rest of the class can gather round to watch. After the first round, students should take turns being the Grid Designer in their separate groups. Group sizes can vary from 3 to 5. The Person who is Grid Designer can also play the role of observer.

The Grid Designer prepares a secret 3x3 color grid, using 3 squares of each color.

> Rule: All of the squares of the same color must be connected by at least one full side.
> See Figure A.3 for examples of permissible and impermissible grids.

The goal is for the players to be able to give the location of all colors on the grid after as few questions as possible. Therefore the group should discuss and decide before asking the gridkeeper a question. In the course of the discussion students should share the logic of their thinking. Why will this question get the maximum amount of useful information for solving the problem? During this discussion, there are two new behaviors that the students should learn:

DISCUSS AND DECIDE

GIVE REASONS FOR YOUR SUGGESTIONS

Rules for asking and answering questions

Players ask for the colors in a particular row or column (rows are horizontal, columns are vertical.)

The Grid Designer gives the colors, **but not necessarily in order**.

Each player should use a grid and colored paper squares to keep track of the clues. Squares may be put beside the row or column until exact places are determined.

NOTE: if this seems too easy for the class, try playing with a 4x4 grid with the same rules.

Discussion

The observer(Grid Designer) for a particular round should keep track of how often people gave reasons for their suggestions. The observer should also watch the character of the discussion to see if people really discussed before they came to a decision. Perhaps one person jumped in and asked the question of the Grid Designer before everyone in the group was heard from or before a controversy was actually resolved.

After most groups have had the chance to complete a few rounds of the exercise, the teacher should stop the action and have observers from each group report what they have seen. Then the class may discuss how to improve the process of discussion and the process of giving reasons. Let the class proceed to give everyone else a turn at being Grid Designer and Observer. After they have finished the final round, ask the observers to come up an form a panel, to discuss whether they heard improved discussion and giving of reasons in the group in the second part of the lesson. Alternatively, students could write about what they have learned concerning the three cooperative norms and how they fit into groupwork in their subject matter.