Table Hopping

In the school cafeteria, 6 people can sit together at 1 table. If 2 tables are placed together, 10 people can sit together. (Hint: What shape do you think the tables might be?) How many tables must be placed together in a row to seat: 22 people? 30 people?

If the tables are placed together in a row, how many people can be seated using: 10 tables? 15 tables? 20 tables?

Are there any patterns here? What if the tables were differently shaped?

Please extend this problem as far as you can.

Grade Levels 6 - 8

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Context

I wanted the class to look at a problem that could be generalized. Notice the problem guides students to look for patterns (22 people, 30 people, 10 tables, 15 tables, 20 tables). The class had looked at strategies like making charts to look for patterns. We also worked on the beginning ideas of simple algebraic equations.

What This Task Accomplishes

This task looks at how students organize data as they do an investigation. The task assesses if students can find patterns and use that information to come to a generalization of the information. Because it puts the number patterns in context, those students are more visually oriented, and can use the diagrams to see patterns. Others may see the pattern just in the data.

What the Student Will Do

Most students began by drawing pictures. Some then were able to organize their data in chart form to look for patterns. Some could verbalize a generalization, while a few others could actually write algebraic formulas to express the generalizations.

Time Required for Task

50 minutes

They may need more time to organize a coherent presentation.

Interdisciplinary Links

Although this task might be linked to a design problem of some kind, it is essentially a purely mathematical problem.

Teaching Tips

I felt I needed to guide my students a little by starting the directions with specific questions (22 people, 30 people, etc.). If your students are fairly familiar with problem solving, looking for patterns and coming to generalizations, you might want to open the problem up by eliminating some of the prompting.

Suggested Materials

Graph paper

Possible Solutions

The shape of the tables could be hexagons or rectangles.

Tables (T)	People (P)
1	6
2	10
5	22
7	30
10	42
15	62
20	82

Generalizations T x 4 + 2 = P

Answers will vary for the extensions.

Novice
This student applied inappropriate concepts and procedures to solve the problem. The student used two tables to seat 10 people, multiplied the tables and the people by 10 and got 20 tables to seat 100 people. The student did not attempt to answer the questions in the task.

Apprentice
This solution is not complete. The student only solves the first question of the task. There is some evidence of reasoning. There is no mathematical representation.

Practitioner
This student has a broad understanding of the problem and the major concepts necessary for its solution. S/he uses a strategy that leads to a solution in each part of the problem using effective reasoning. The mathematical procedures are correct. There is a clear explanation aided by mathematical representation (tables and diagrams) and notation. The student describes a pattern ("they all end in two").

Expert

This student has a deep understanding of the problem and has the ability to identify the appropriate mathematical concepts necessary to come to an algebraic generalization. The student employs refined reasoning (in fact you can see his/her transition from one formula ((middle tables x 4) + (end tables x 5) = people) to the more efficient formula (table x 4 + 2 = people). There is a clear and effective explanation detailing how s/he solved the problem. The student extends the solution to tables with different shapes.