

Dinner Tables I

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Summary	Students work with a function relating number of tables to the number of available seats. One table seats 4, two tables seat 8, three tables seat 12....
Goals	1. To work with linear functions in a new context.
Materials	Overheads, Handouts
Keywords	Contextualized Situations Full Class Discussion Interpretation of Stories Inverse Relations Linear Functions Production of Tables

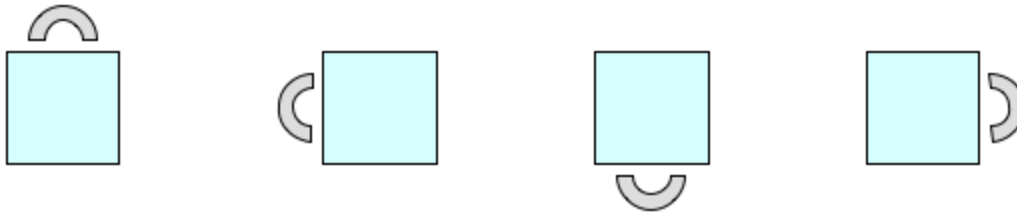
Activity Plan:

1. Minimum and Maximum (at tables for 4) [Whole Class]

First pose the following question:

How many ways can one person sit at a table for 4?

Try to get students to accept the idea that, for the present purposes, each of the following is equivalent.



Now ask them:

How many ways can 4 people be seated at tables?

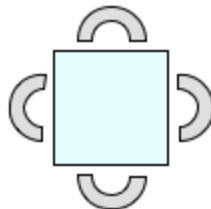
The important point here is that four people could be at 1, 2, 3, or 4 tables.

1 represents the minimum number of tables.

4 represents the maximum number of tables.

From here on, we will assume that it is the minimum number of tables that we are after. This is implicit in the question, "How many tables do we *need*?"

2. Seating Arrangements: From Tables to People Seated [Whole Class]



Show the basic table we'll be working with on the overhead (page 1).

Here are some questions to discuss:

How many people can sit in one table, two table, three tables...?

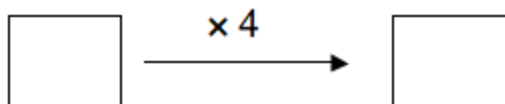
How about at 10 tables?

What about 100 tables?

What operation(s) can I use to get from the number of tables to maximum number of people that can be seated at the tables?

Make sure that children consider multiplication, not just addition.

Discuss number of tables to number of seats as an input-output function:



Number of Tables

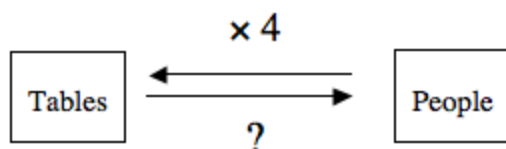
(Maximum number of people seated)

It is important that the students realize that multiplication is not simply repeated addition. We are also changing the nature of the thing itself. In this case, the ingredient we put into the function is "tables". We get out "seats" or "places to sit". This is what Schwartz (1996) means when he says multiplication is "referent transforming".

It may be a good idea to pose the following as a challenge for the students.

If t refers to the number of tables and p refers to the maximum number of people seated, what expression describes how you get from t to p ?

3. Inverting Multiplication: From People Seated to Tables



The question here is:

How do we get from knowing the number of people in seats to the number of tables needed?

Note: If tables are all to be equally filled, then we need to find the minimum number of tables. However, if people can sit wherever they want, the maximum number of tables will be equal to the number of people.

Try the following:

If there are 8 people in the restaurant, what is the smallest/ minimum number of tables we need?

What if there were 12 people? 100 people?

Now, a really important question:

What operation(s) can I use to get from the number of people to the minimum/smallest number of tables I need?

4. Table about Tables

Have the students complete the handout on page 1, namely a table about tables.

5. Developing and algebraic representation for the pattern [Whole Class]

Ask a few children to show to the class how they computed the number of people and tables.

Discuss what to do for t tables and for n people.

Discuss in detail: What happens when the number of people is not a multiple of 4?

6. Homework (Page 2)

Distribute and explain the homework. It is identical to today's handout, with only a slight change: each table holds a maximum of three people.

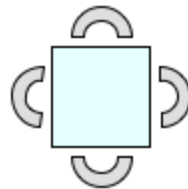
Reference

Schwartz, J. L. (1996). Semantic aspects of quantity. Cambridge, MA: Harvard University, Graduate School of Education.

Overhead and Handout: Seating People at Tables for 4 (Page 1)

Name: _____ Date: _____

In your restaurant, a maximum of four people can sit at each dinner table.



Fill in the following data table.

If you know the number of tables, figure out the maximum number of people you can seat.

If you already know the number of people, figure out the minimum number of tables you need.

Assume that each table will have the maximum number of people sitting.

Number of Dinner Tables	Show How	Number of People
1	$1 \times 4 \rightarrow$	
2	$2 \times 4 \rightarrow$	
3	\rightarrow	
4	\rightarrow	
	\leftarrow	24
	\leftarrow	20
	\leftarrow	12

How many people can you seat at t tables? [hint: More than t people? Less than t people? Exactly t people?]

How many tables do you need to seat n people? [hint: More than n tables? Less than n tables? Exactly n tables?]

Overhead and Homework: Seating People at Tables for 3 (Page 2)

Name: _____ Date: _____

In your restaurant, a maximum of **three** people can sit at each dinner table.



Fill in the following data table.

If you know the number of tables, figure out the maximum number of people you can seat.

If you already know the number of people, figure out the minimum number of tables you need.

Assume that each table will have the maximum number of people sitting.

Number of Dinner Tables	Show How	Number of People
1	1 x →	
2	2 x →	
3	→	
4	→	
	←	24
	←	21

How many people can you seat at t tables? [hint: More than t people? Less than t people? Exactly t people?]

How many tables do you need to seat n people? [hint: More than n tables? Less than n tables? Exactly n tables?]