TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION

Regional Professional Development Program
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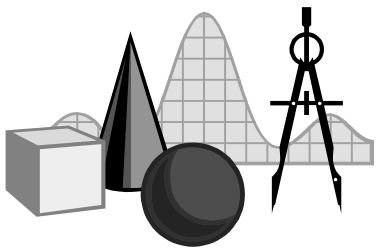


One of the big ideas in algebra, actually in all of mathematics, is the concept of *functions*. Functions are part of the elementary curriculum, and while they are not studied formally, their inclusion lays a foundation for future in-depth application.

We will not address functions formally here—a secondary math text is a good place to find a precise definition. As far as we're concerned, it is sufficient to say that a function shows a relationship between two sets of objects. Typically, those objects are numbers, but they don't have to be. Generally, some rule or property defines the relationship between the sets.

One of the most common ways to represent a function is with a table. Consider the table to the right as an example. Such tables are routinely found in elementary math texts. Students—and sometimes teachers—complete the table without realizing they are evaluating a function. In this case, the function matches one set of numbers {100, 200, 300} with a second set of numbers {130, 230, 330} by the rule "add 30."

Complete the table.

Number	Number + 30
100	130
200	?
300	?

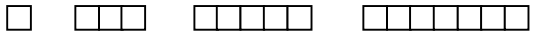
We can extend this by generalizing the function. Students can easily replace the question marks in the table, or calculate the "number + 30" for any value of the "number" we choose to provide. However, what if we tell students, the "number" is "*n*"? We are now asking for a *general*, symbolic result given the rule "add 30." What students should report is the variable expression $n + 30$. That is, when we say "add 30 to the number" in words, we write $n + 30$ in symbols. Students should be able to express the rules for simple functions in words. When grade-level appropriate, symbolic expression is also required.

Number	Number + 30
n	*n* + 30

When students are studying relationships between numbers, we give them tasks such as listing all pairs of whole numbers whose product is 1000. We may even ask them to put it in tabular form, as shown. Once again, we have a function—a relationship between two sets of numbers defined by some rule. In words, our rule is "two whole numbers whose product is 1000." In symbols, we could define F to be the first number, S to be a second number, and our rule would be $F \times S = 1000$.

First Number	Second Number
1	1000
2	500
4	250
8	125
10	100
20	50
25	40
40	25
50	20
100	10
125	8
250	4
500	2
1000	1
F	***S***

When we look at patterns, for instance the one shown below,



we are generating a function. We typically match a place in the pattern {1st picture, 2nd picture, etc.} with the picture itself, or the number of squares in the picture, or some other characteristic of the picture. Sometimes, a rule may not be apparent, but that does not prevent a function from being created. While one need not have a rule to have a function—the matching of items in sets is sufficient—a rule is often desirable in order to know how a pattern continues.