Algebra,

Been there – Done that

Functions & Relations

Mathematical Systems

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Algebra, Been there –Done that is a newsletter that links algebra to previously learned concepts and skills or outside experiences

Students that have read a menu have experienced working with ordered pairs. Menus are typically written with a food item on the left side of the menu, the cost of the item on the other side as shown:

Ordered pairs

Hamburger …….$3.50
Pizza...……..2.00
Sandwich……..4.00

Menus could have just as well been written horizontally;

Hamburger, $3.50, Pizza, 2.00, Sandwich, 4.00.

But that format (notation) is not as easy to read and could cause confusion. Someone might look at that and think a sandwich costs $2.00. To clarify that so no one gets confused, I might group the food item and its cost by putting parentheses around them :

Relation – any set of ordered pairs

(Hamburger, $3.50), (Pizza, 2.00), (Sandwich, 4.00)

Those groupings would be called ordered pairs, pairs because there are two items. Ordered because food is listed first, cost is second.

By definition, we have a relation, any set of ordered pairs.

Another example of a set of ordered pairs might be buying cold drinks. If one cold drink cost $0.50, two drinks would be $1.00, three drinks would be $1.50. I could write those as ordered pairs:

Function - special relation in which no two different ordered pairs have the same first element.

(1, .50), (2, 1.00), (3, 1.50), and so on

From this you would expect the cost to increase by $0.50 for each additional drink. What do you think might happen if one student went to the store and bought 4 drinks for $2.00 and his friend who was right behind him at the counter bought 4 drinks and only paid $1.75?

My guess is the first guy would feel cheated, that it was not right, that this was not working, or this was not *functioning*. The first guy would expect anyone buying four drinks would pay $2.00 - just like he did.

Relations and functions can be described by a relation ship that generates more ordered pairs such as:

Let's look at the ordered pairs that caused this problem.

(1, .50), (2, 1.00), (3, 1.50), (4, 2.00), (4, 1.75)

The last two ordered pairs highlight the malfunction, one person buying 4 drinks for $2.00, the next person buying 4 drinks for a $1.75.

Cost = $.50 x drinks
(5, 2.50)
(6, 3.00)
(10, 5.00)

For this to be fair or functioning correctly, we would expect that anyone buying four drinks would be charged $2.00. Or more generally, we would expect every person who bought the same number of drinks to be charged the same price. When that occurs, we'd think this is functioning correctly. So let's define a function.

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A function is a special relation in which no two different ordered pairs have the same first element. Since the last set of ordered pairs have the same first elements, those ordered pairs would not be classified as a function.