Function Machine Game Suggestions

Exploration 1 (function as a process; formulas; particular functions):

Use as many numbers as you need to figure out what each machine does. The way you "tell" the program what each machine does is called **formula of the function**. It is one of the traditional ways to describe functions. Can you come up with other ways to do it? Share your ideas with other people. Which ways of describing a function do you like and why?

Exploration 2 (input and output):

• What kind of numbers can you put into each machine? These numbers are called **input**. In this game, input is defined by software restrictions. Usually, input is determined by natural restrictions on the function (e.g., division by zero is prohibited), or by the situation the function describes (e.g., if the function helps to find the area of squares by the length of their sides, input may not be a negative number, as a length cannot be negative). Can you find other examples of functions that naturally restrict input?

• What kind of numbers can come out of each machine? Such numbers are called **output**. How does the output depend on the machine rule? How does it depend on the input? Try to restrict the input to even numbers only (-4, -2, 0, 2, 4, 6...). What happens to the output? Now do the same with a different machine. What changes? Why? Come up with your own examples of how input changes output.

Exploration 3 (properties of linear functions):

In this game, the functions are quite simple. What kinds of functions can there be? Try to find the rule of each function using as few numbers as you can, but without guessing. How many numbers does it take to know the rule for sure? Why? Are there some numbers for input that make it easier to find the rule? What are they? Why?

Exploration 4 (purposes of functions):

After you find out what each function machine does, make up a story of how this machine may be used. For example, the function that adds two may describe global warming (when average temperatures rise by two degrees), or a salary increase (everybody's salary is raised by $2). The function that multiplies by 5 may describe the area of a rectangle in terms of one side, when the length of another side is 5. Come up with your own stories.