

Function Machines

[not complete!]

Here are two functions.

$$A(x) = x^2$$

$$B(x) = x - 1$$

I am going to connect them in alphabetical order and use 2 as the input number. The output of the function A would be

$$A(2) = 2^2 = 4$$

The output of A becomes the input for B .

$$B(4) = 4 - 1 = 3.$$

The output of B is 3.

1. What do I get if instead I input 2 into the function B , and then use the output as the input into function A ?
2. If 2 is input 2 into A first, and then input the output into B , I can symbolize this as $B(A(2))$. How would you write it if I input 2 into B first, and then the output of B becomes the input of A ?

Now compare $B(A(3))$ and $A(B(3))$. Which is larger, and by how much?

3. Can you find an input number, n , so $A(B(n)) = B(A(n))$?
4. Can you find an input number, n , so $A(B(n)) > B(A(n))$?
5. Can you find ALL input numbers, n , so $A(B(n)) > B(A(n))$?

2. Repeat for these two functions.

$$A(x) = 3x + 1$$

$$B(x) = x^2$$

Here are five functions.

$$A(x) = 4x - 3$$

$$B(x) = 3x^2$$

$$C(x) = 7x + 1$$

$$D(x) = x^2$$

$$E(x) = 2x + 7$$

I am going to connect them in alphabetical order and use 2 as the input number. The output of the A function would be

$$A(2) = 4 \times 2 - 3 = 5$$

The output, 5, becomes the input for B .

$$B(5) = 3 \times 5^2 = 75$$

And

$$C(75) = 526$$

and $D(526) = 276\,676$

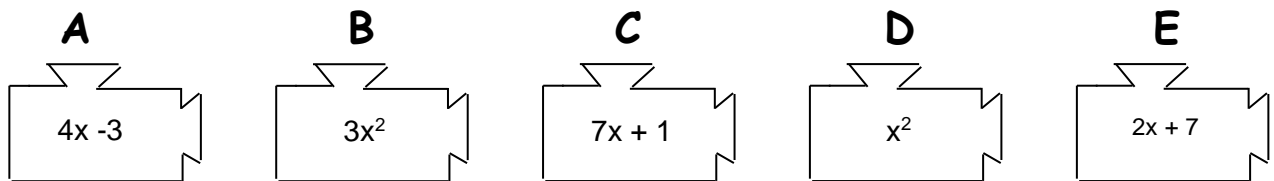
so $E(276\ 676) = 553\ 359$.

Can you use 2 as the input number, rearrange the functions using each function only once and get a larger final answer than I did?

Who can get the biggest final output?

Function Machines Challenge!

Here are five function machines. In each case, the variable "x" represents the input.



I am going to connect them in alphabetical order.

I will use 2 as the input number for function A. The output of A is 5, so the input into B is 5.

Function B function squares 5 and multiplies the answer by 3, giving 75.

This goes into C, which multiplies the answer by 7 and adds 1, giving 526.

When this is input into D, the output is 276 676.

Finally, this number is input into E, and the final output is 553 359.

Budding Genius

What is the final output if I use 3 as the input number?

Genius

Can you change the order in which you connect the function machines to get a larger final output?

MegaGenius

What order gives the largest final output?