Cup Stacking Code!

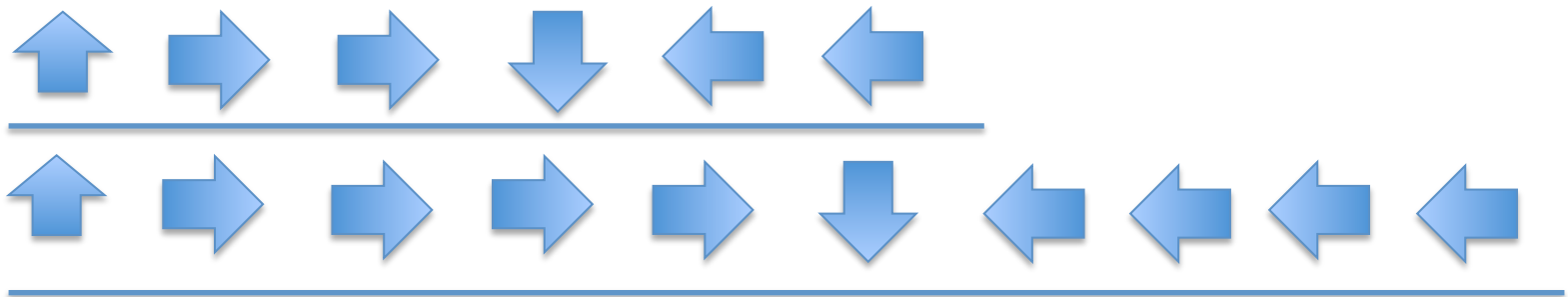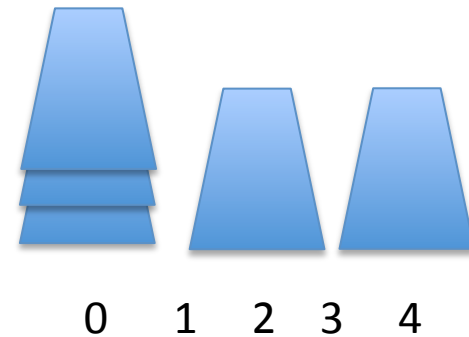An Introduction to Coding, Functions, and Parameters

Motivation

- Robots are cool
- Robots need instructions
- Robots need very clear instructions in a language they can understand
- Let's create a language for a cup tower building robot.

Our language (code)

⬆ = Pick up cup

⬇ = Set cup down

➡ = Move ½ cup width forward

⬅ = Move ½ cup width backward
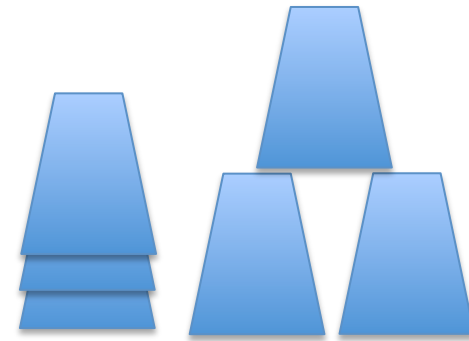
↻ = Flip cup over

Let's try our language!(Example)

Consider this tower, we might

write this as:

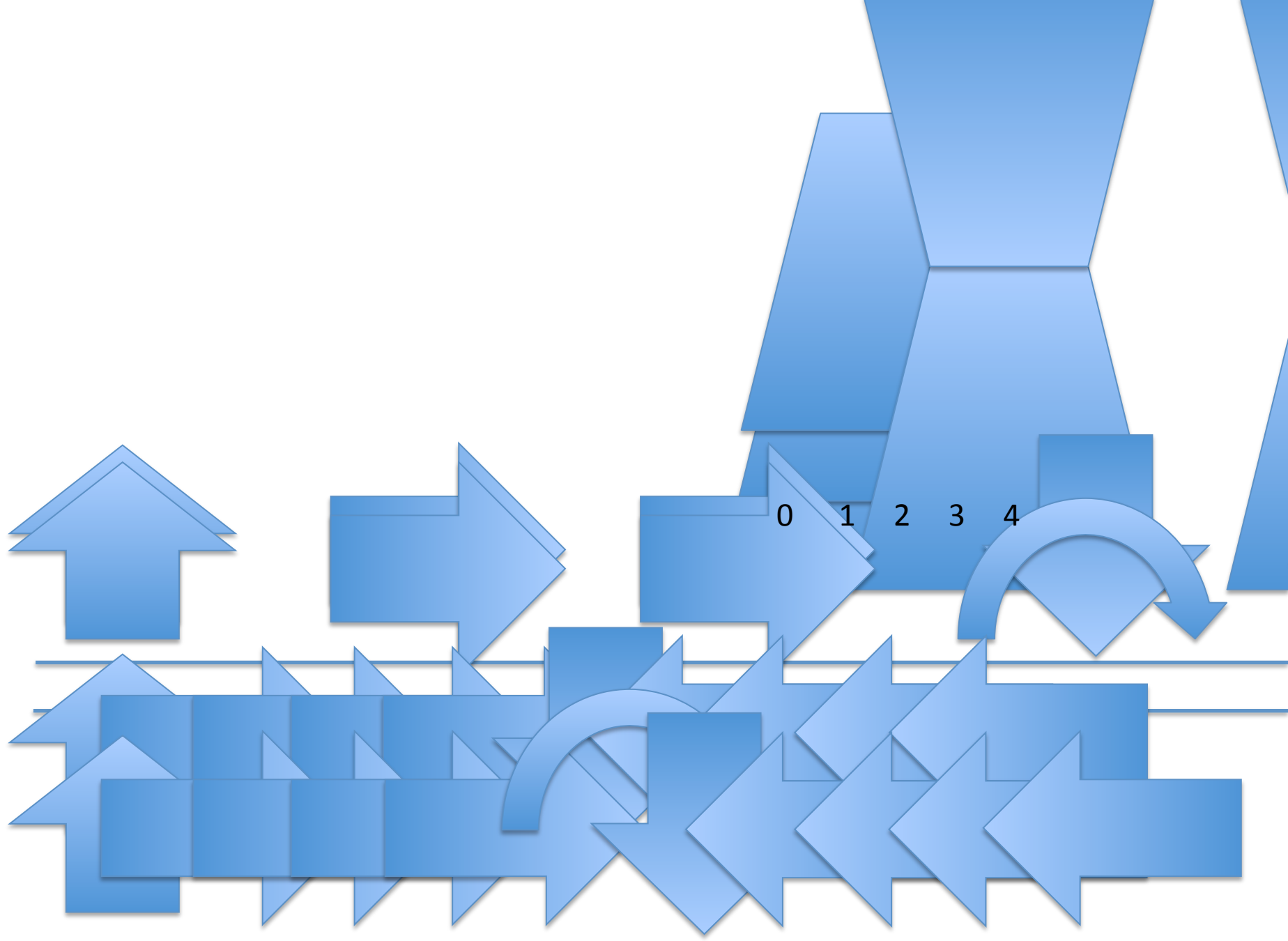0   1   2   3   4

Let's try our language! (Build)

Try building a tower by

Following these instructions
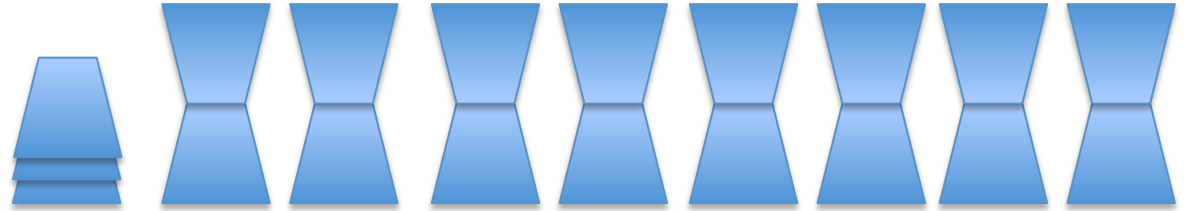
0   1   2   3   4

0   1   2   3   4

Now, try designing your own!

- Design a 3-5 cup tower
- Encode the tower with the language
- Trade codes with a partner
- Build their tower using just their code
  (no help!)
- If the design and the tower are the same, awesome!
- If there are some differences, try to figure out why that happened!

How about this one?

- This would take 328 arrows

- Really hard to write, read, or fix if we make mistakes!
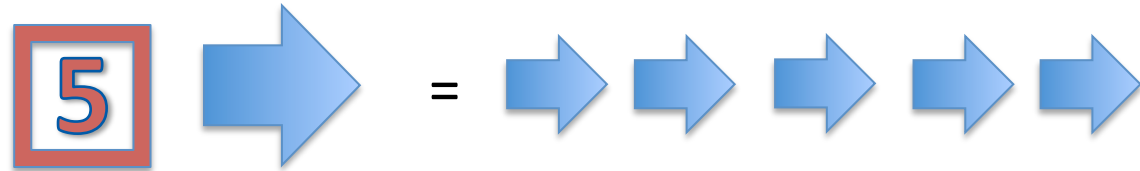
- Do we have any patterns we can use?

Functions

- A function is any process that we can repeat
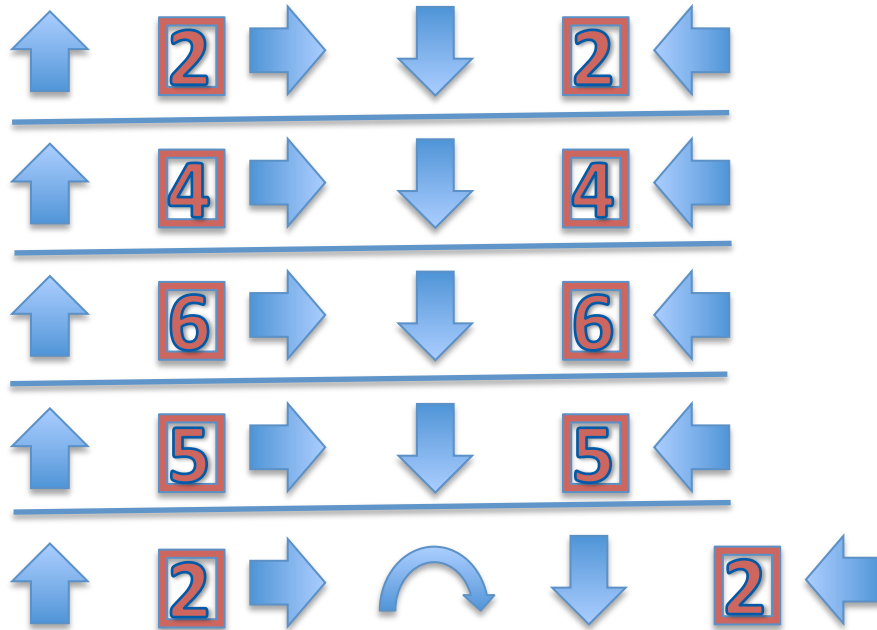- Let's use a function to make our language easier to write and understand!
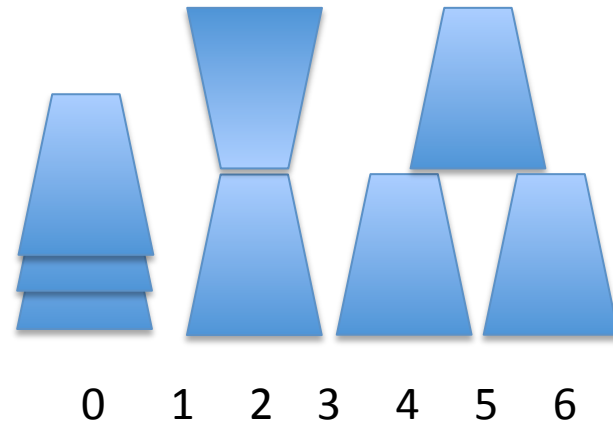
Our new function:

☐ ➡ = Move forward ☐ times

Example:

5 ➡ = ➡ ➡ ➡ ➡ ➡

Try making this tower!

↑ 2 → ↓ 2 ←

↑ 4 → ↓ 4 ←

↑ 6 → ↓ 6 ←

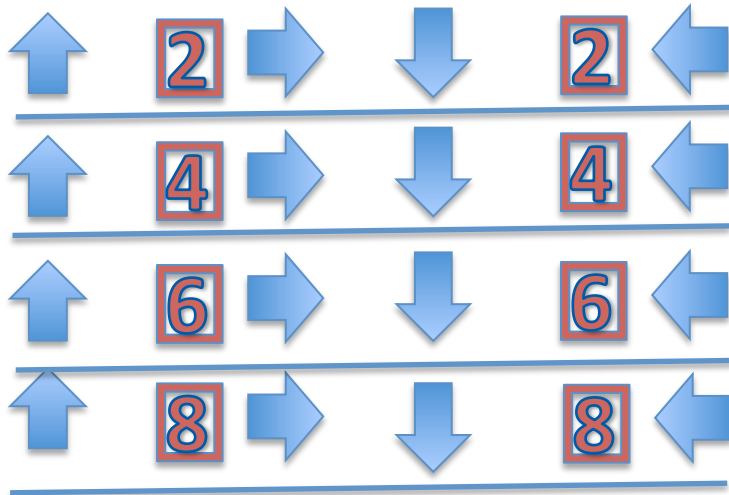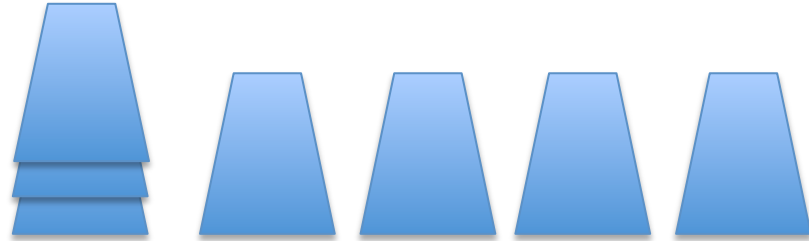↑ 5 → ↓ 5 ←

↑ 2 → ↻ ↓ 2 ←

Solution:

0   1   2   3   4   5   6

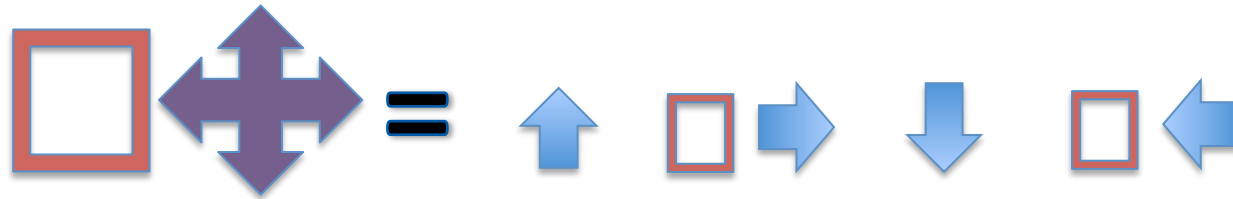# Let's use our new function!

Let's encode this tower!

- Easier to understand
- Easier to write
- We can build more interesting towers!

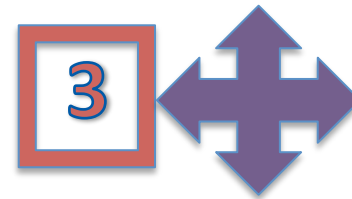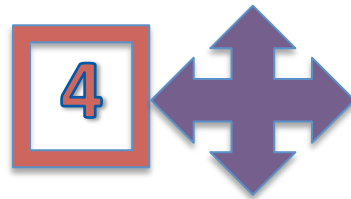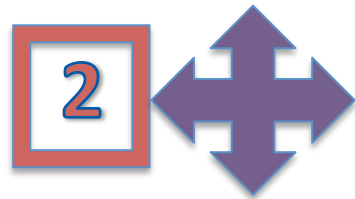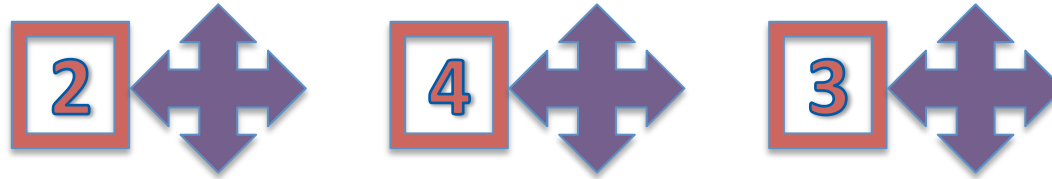# We can make any function!

What does this function do?

(It places a cup ▢ spots away)

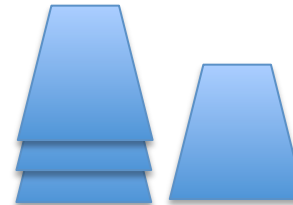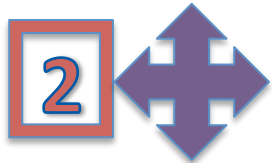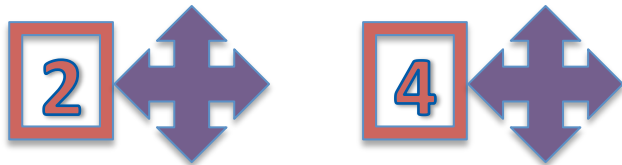▢ ✛ = ⬆ ▢➡ ⬇ ▢⬅

So, what would this build?

2 ✛   4 ✛   3 ✛
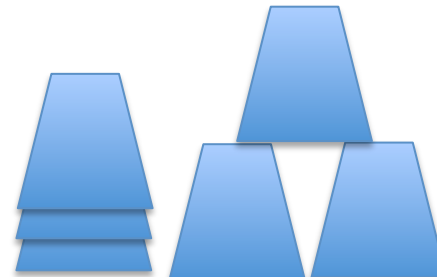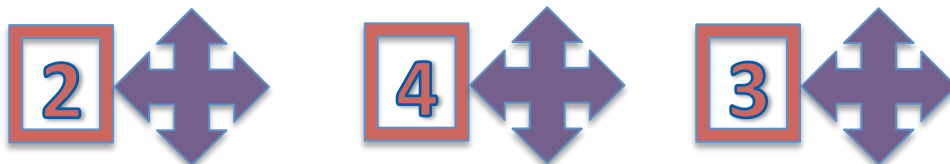
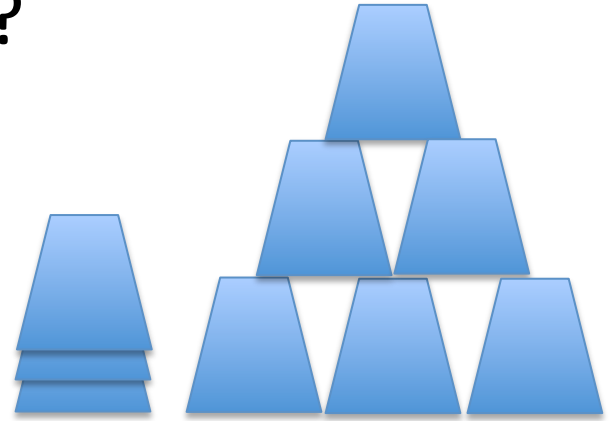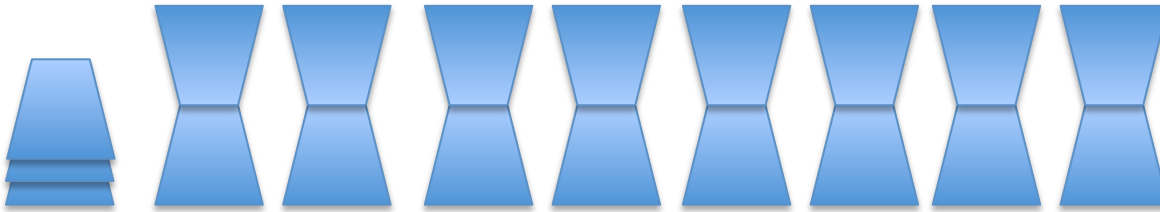# Step By Step

Step 1

Step 2

Step 3

Encoding with our new function

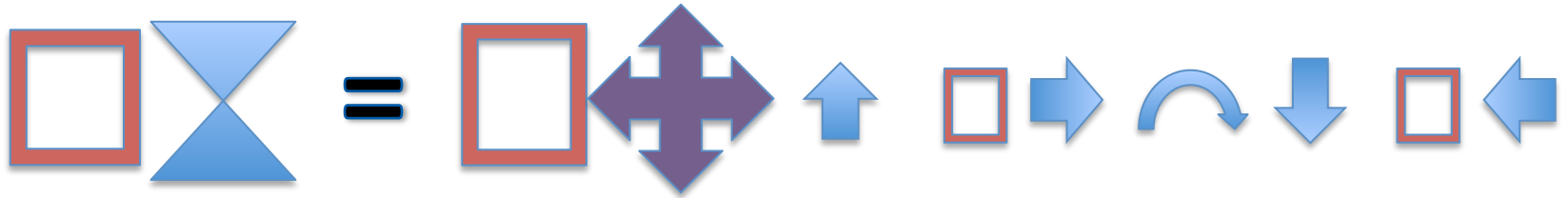- How would we encode this?

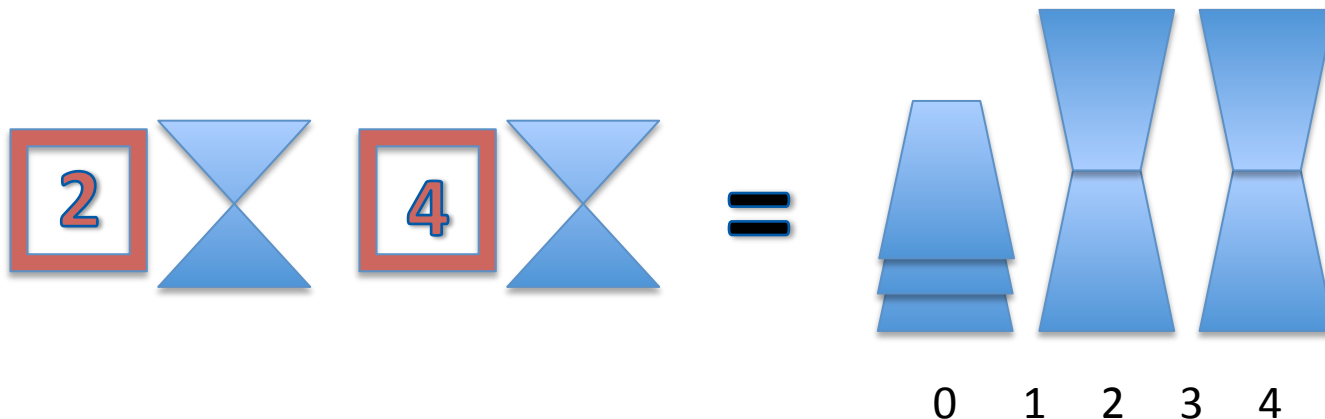# Make your own function!

Let's re-visit this tower:

- Do you see any patterns?
- What would a useful function for this be?
- How could we write this function?

The flipped tower function

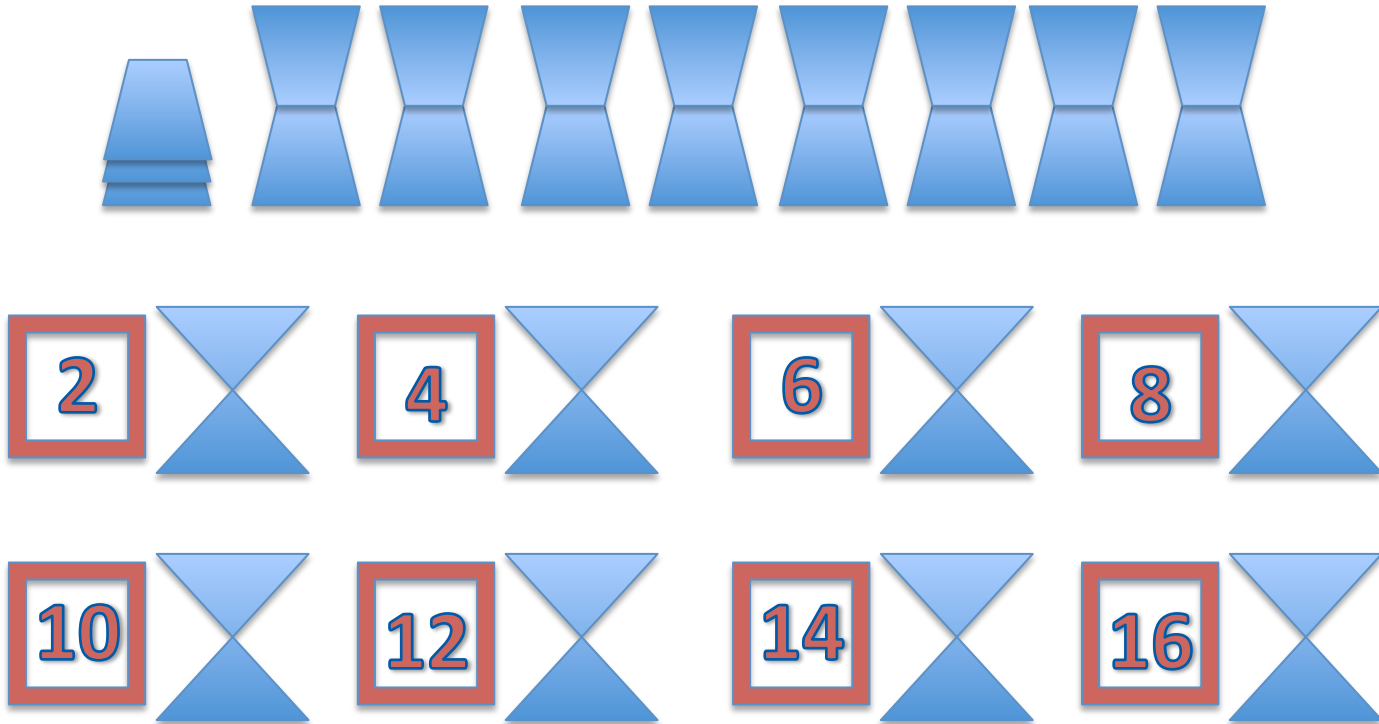- Let's make a function that makes a flipped tower some spaces away from the start

Let's try using our new symbol!

0 1 2 3 4

Functions are powerful!

2 4 6 8

10 12 14 16

We went from a tower that needed 328 arrows, to one that just just uses 8 symbols!