CAMT Conference
San Antonio

Use Magic to Introduce the Key Concepts of Functions

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Outline of Presentation

1. The “Biggest” Challenge
2. Why Magic in Math Classroom?
3. The 5-4-3-2-1 Magic
4. What Can Our Students Learn?
5. Open Discussion

1. The “Biggest” Challenge

Write on a piece of paper, what you think the biggest challenge in the math education is (other than helping out students excel in high-stake examinations).

A Quick-Write
(1 minute)

2. Why Magic?

- Magic captivates students

  Humans have an innate capacity to be intrigued and a desire to resolve their curiosity.

- Magic makes students think

  Magic can enhance students **mathematical habits of mind**.

- Magic allows students to experience the power of mathematics

  Magic can reinforce students **conceptual understanding**.

The "5 4 3 2 1 and I Know Your Number" Magic

5 4 3 2 1 and I Know Your Number

Think of a Secret Number

(make it difficult for me to guess)

(choose wisely because you will need to do math with it)

Write your number somewhere and don't tell anyone!

You may get a piece of paper to do the math, or you may do the math mentally.

Are you Ready ?

5 4 3 2 1 and I Know Your Number

Think of a Secret Number

(make it difficult for me to guess)

(choose wisely because you will need to do math with it)

- Increase Your Number by 5
- Multiply Your Sum by 4
- Minus Your Product by 3
- Divide Your Answer by 2
- Add 1 to Your Quotient

Wait

- Add ½ More

Let's see if I know your secret number!

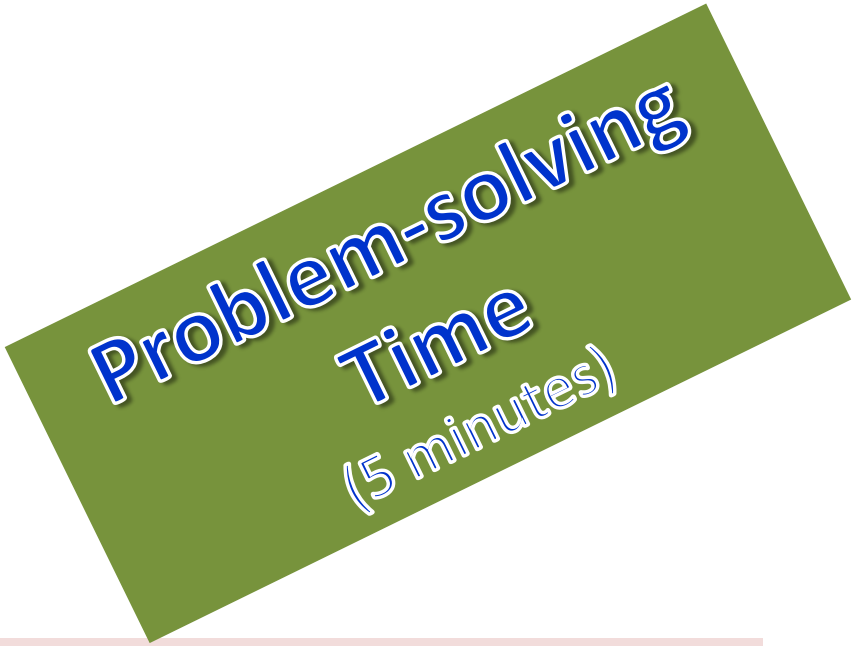
5 4 3 2 1 and I Know Your Number

Think of a Secret Number

(make it difficult for me to guess)

(choose wisely because you will need to do math with it)

- Increase Your Number by 5
- Multiply Your Sum by 4
- Minus Your Product by 3
- Divide Your Answer by 2
- Add 1 to Your Quotient
- Add ½ More



What's My Secret?

5 4 3 2 1 and I Know Your Number

Think of a Secret Number

(make it difficult for me to guess)

(choose wisely because you will need to do math with it)

- Increase Your Number by 5
- Multiply Your Sum by 4
- Minus Your Product by 3
- Divide Your Answer by 2
- Add 1 to Your Quotient
- Add ½ More

Discussing Time
(2 minutes)

How will your students figure out the secret?

5 4 3 2 1 and I Know Your Number

Think of a Secret Number

(make it difficult for me to guess)

(choose wisely because you will need to do math with it)

- Increase Your Number by 5
- Multiply Your Sum by 4
- Minus Your Product by 3
- Divide Your Answer by 2
- Add 1 to Your Quotient
    - Add ½ More

Method A

1. Subtract 10
2. Half it

Method B

1. Half it
2. Subtract 5

Are both methods equivalent? Will students investigate?

3. The 5-4-3-2-1 Magic

What math concepts can this magic activity reinforce?

A Quick-Write
(5 minutes)

3. The 5-4-3-2-1 Magic

Questions that we can ask our students:

- Why does the "trick" work all the time?

- Increase Your Number by 5
- Multiply Your Sum by 4
- Minus Your Product by 3
- Divide Your Answer by 2
- Add 1 to Your Quotient
    - Add ½ More

Method A

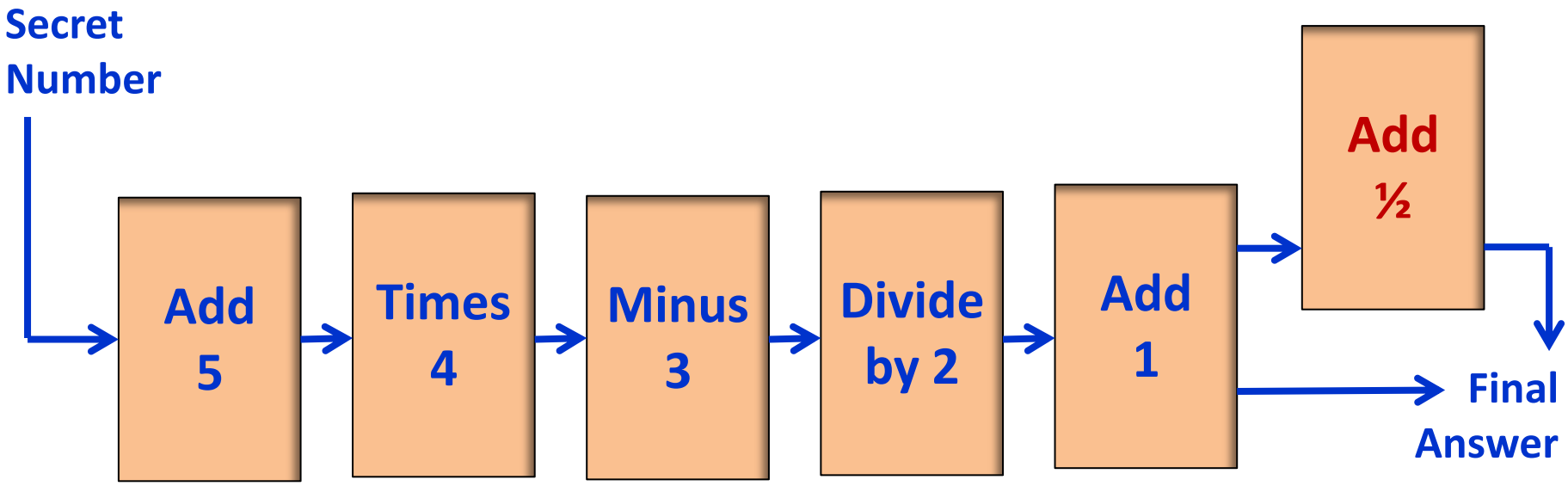
1. Subtract 10
2. Half it

Method B

1. Half it
2. Subtract 5

Questions that we can ask our students:

- Why does the "trick" work all the time?



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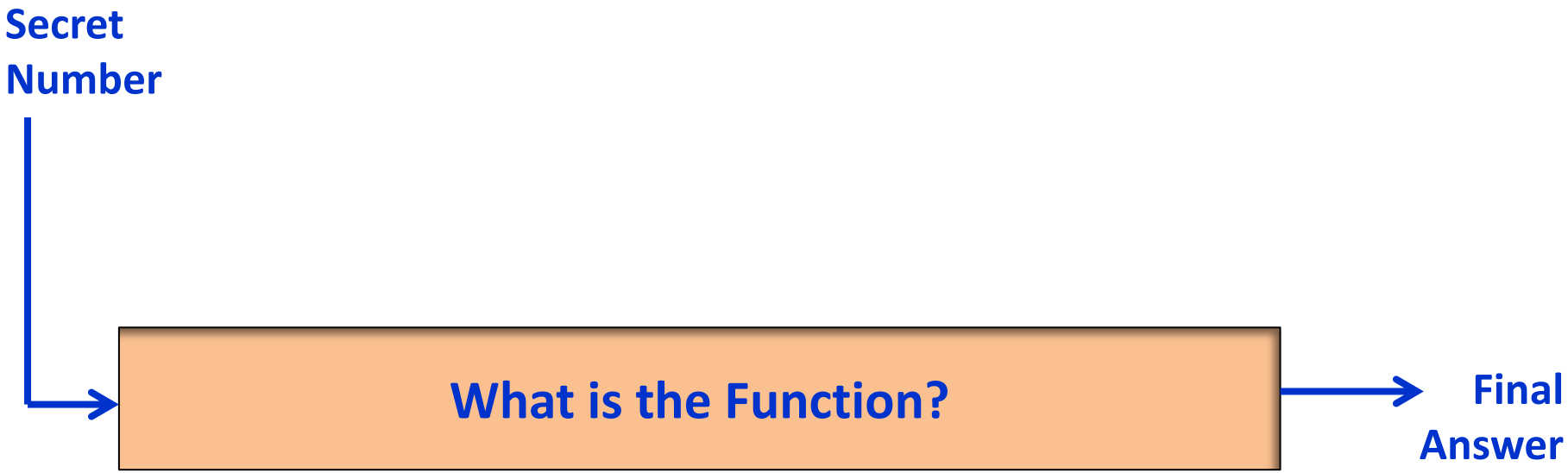
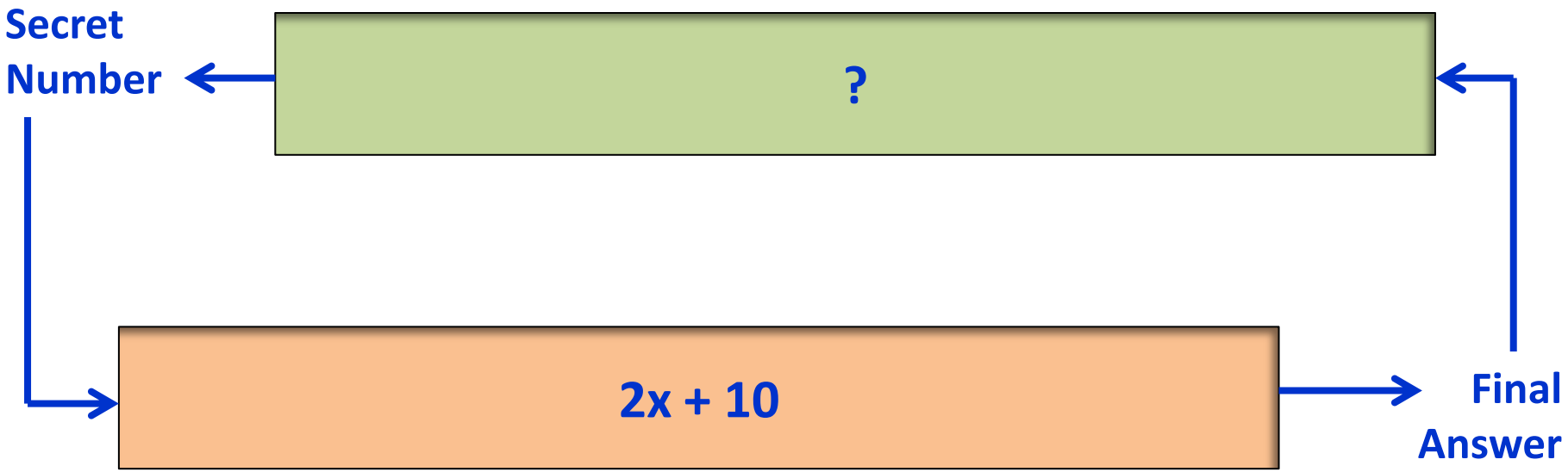
- Why does the "trick" work all the time?



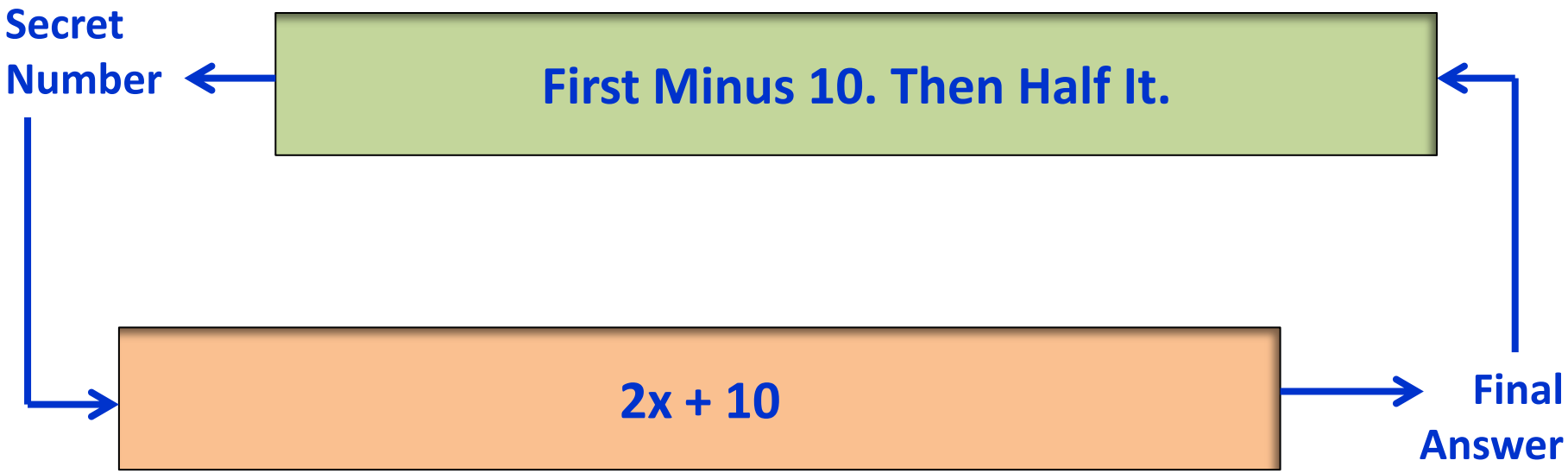
Questions that we can ask our students:

- Why does the "trick" work all the time?
- How to find the *Secret Number* using the *Final Answer*?



Questions that we can ask our students:

- Why does the "trick" work all the time?
- How to find the *Secret Number* using the *Final Answer*?
- To which math concept is this related?



4. What Can Our Students Learn?

Rrecorded Version for PD

4. What Can Our Students Learn?

1. Good Thinking Habits

- Looking for patterns
- Using a table to organize data
- Comparing methods and establishing equivalence
- Using variables, expressions, and functions
- Using pictures or diagrams
- Making connections
- Justifying why the trick works for “any number”
- Seeking efficiency
- Thinking about reversibility

4. What Can Our Students Learn?

1. Good Thinking Habits

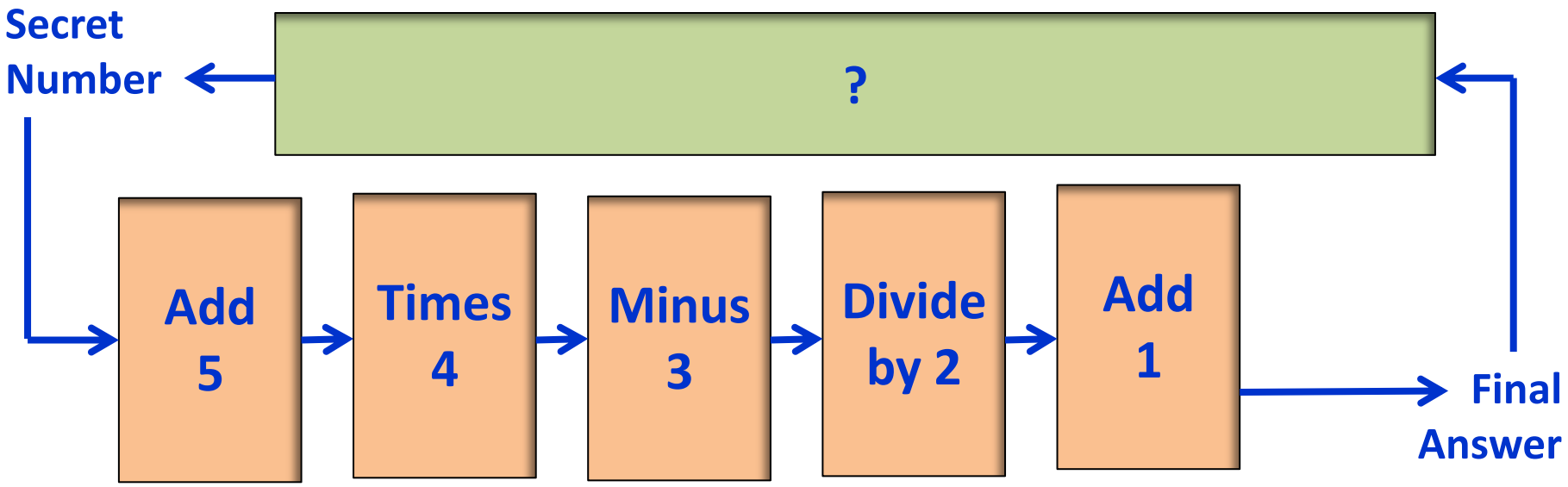
2. Foundational Math Concepts

- A variable can represent any number
- An expression represents both the process and the result
- A function is an input-output process
- A composite function concatenates two or more functions
- Simplifying an expression can help to reduce computational work
- An equation relates two variables
- An inverse function is the reverse process of the original function

Follow-up Challenge for Students #1

A Challenge for You!

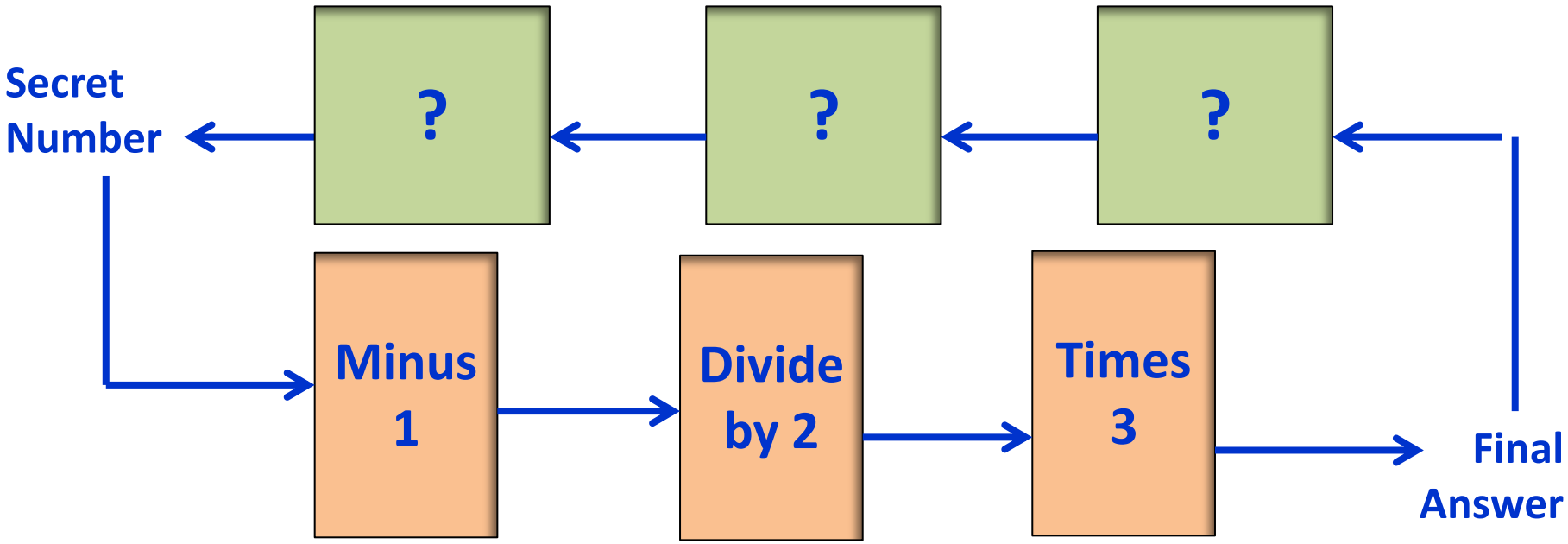
Can You Figure Out How to Obtain the Secret Number for the Actual “5 4 3 2 1” Sequence (i.e., without the “½”)



Follow-up Challenge for Students #2

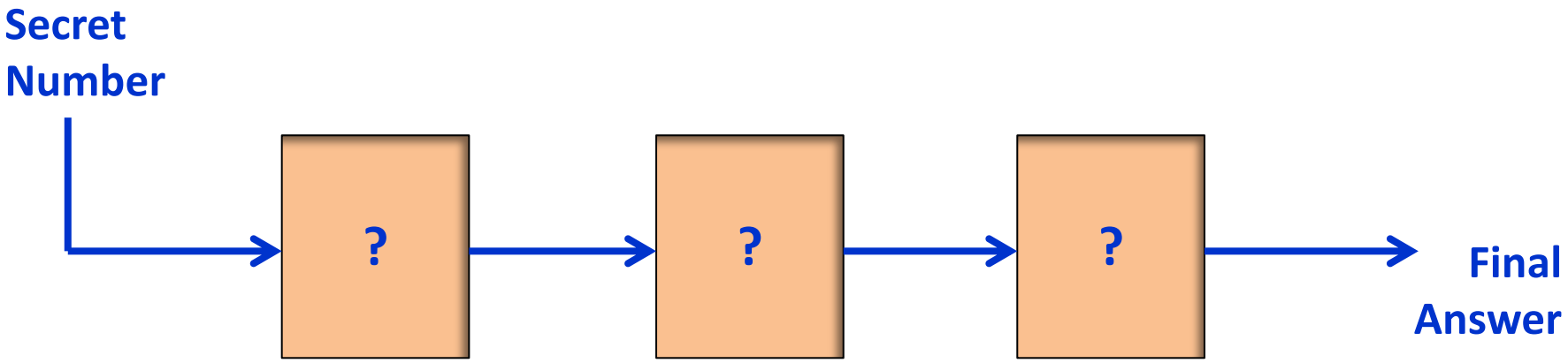
Another Challenge for You!

Can You Figure Out How to Obtain the Secret Number for this “1 2 3” Sequence



Be Creative! Create Your Own Magic

Create Your Own Sequence, Test it Here
and then
“Show Off” to Your Friends and Family!



5. Open Discussion

Do you think this activity will …

- engage students?
- enhance their mathematical habits of mind?
- reinforce conceptual understanding of functions?

Thank You