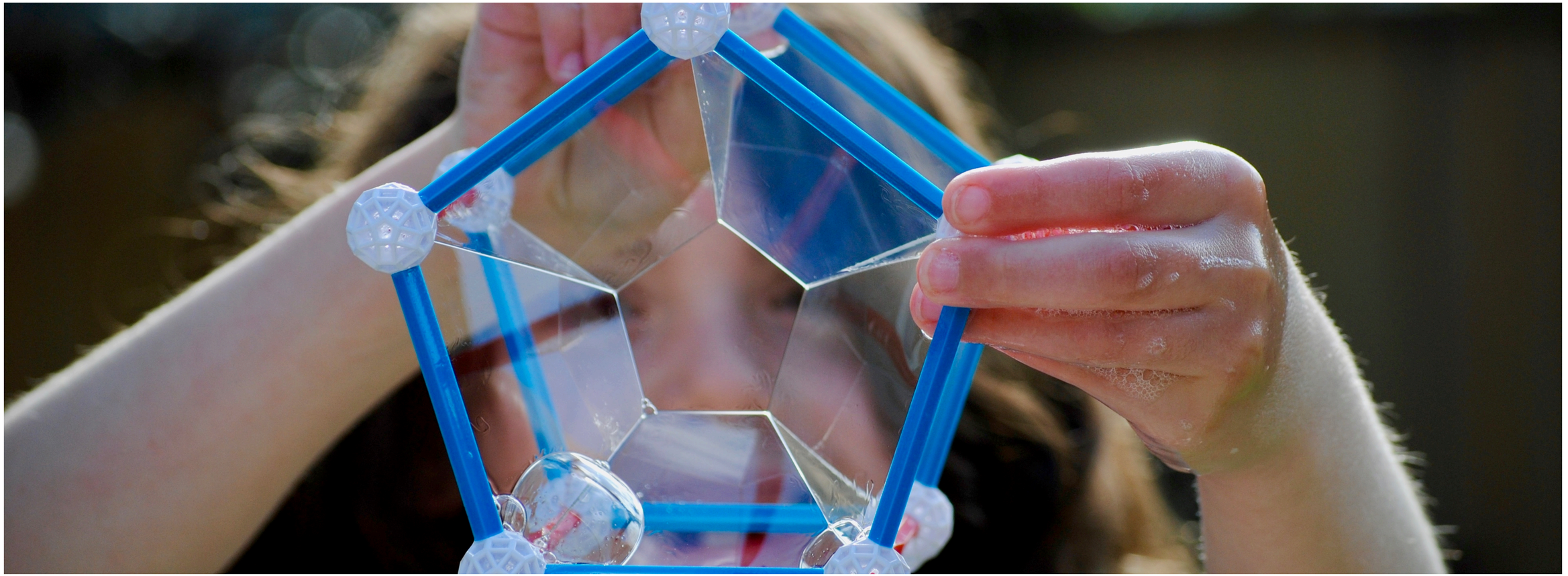
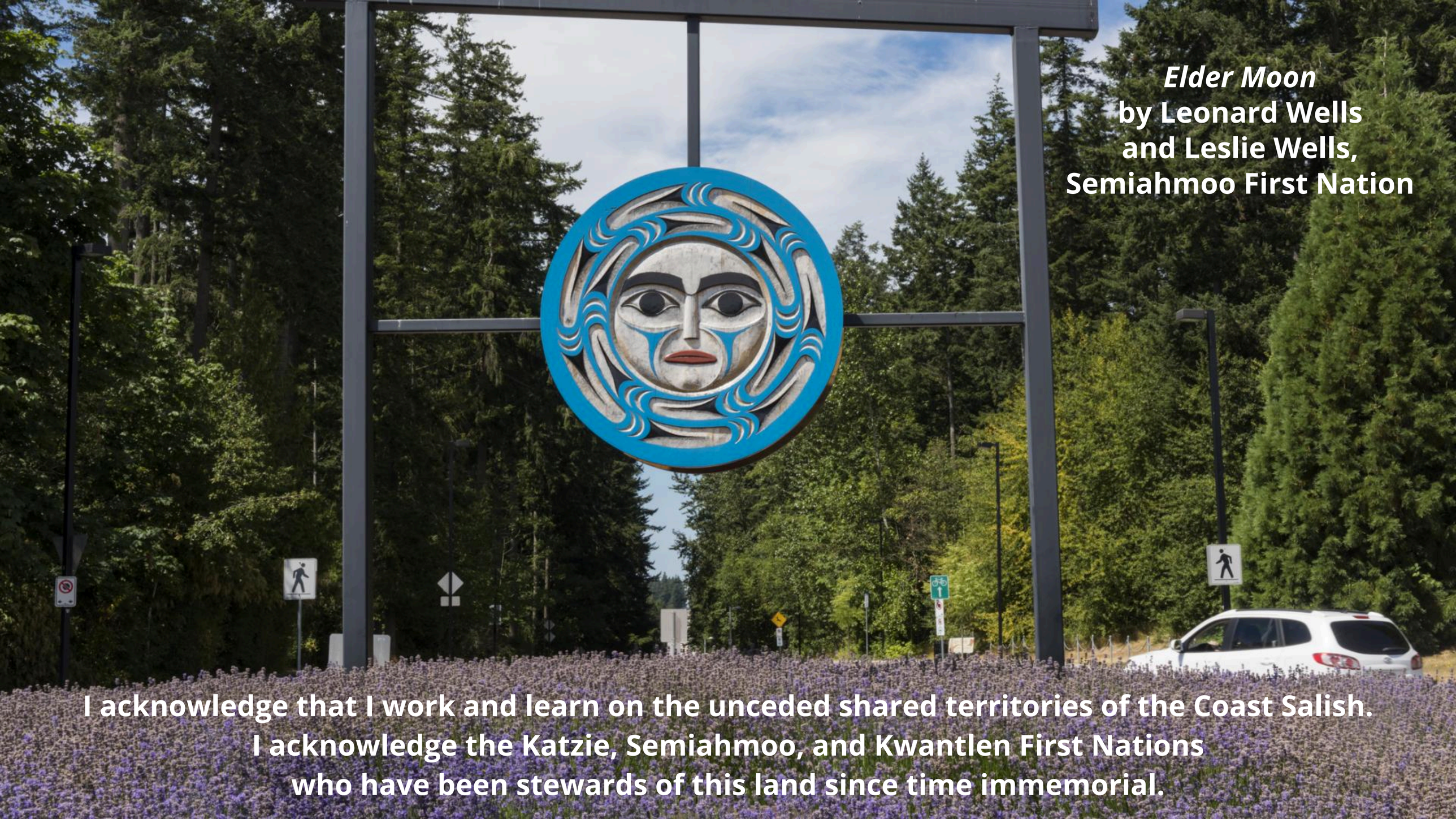


Opening Up Math Class

STA Convention • May 7, 2021

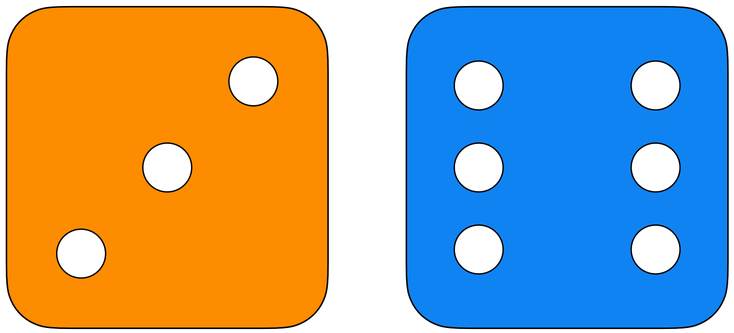


Elder Moon
by Leonard Wells
and Leslie Wells,
Semiahmoo First Nation

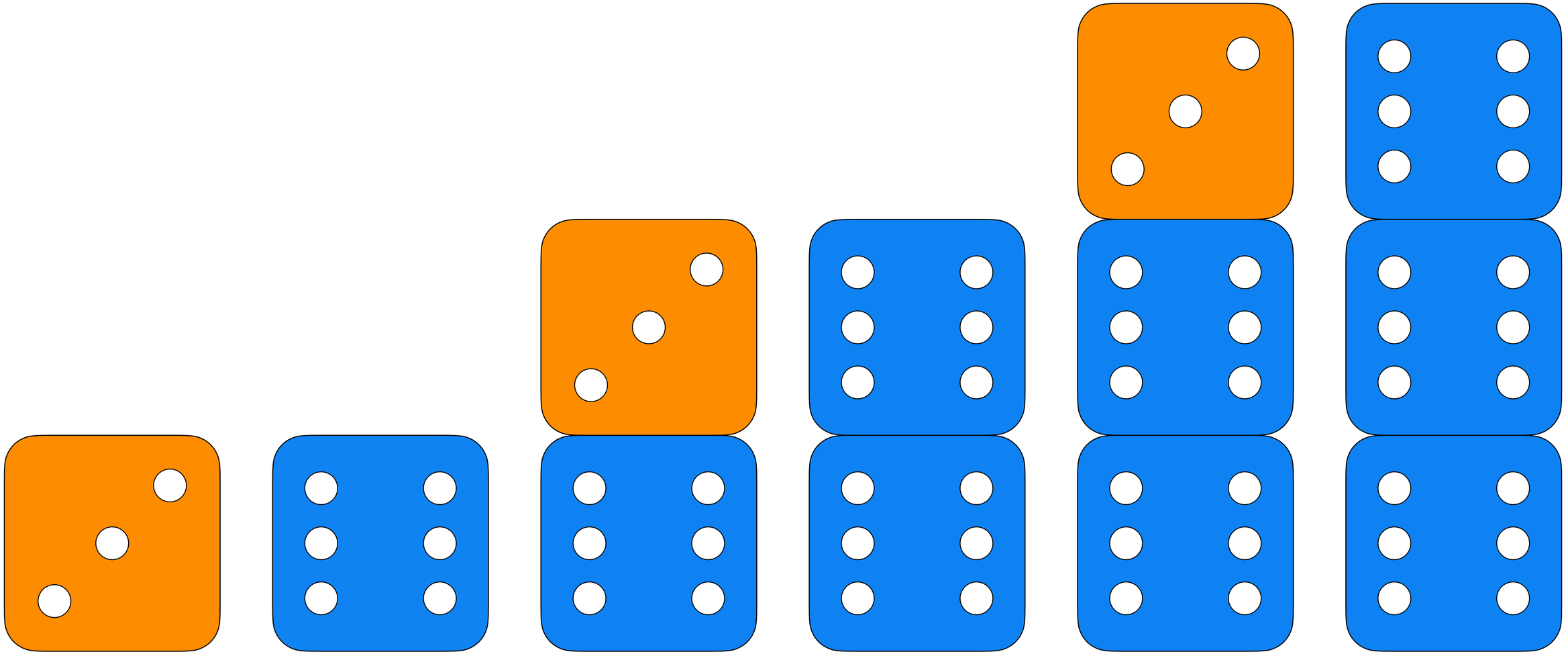
I acknowledge that I work and learn on the unceded shared territories of the Coast Salish.
I acknowledge the Katzie, Semiahmoo, and Kwantlen First Nations
who have been stewards of this land since time immemorial.

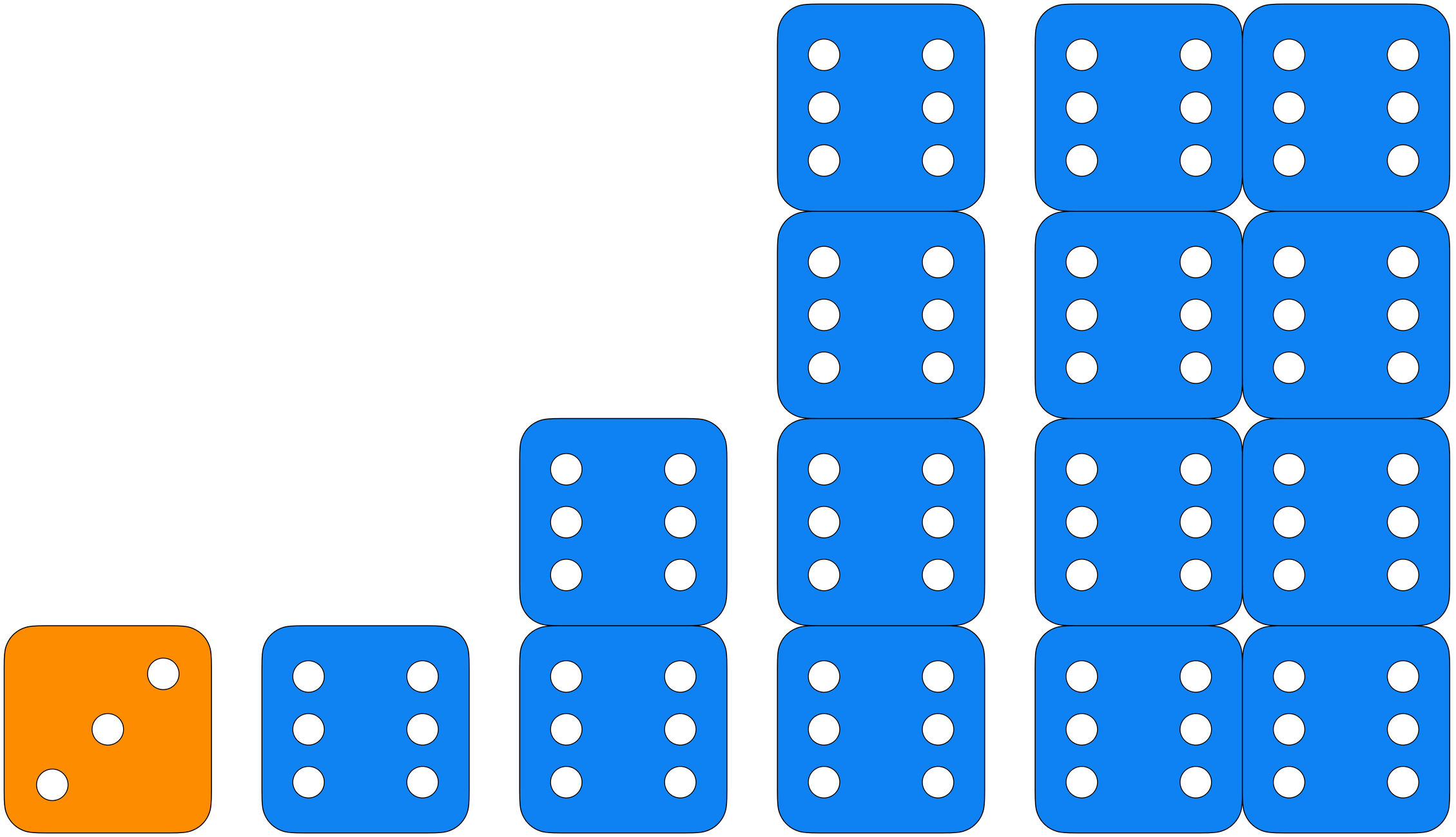
Chris Hunter

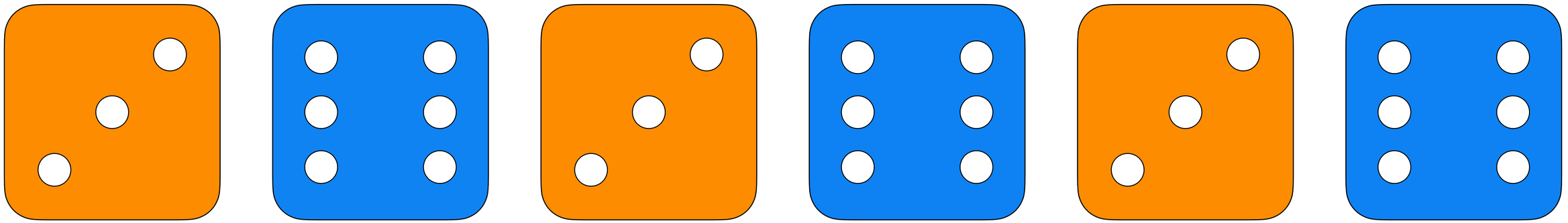
K-12 Numeracy Helping Teacher
email: hunter_c@surreyschools.ca
Twitter: @ChrisHunter36
blog: chrishunter.ca

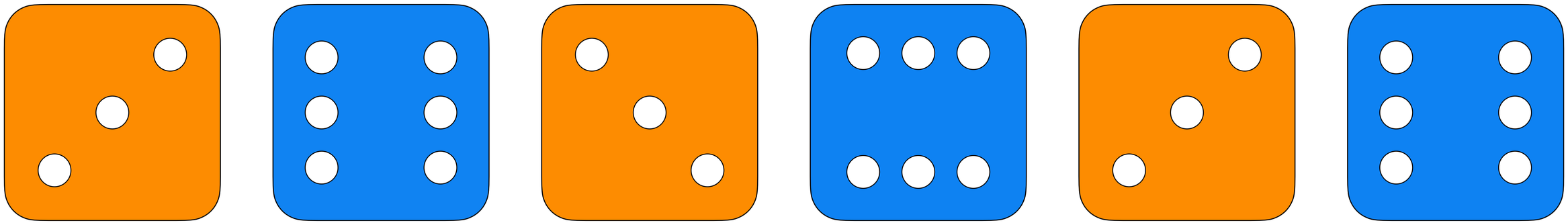


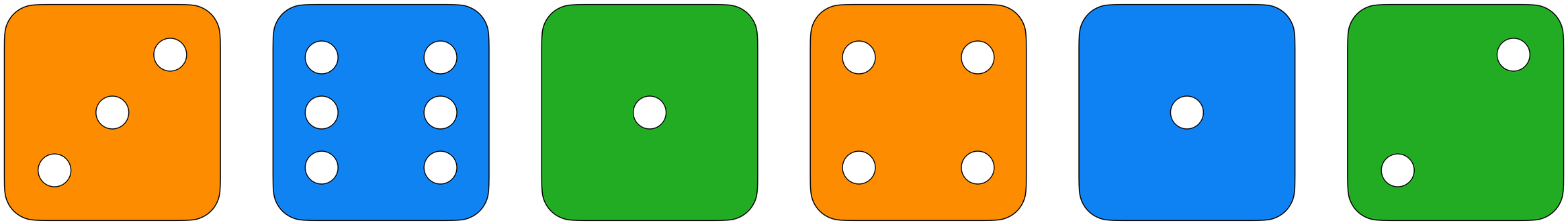
Extend the pattern in as many ways as you can.







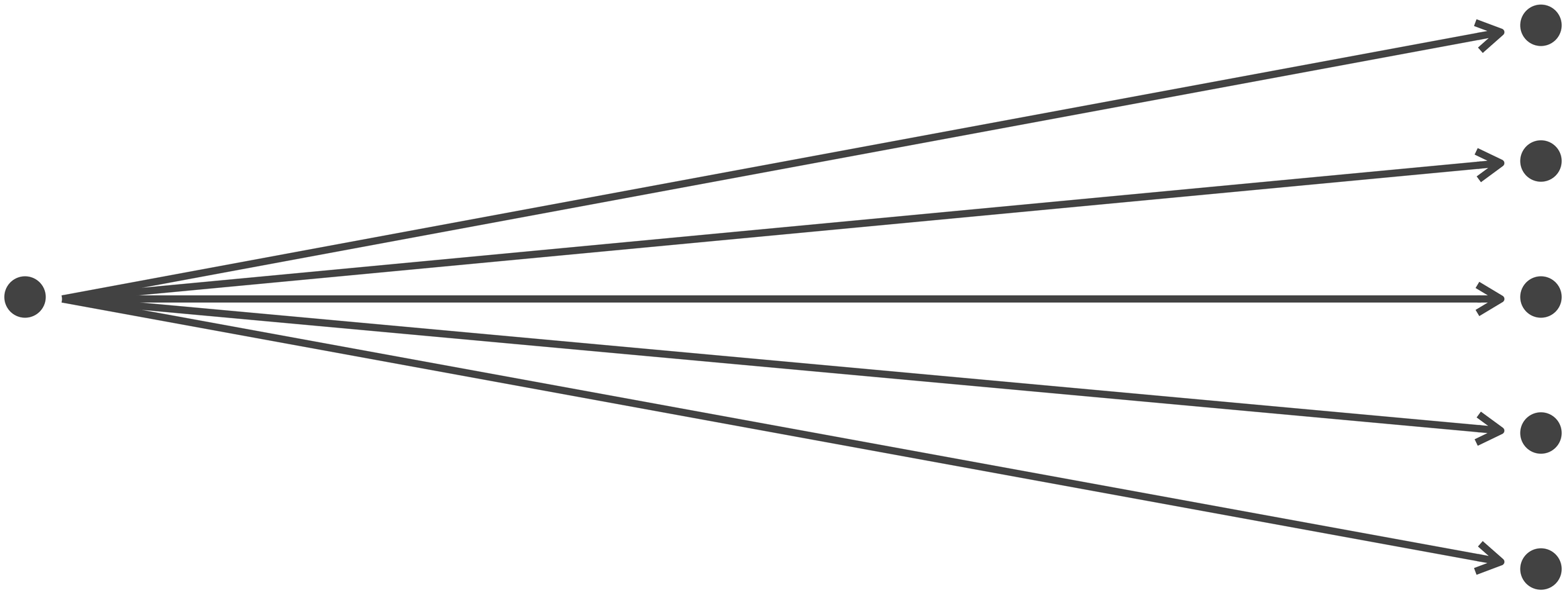




beginning

end

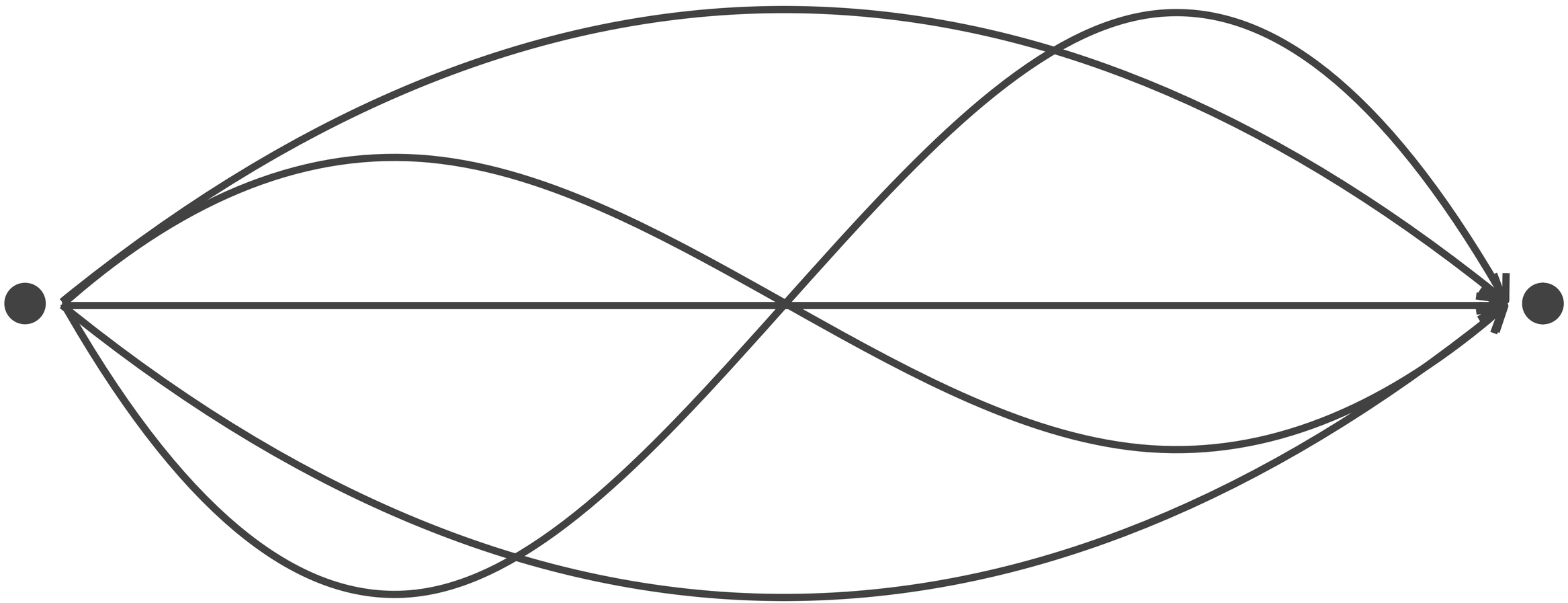
closed



beginning

end

open



beginning

middle

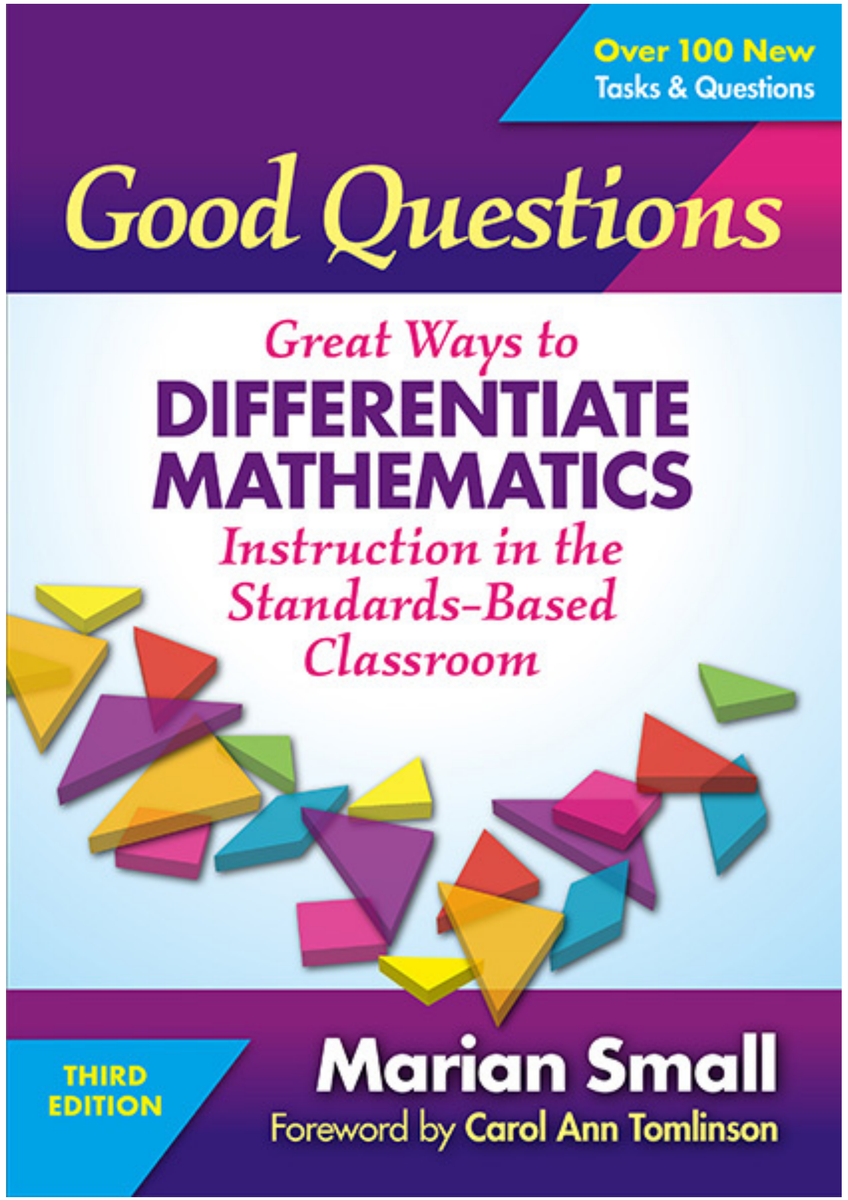
open

end

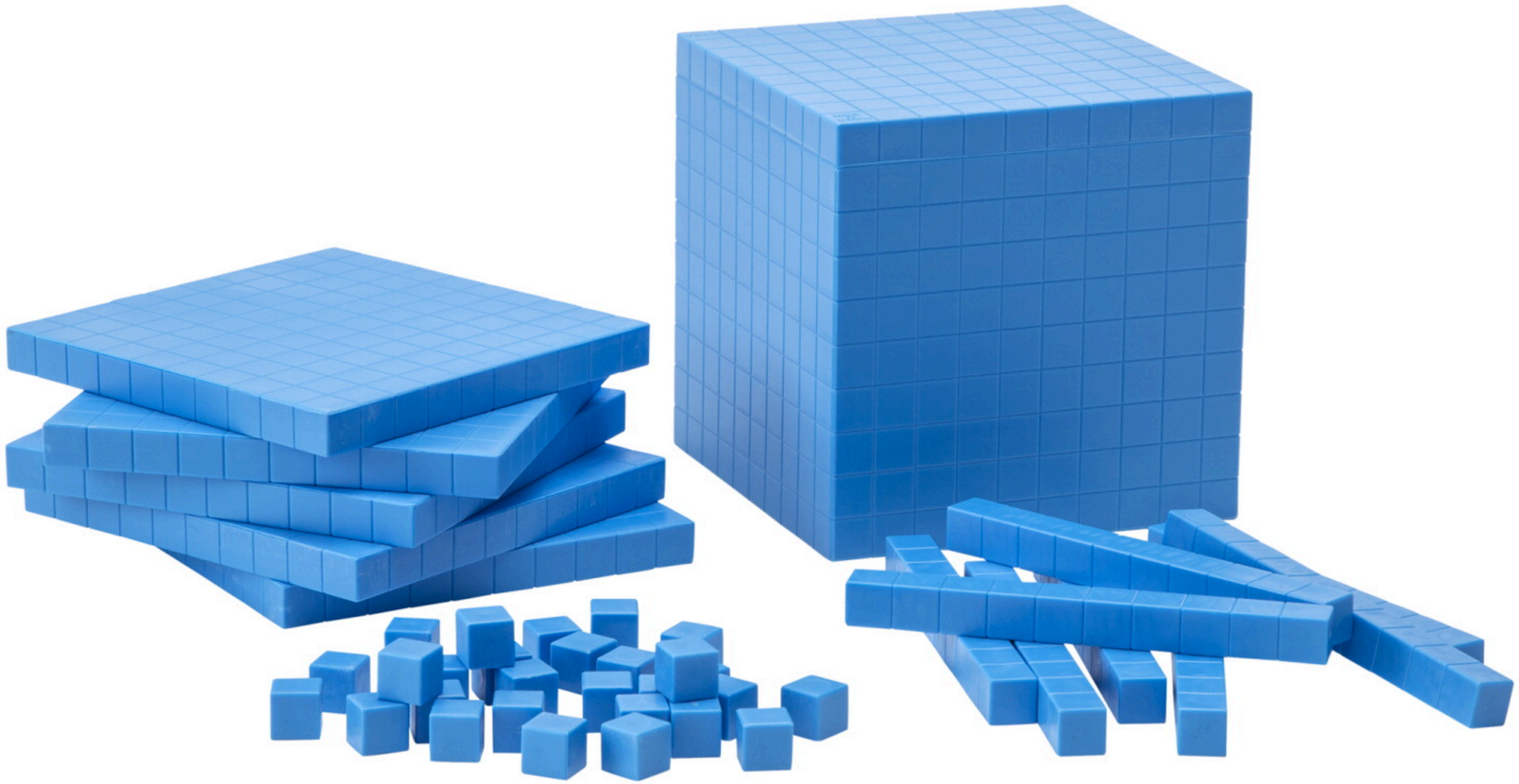
closed

What are Open Questions?

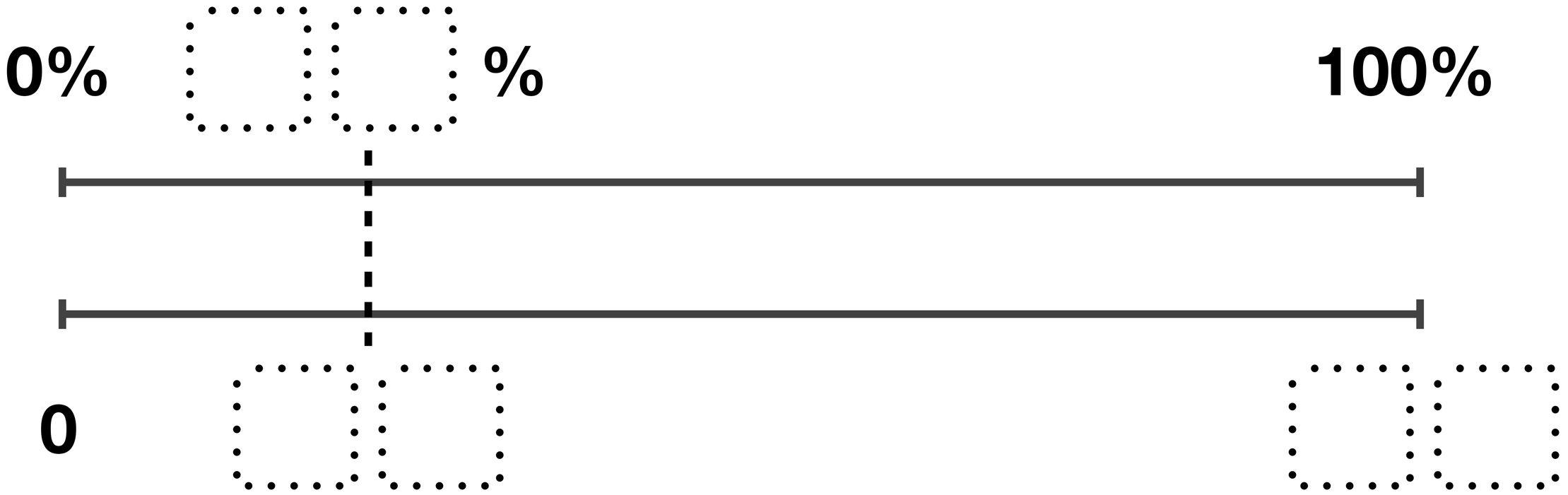
*A question is **open** when it is framed in such a way that a **variety** of **responses** or **approaches** are possible.*



What numbers can you represent using thirteen **base ten blocks**?



The double number line below represents the solution to a percent problem.
What could the missing numbers be?
Place digits from 0 to 9 in the boxes below.



0	1	2	3	4	5	6	7	8	9

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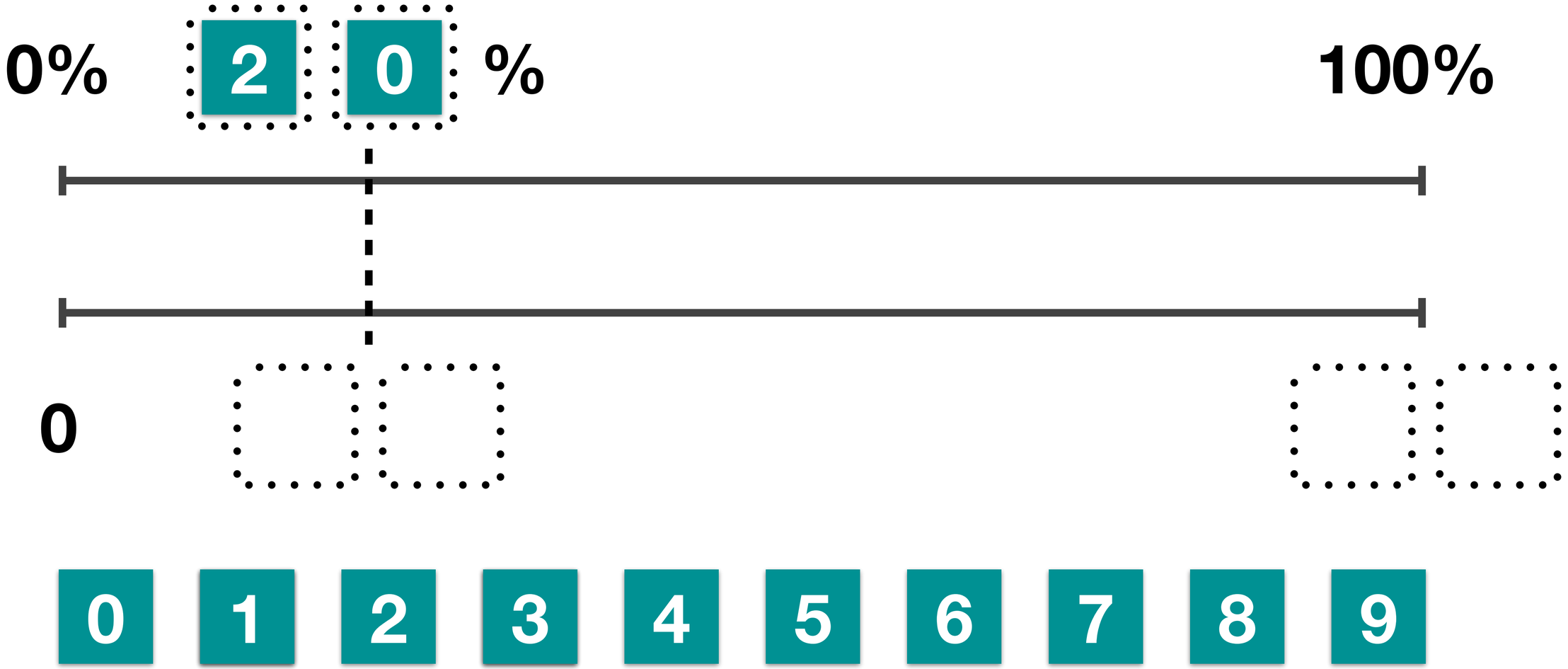

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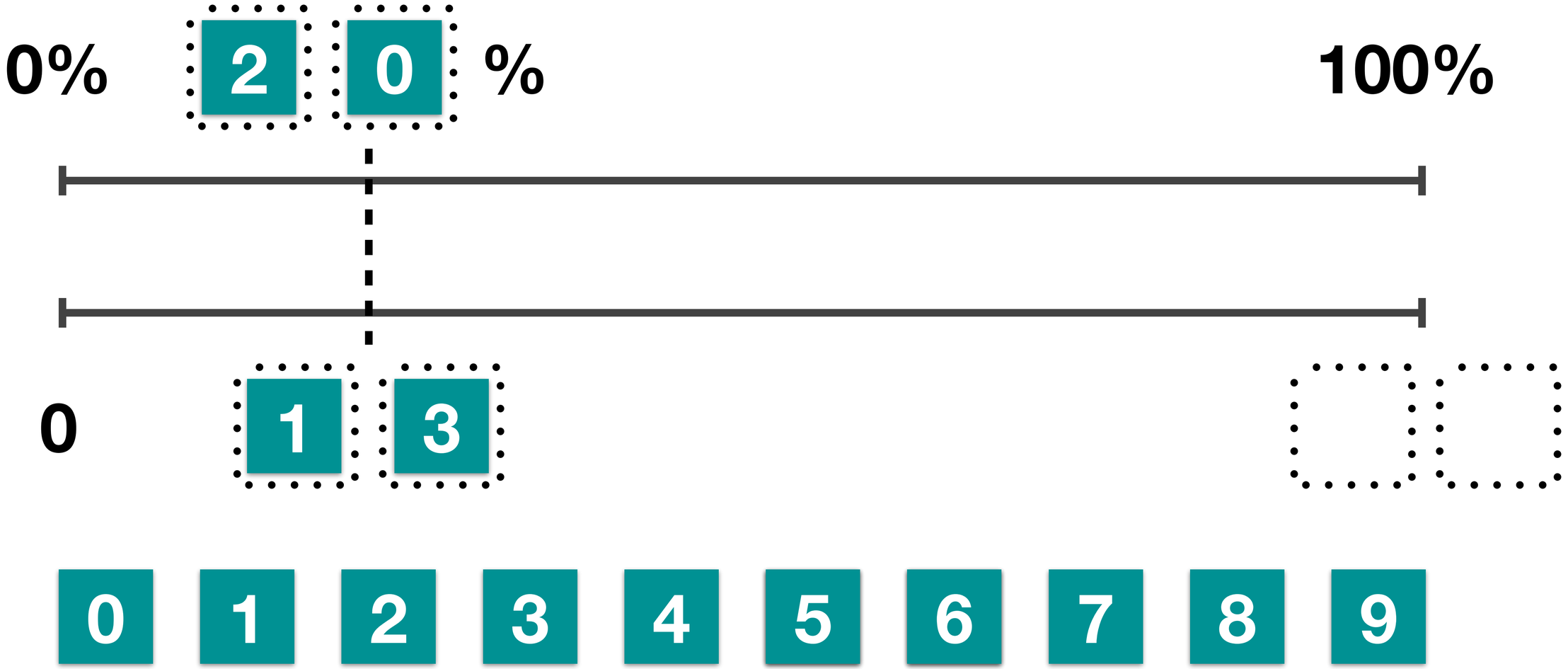

0 1 2 3 4 5 6 7 8 9

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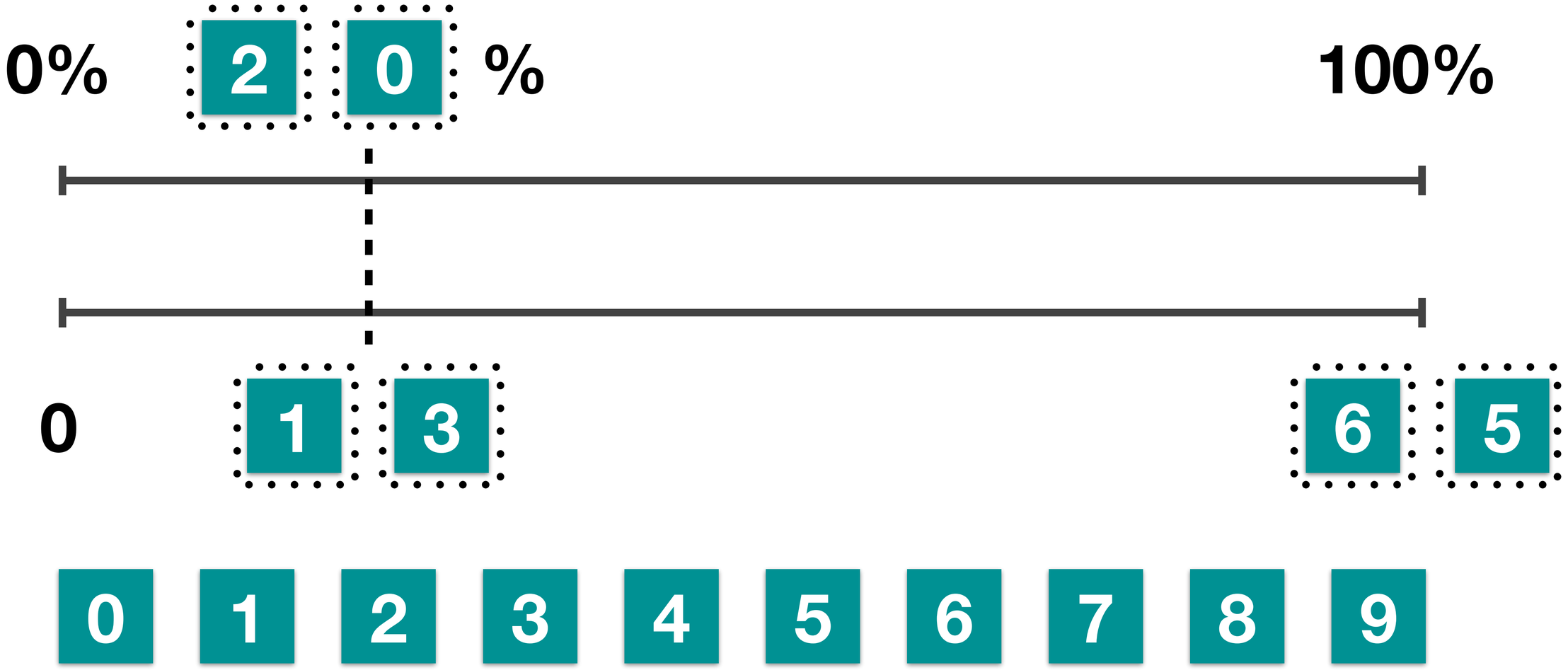

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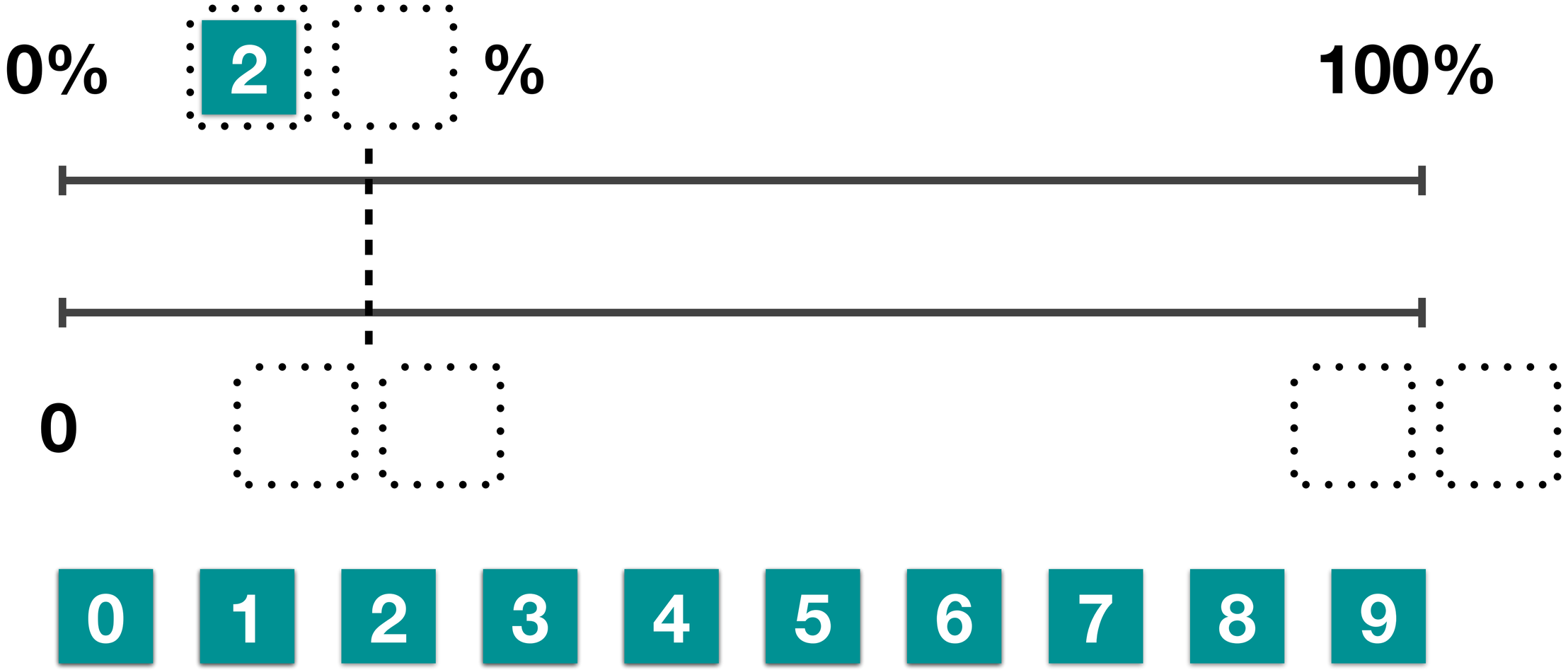

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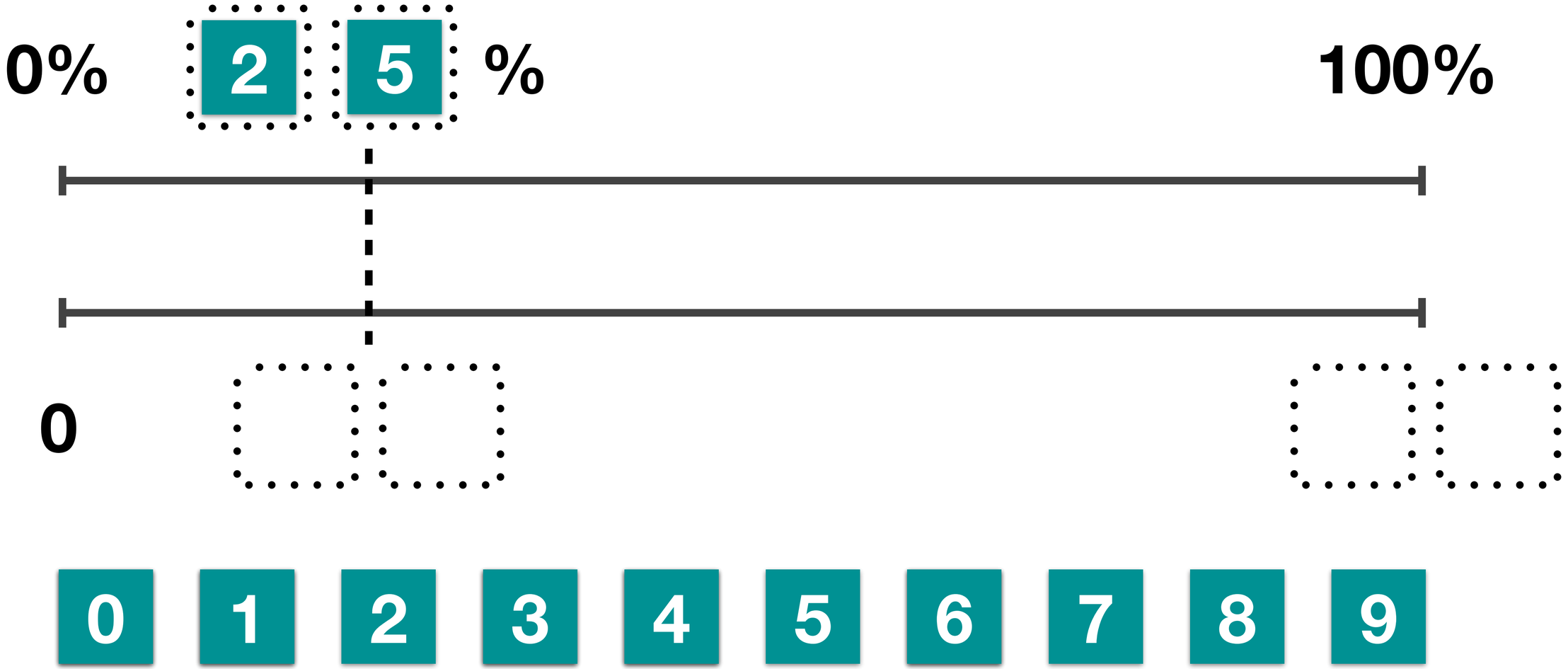

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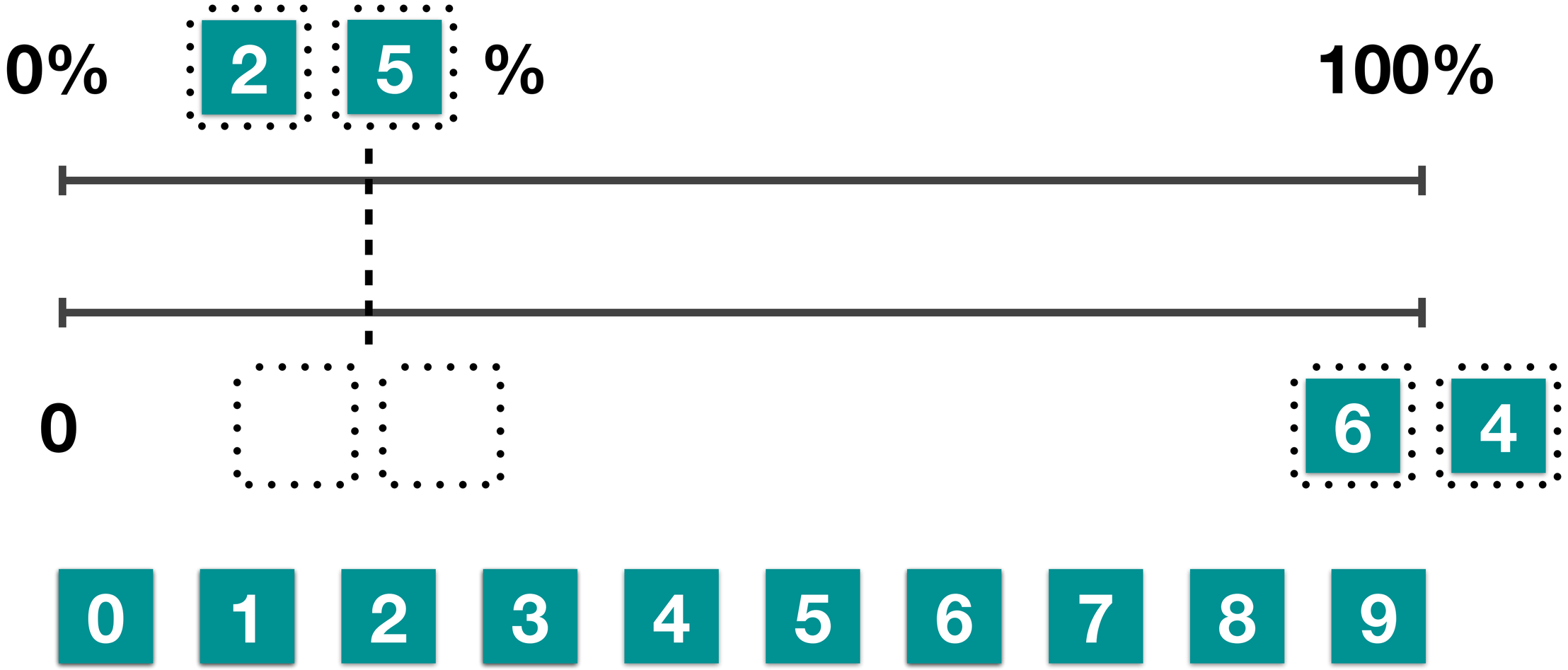

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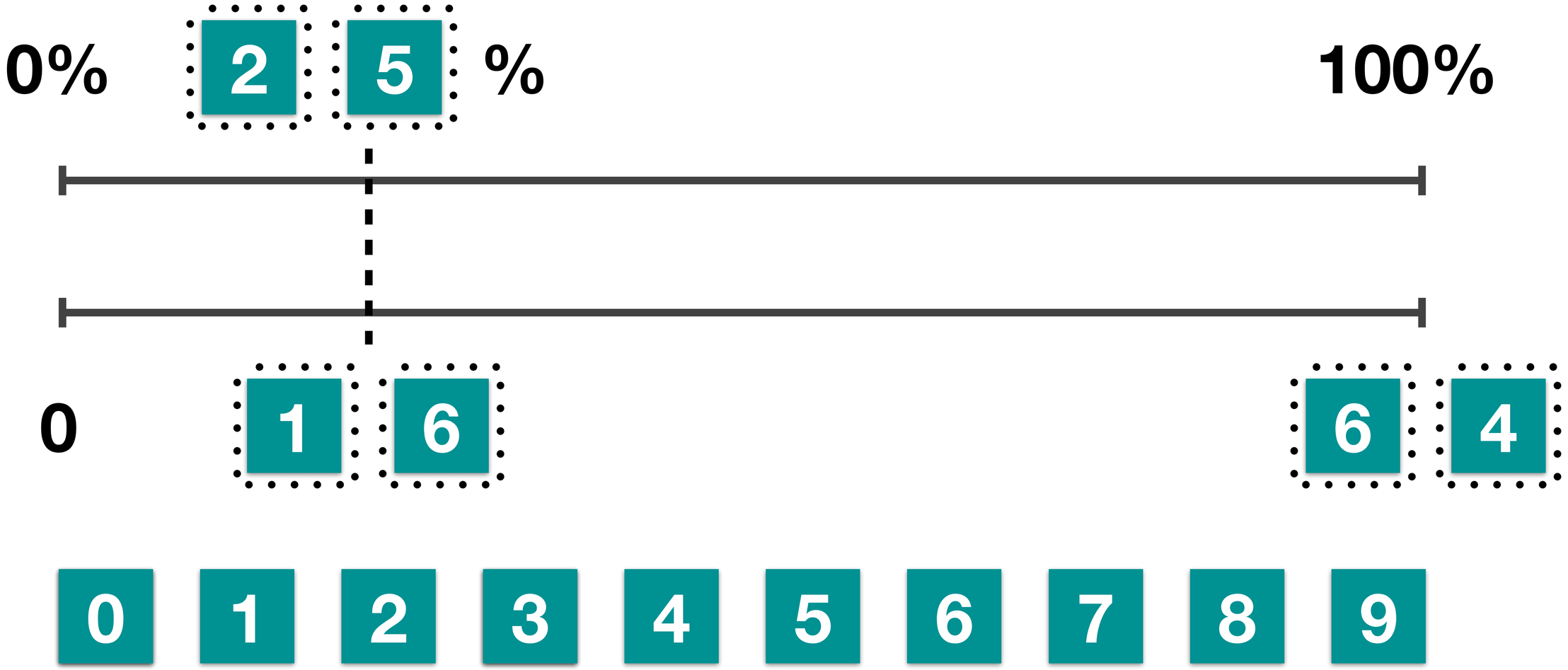

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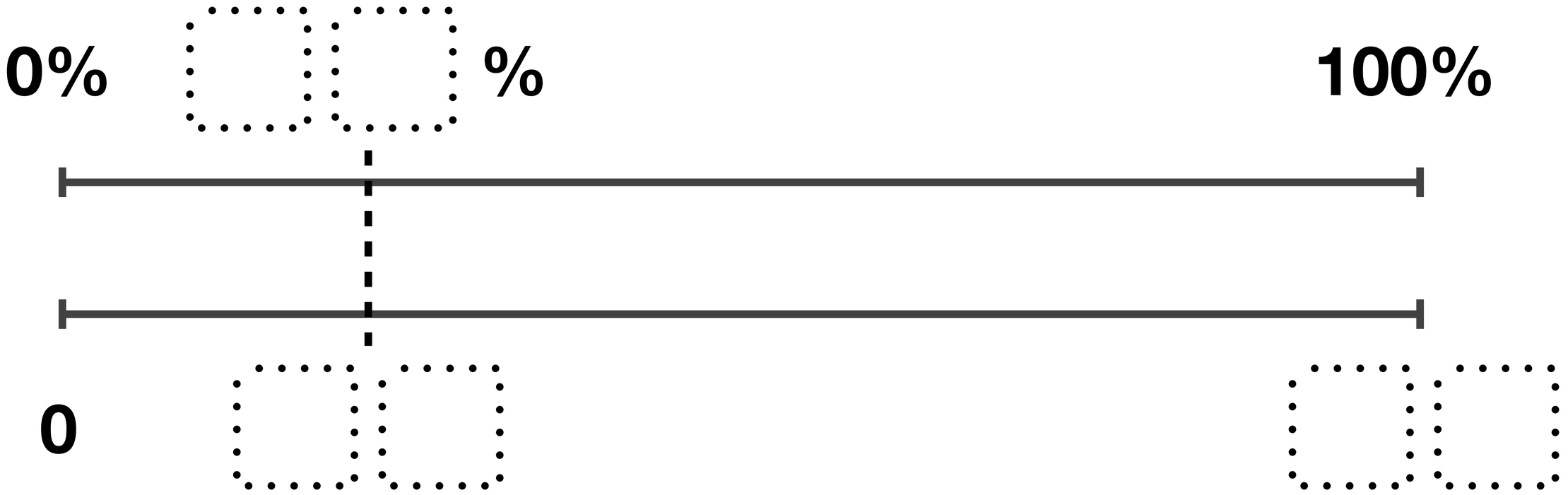

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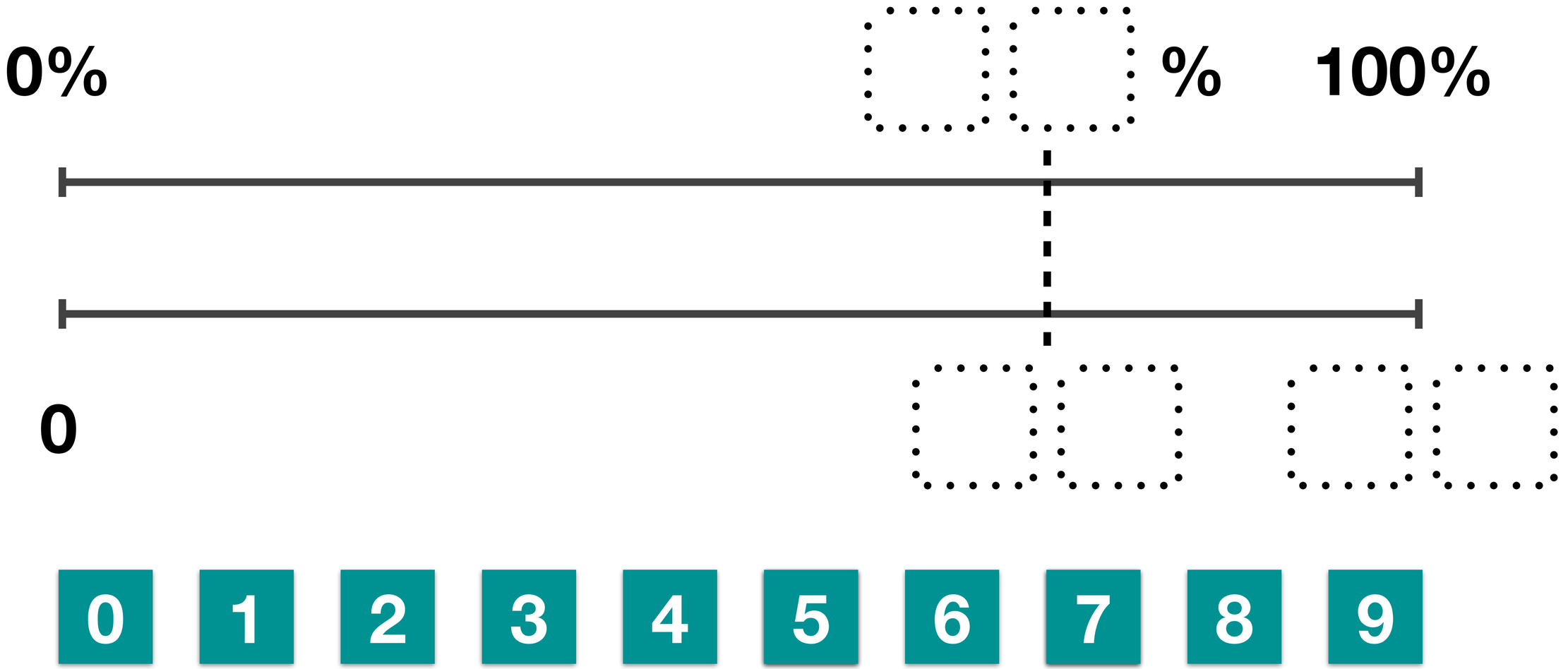


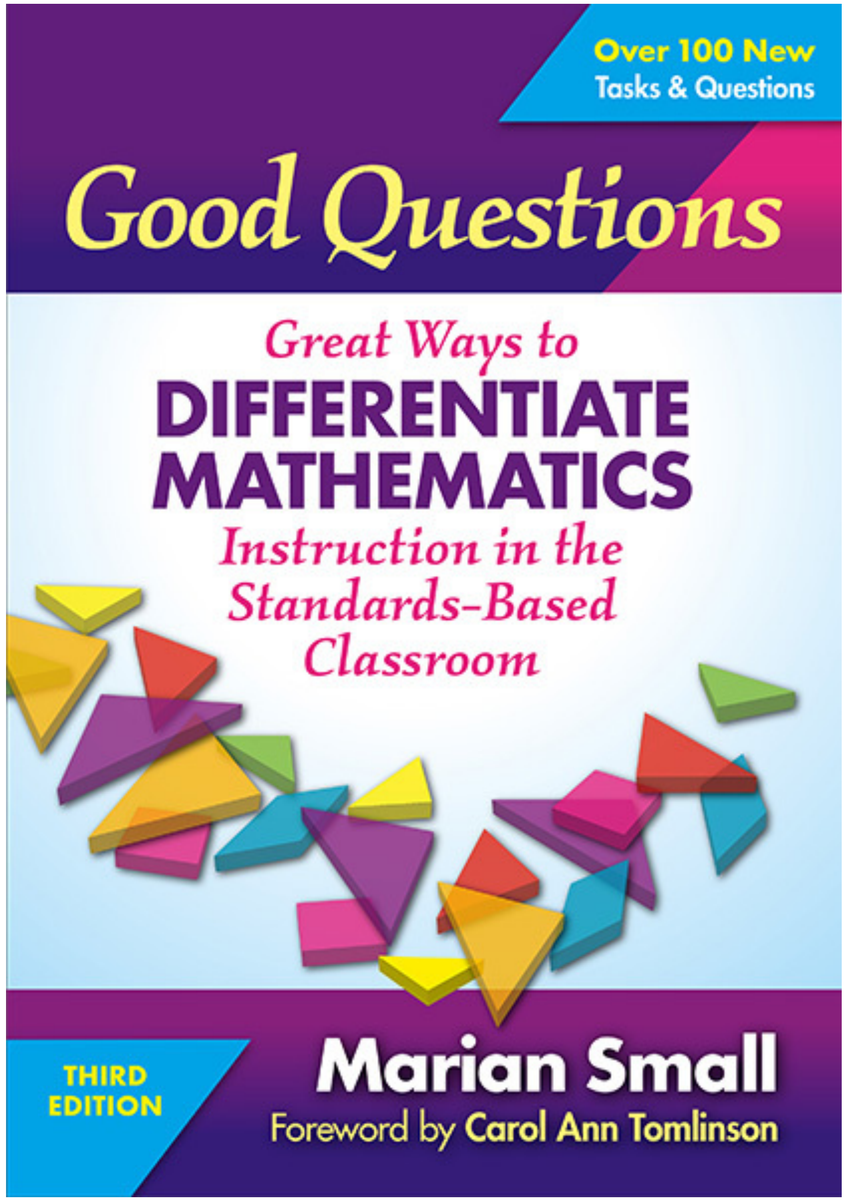
0 1 2 3 4 5 6 7 8 9

Why Should I Ask Open Questions?

inclusive

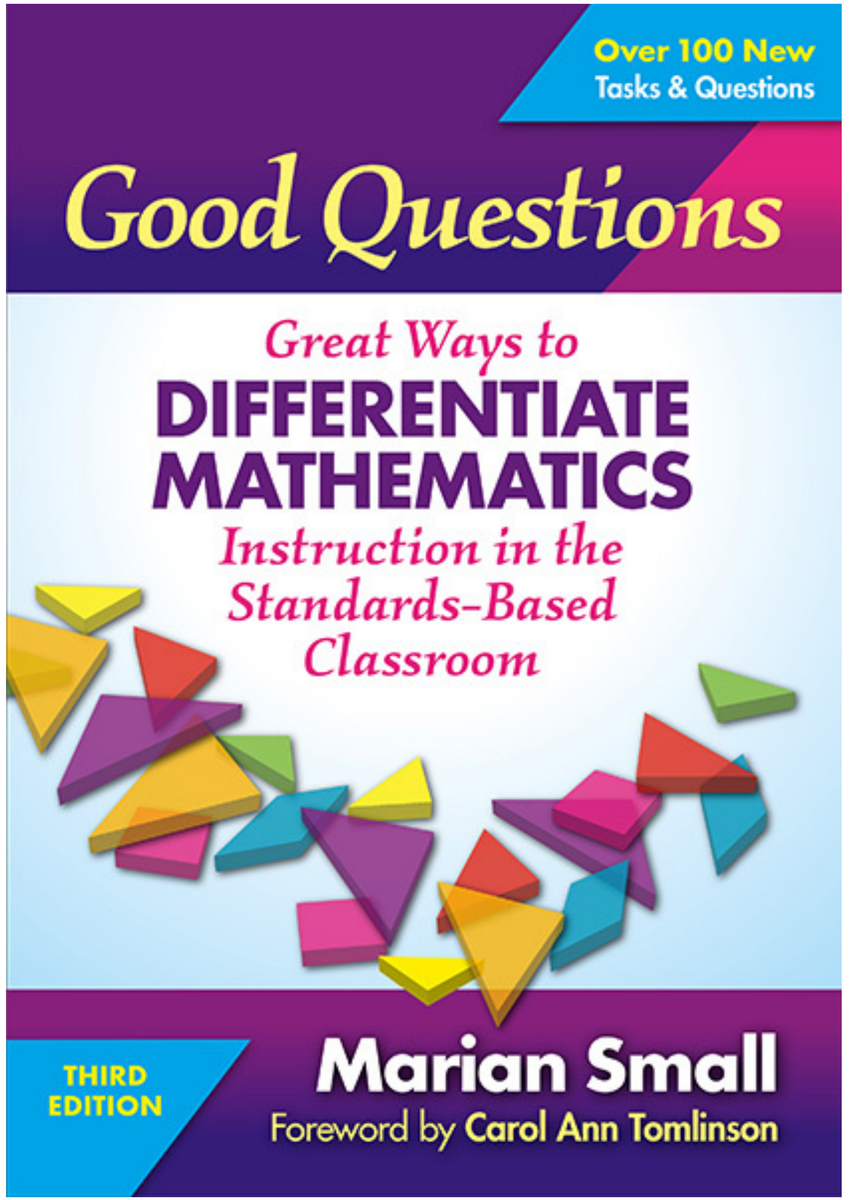
- allows for **different students** to approach a **single question** or **task** by using **different processes** or **strategies**
- allows for **all students** to **benefit** and **grow** from attention to the **task**
- allows for **all students** to **participate** fully and **gain** from the **classroom discussion**

another benefit…



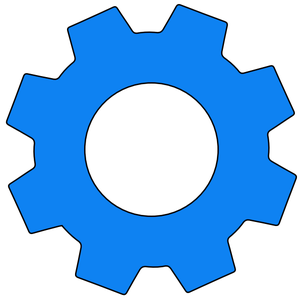
Why Should I Ask Open Questions?

It is the job of teachers to help see that ***mathematics is multifaceted****. Any mathematical concept can be considered from a variety of perspectives, and those multiple perspectives actually enrich its study. Open questions provide the opportunity to demonstrate this.*

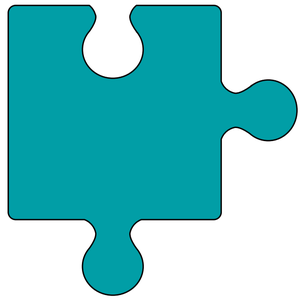


When Should I Ask Open Questions?

Getting Started



Working On It

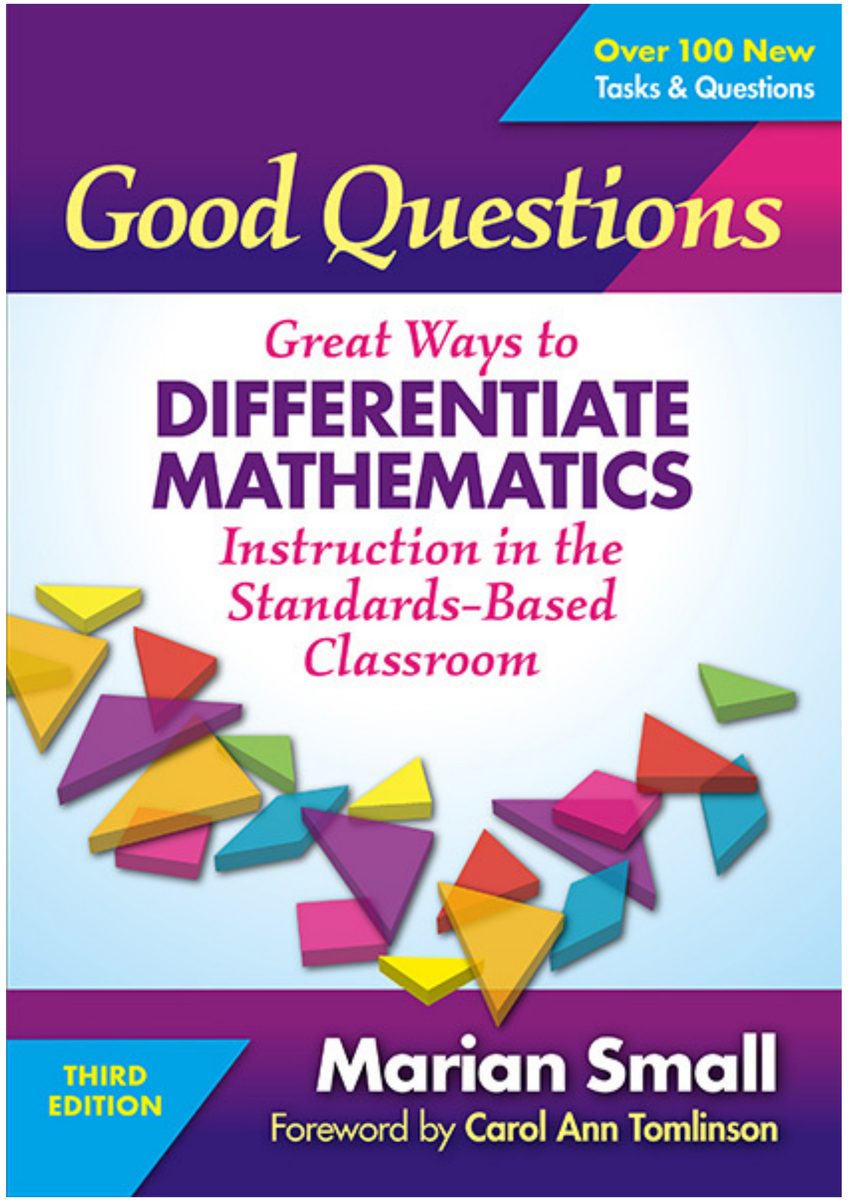


Consolidating

How Do I Create Open Questions?

Four Strategies

1. Turning Around a Question
2. Asking for Similarities and Differences
3. Replacing a Number with a Blank
4. Asking for a Number Sentence



How Do I Create Open Questions?

Four Strategies

1. Turning Around a Question
2. Asking for Similarities and Differences
3. Replacing a Number with a Blank
4. Asking for a Number Sentence

Which fraction do you think doesn't belong:
$\frac{3}{10}$, $\frac{3}{3}$, $\frac{1}{8}$, or $\frac{2}{3}$?

Which do you think doesn't belong:
4 × 23, 3 × 33, 5 × 21, 7 × 14?

How are the numbers 85 and 100 (or 350 and 550 or 6.001 and 1.006) alike? Different?

Do you think that the ratios 5:2 and 24:10 are more alike than the ratios 5:2 and 20:17?

How is adding decimals like adding whole numbers? How is it different?

Ways to Make $\sqrt[3]{6^6} + 6x$

"Write as many ways to make 36 ***as you can think of****."*

Ways to Make 36

“Write as many ways to make 36 ***as you can think of****.”*

“Write ways to make 36 with ***three*** *addends.”*

“Think of ways to make 36 using ***subtraction****.”*

“Think of ways to make 36 using ***multiplication****.”*

Ways to Make 36

From freedom…

“Write as many ways to make 36 ***as you can think of****.”*

… to constraints

“Write ways to make 36 with ***three*** *addends.”*

“Think of ways to make 36 using ***subtraction****.”*

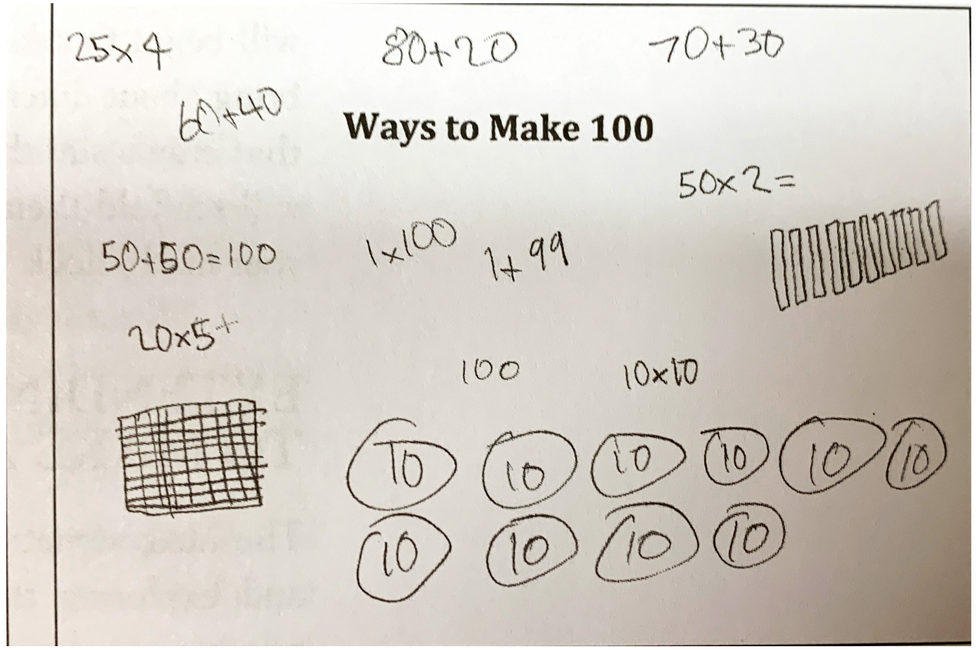
“Think of ways to make 36 using ***multiplication****.”*

From freedom…

… to constraints

Ways to Make a Number

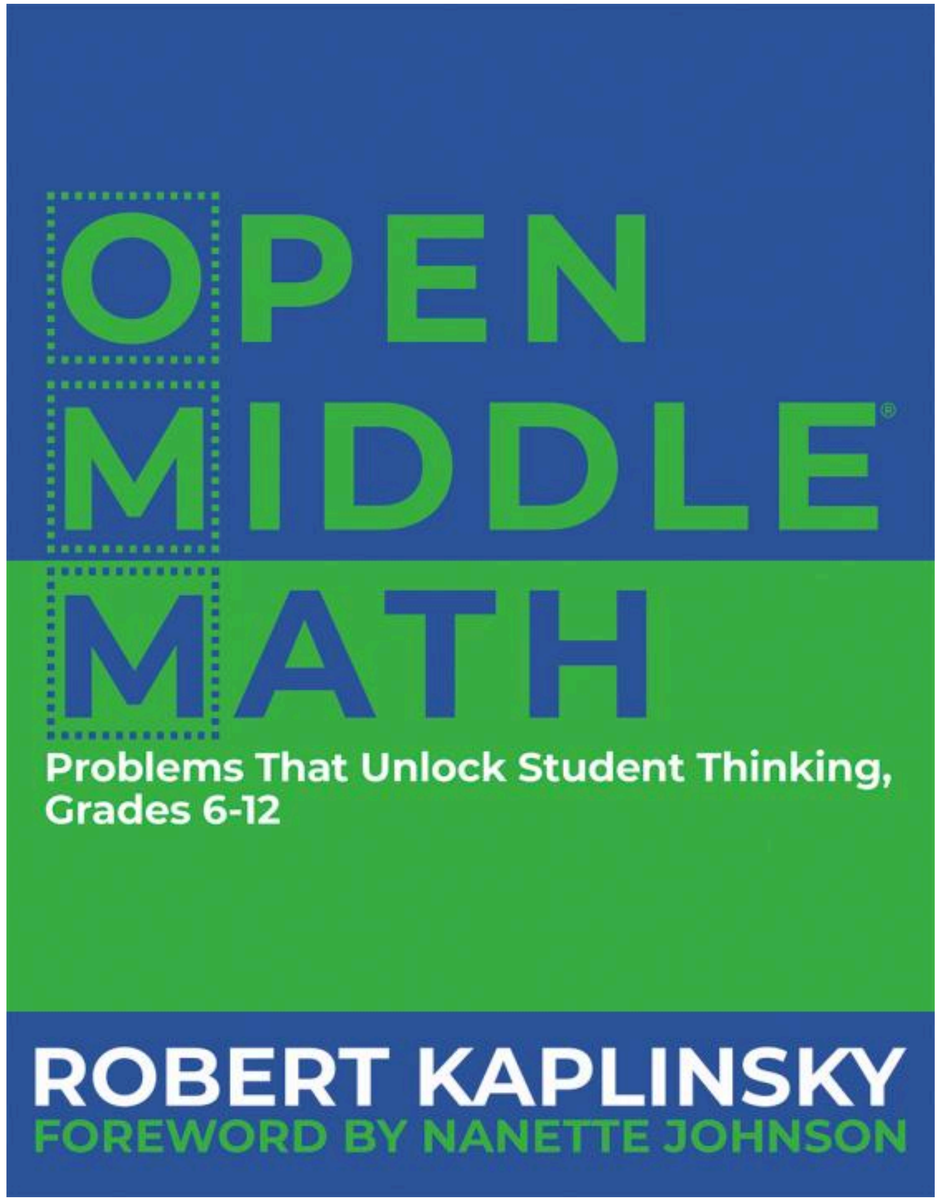
What to L  k For



- **decomposing**
  - expanded notation, place value, unit fractions, benchmarks or friendly numbers, etc.
- using **patterns**
- **visual** ways of thinking about numbers
  - pictures, number lines, tallies, base ten blocks, etc.

Open Middle Math

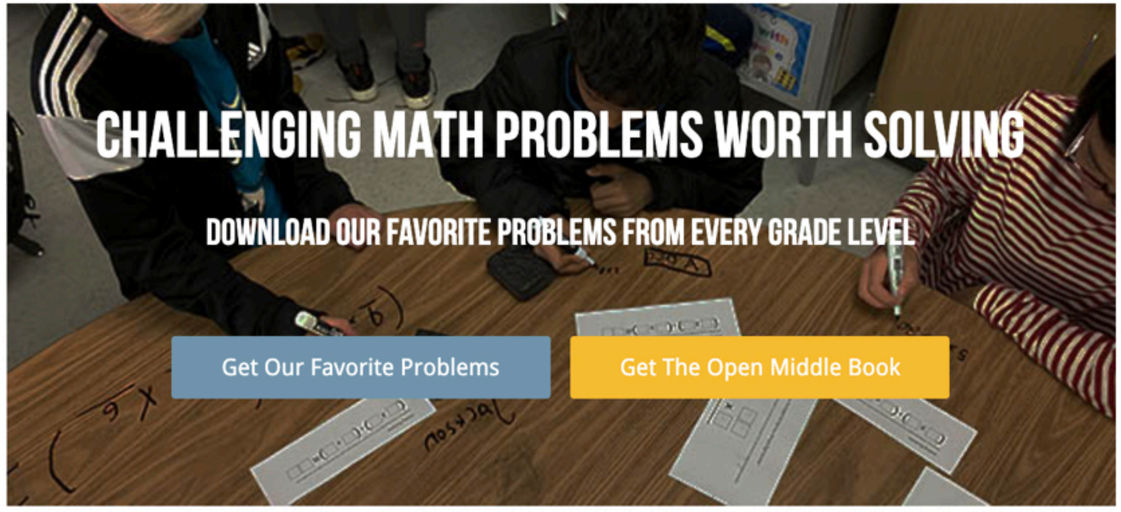
[M]ost math problems begin with everyone having the same problem and working toward the same answer. As a result, the beginning and ending are closed. What varies is the middle. Sometimes a problem's instructions tell students to complete a problem using a specific method (a closed middle). Other times, there are possibly many ways to solve the problem (an open middle). ***Problems with open middles tend to be much more interesting and lead to richer conversations.***



OPEN MIDDLE

Get The Open Middle Book

Home | Kinder | 1st Gr | 2nd Gr | 3rd Gr | 4th Gr | 5th Gr | 6th Gr | 7th Gr | 8th Gr | High School | About | Submit | English



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OPEN MIDDLE STICKERS

Get an Open Middle sticker

OPEN MIDDLE WORKSHEET

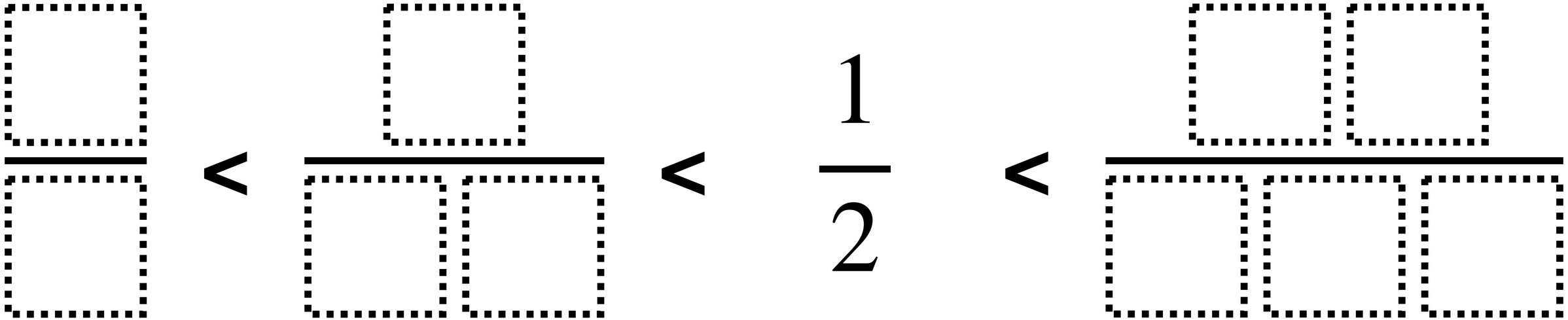
English (student version)
English (document camera version)
French (student version)
French (document camera version)
Spanish (student version)
Spanish (document camera version)

NUMBER TILES

Printable PDF with the digits 0 to 9
Printable PDF with the integers -9 to 9

BROWSE BY COMMON CORE STATE STANDARDS

Place the digits from 0 to 9 in the boxes below to make the statement true.



0 1 2 3 4 5 6 7 8 9

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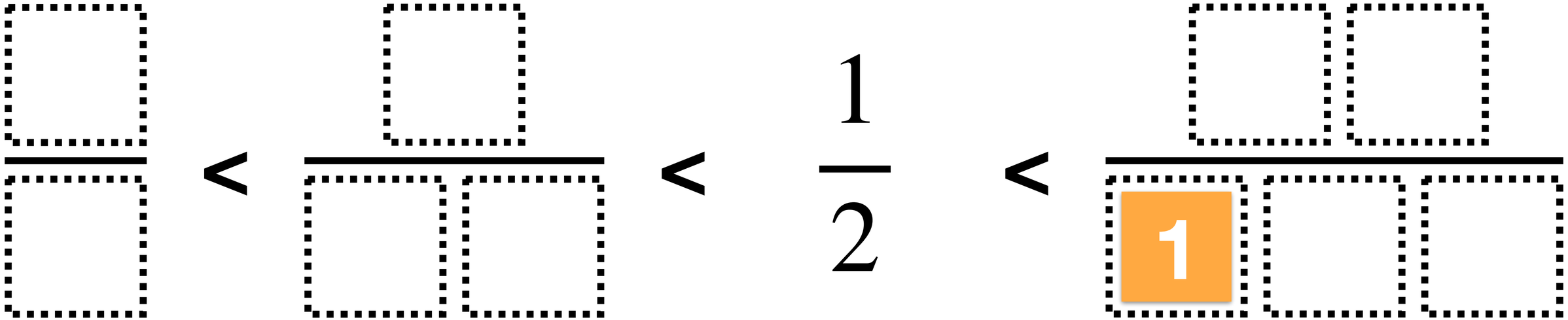

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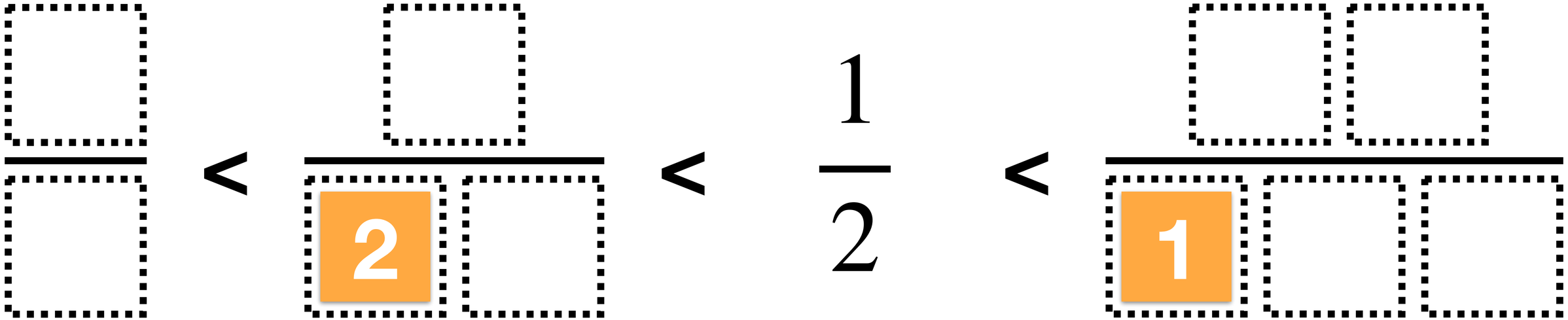

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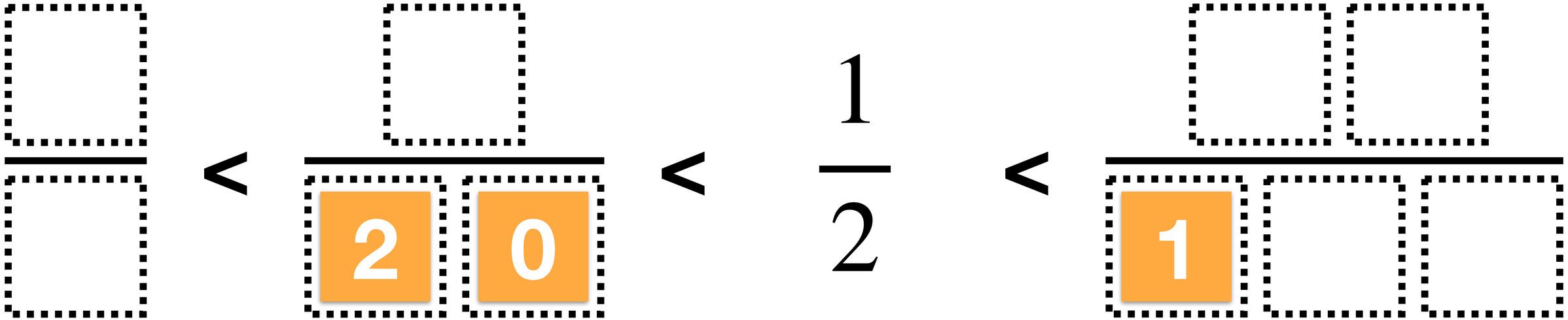

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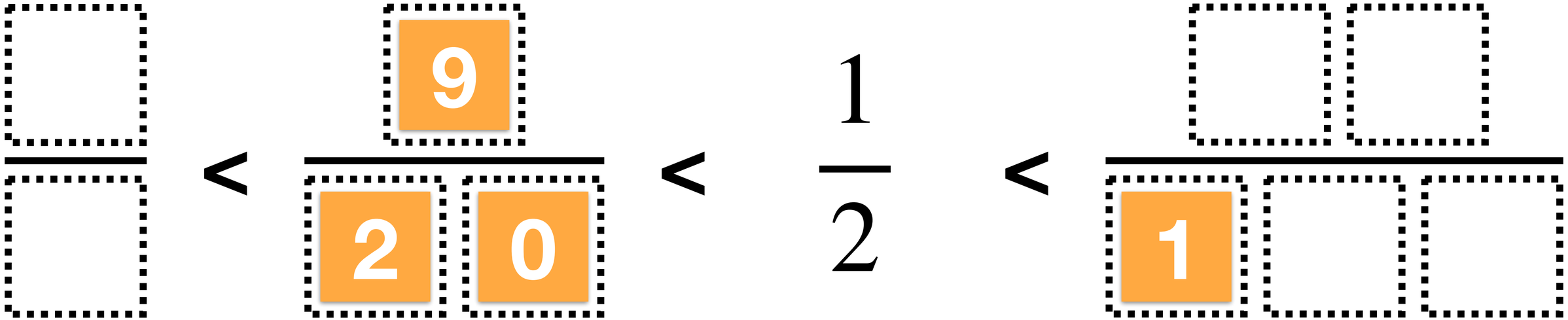

3 4 5 6 7 8

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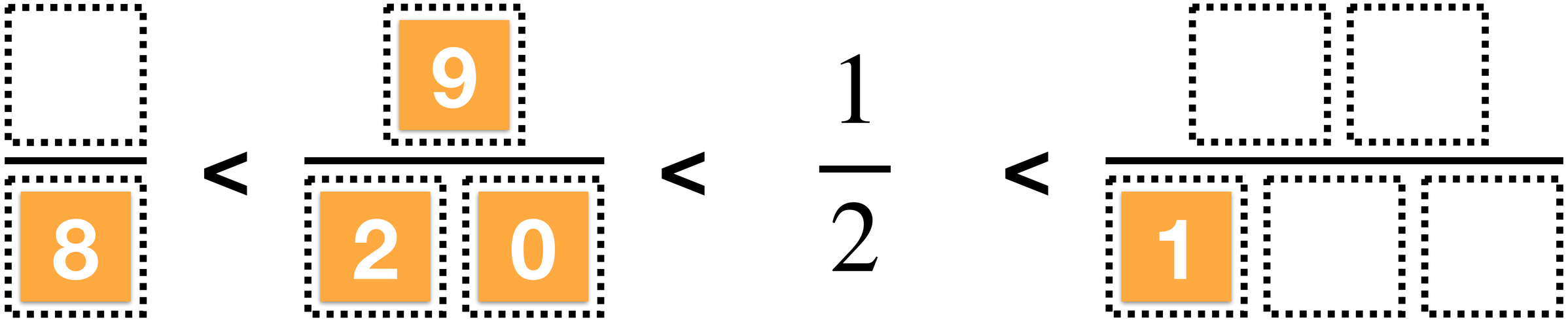
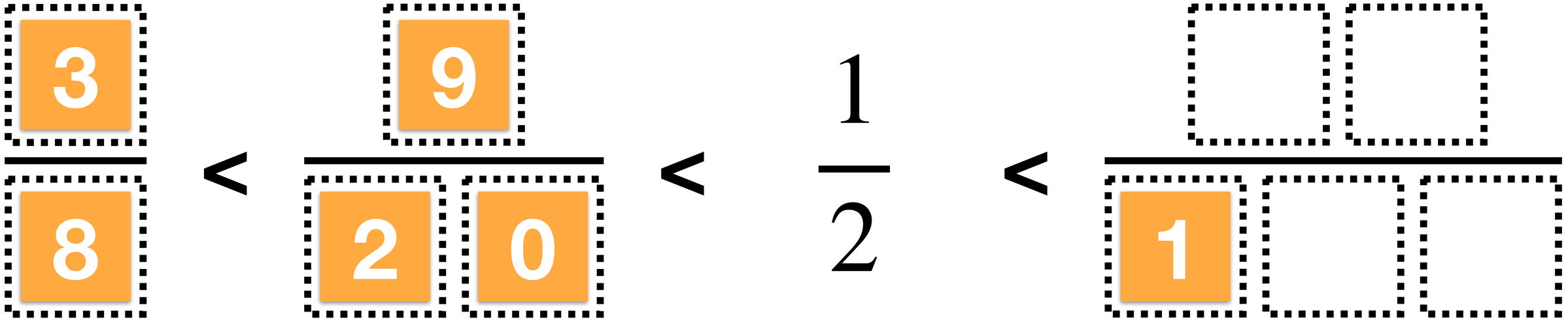


3 4 5 6 7

Place the digits from 0 to 9 in the boxes below to make the statement true.



4 5 6 7

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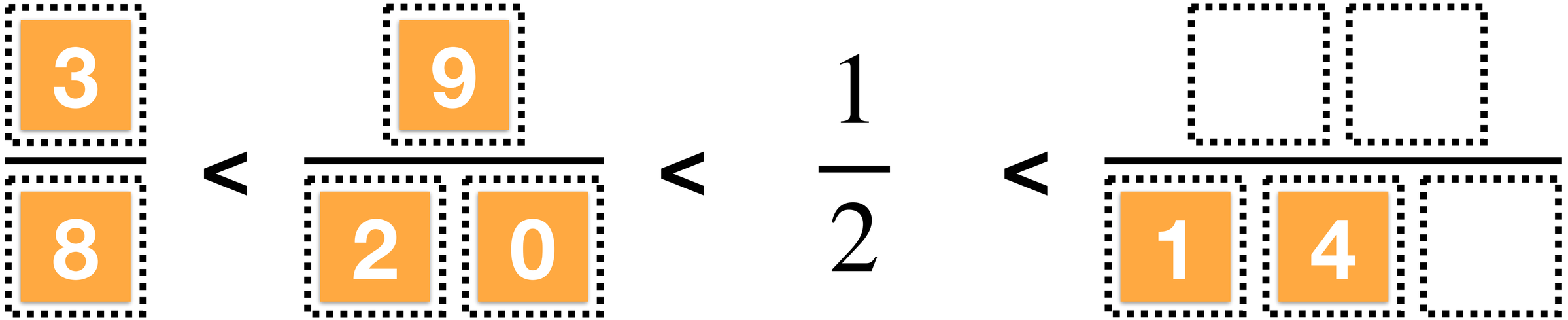
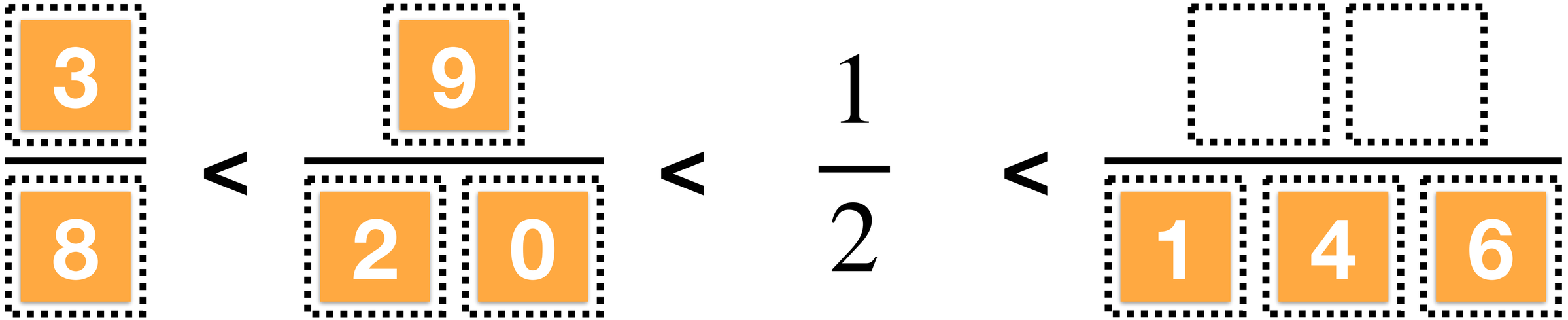


5 6 7

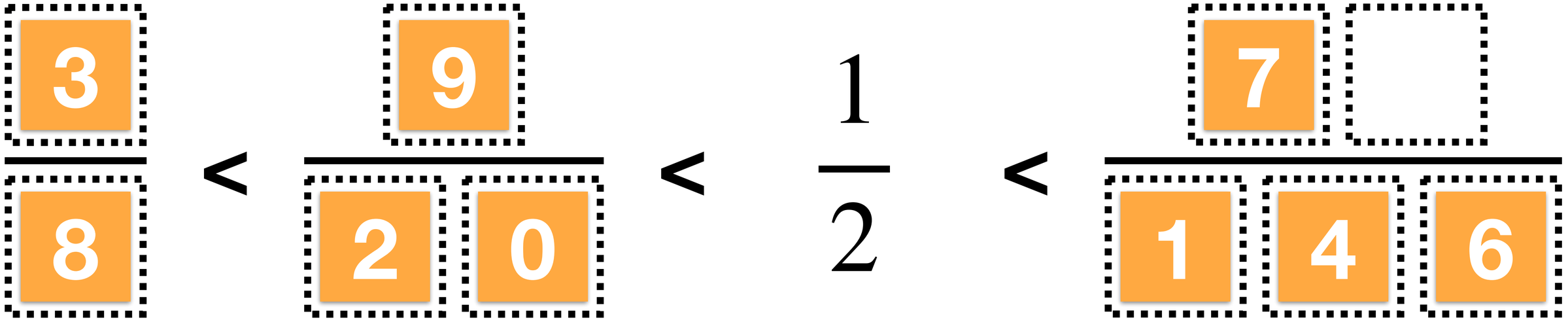
Place the digits from 0 to 9 in the boxes below to make the statement true.



5

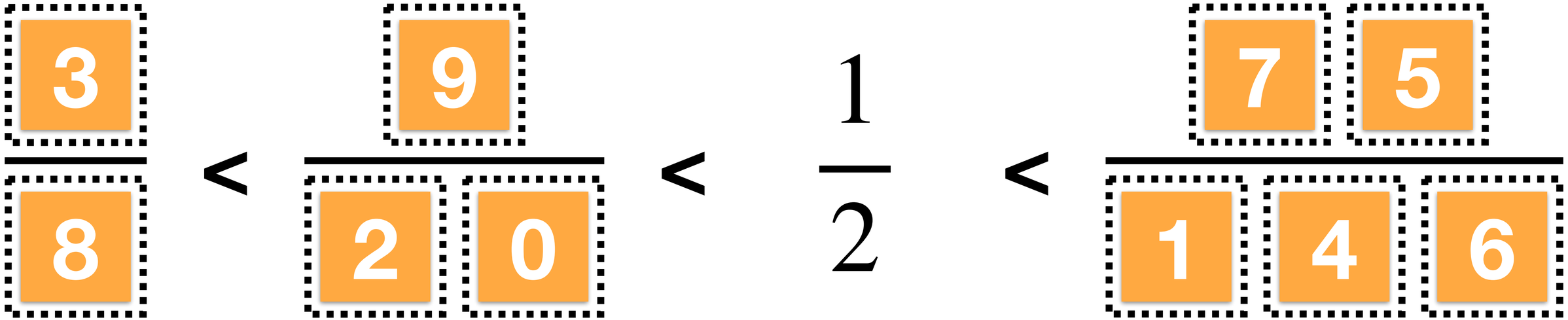
7

Place the digits from 0 to 9 in the boxes below to make the statement true.



5

Place the digits from 0 to 9 in the boxes below to make the statement true.



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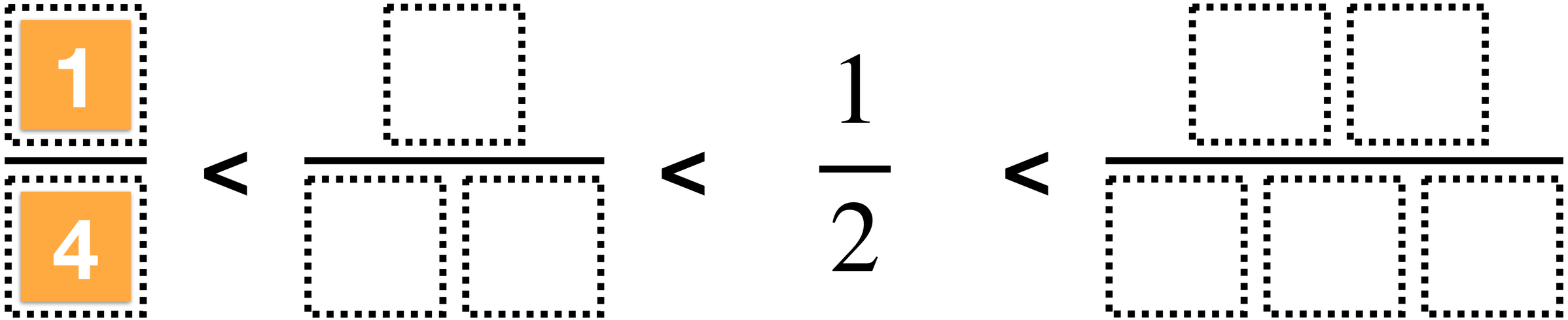
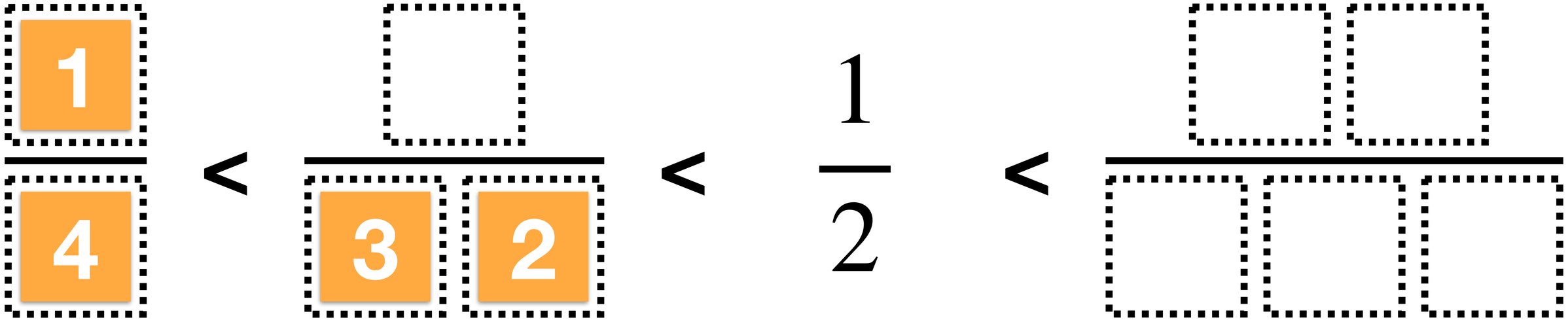


0 2 3 5 6 7 8 9

Place the digits from 0 to 9 in the boxes below to make the statement true.



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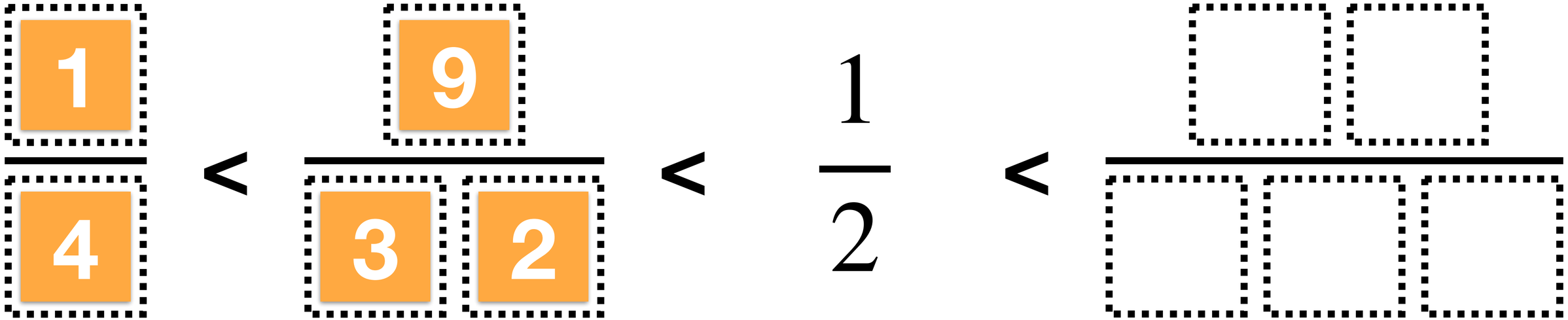
5 6 7 8 9

Place the digits from 0 to 9 in the boxes below to make the statement true.



0

5 6 7 8

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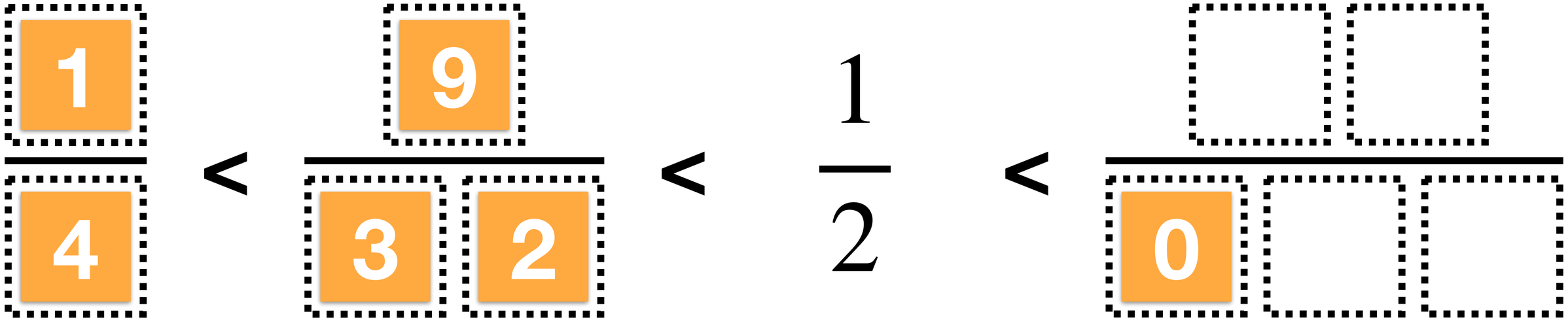

5 6 7 8

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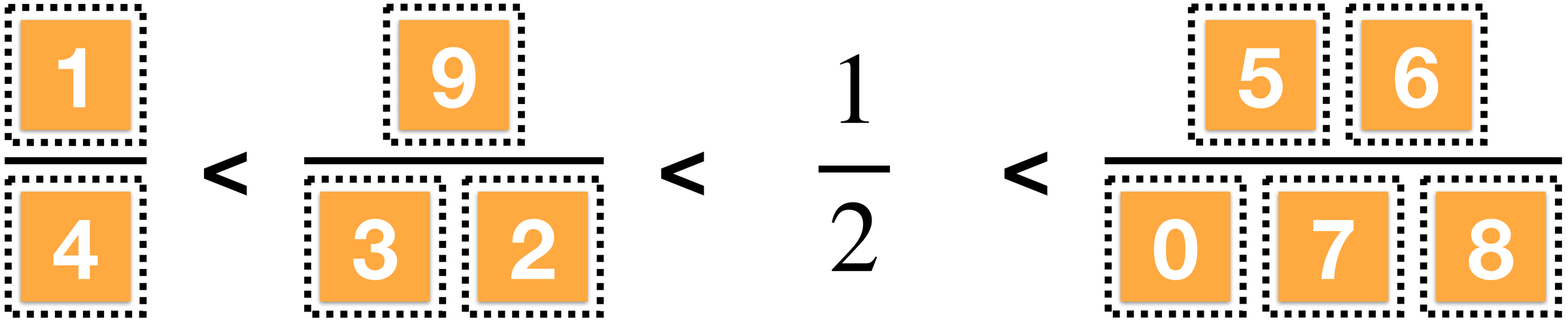


Math Challenge #25 GRAPE JUICE JUNGLE

FigureThis! Math Challenges for Families

Which tastes JUICIER??

Figure This! If all grape juice concentrates are the same strength, which recipe would you expect to have the strongest grape taste?

Ratios are fractions that compare two or more quantities. Shoppers use ratios to compare prices; cooks use them to adjust recipes. Architects and designers use ratios to create scale drawings.

Jerry’s Juice

2 : 3

Grapeade

5 : 8

Good Grape

3 : 4

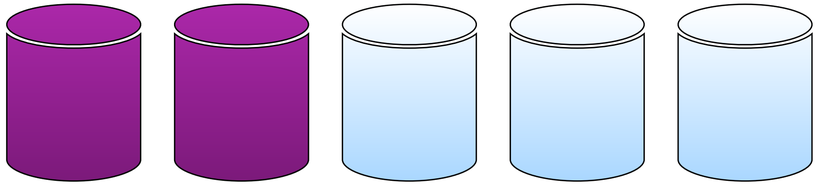
Jane’s Juice

4 : 7

Jerry's Juice

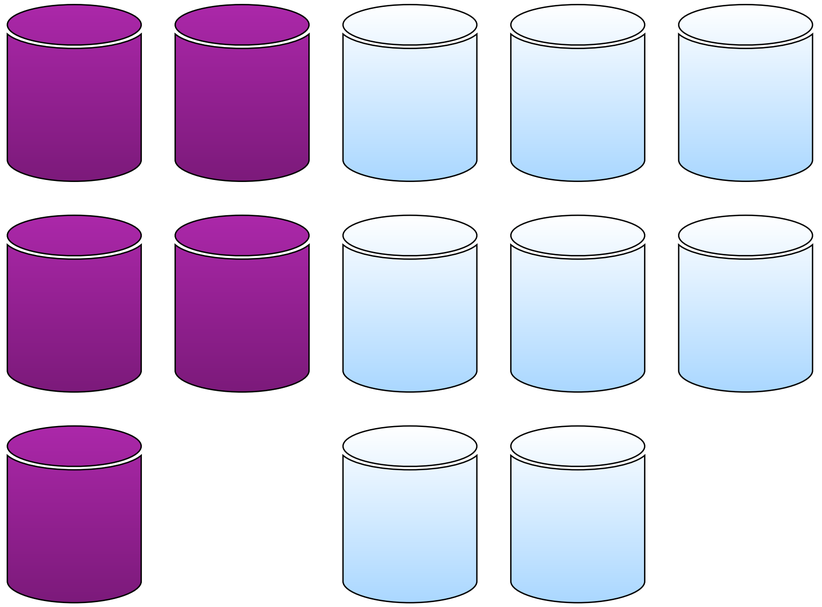
$2:3$

$$\frac{2}{2+3}$$



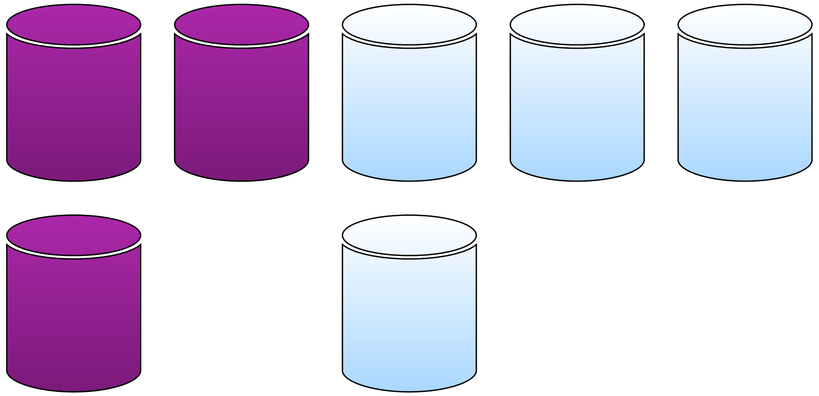
Grapeade

$5:8$



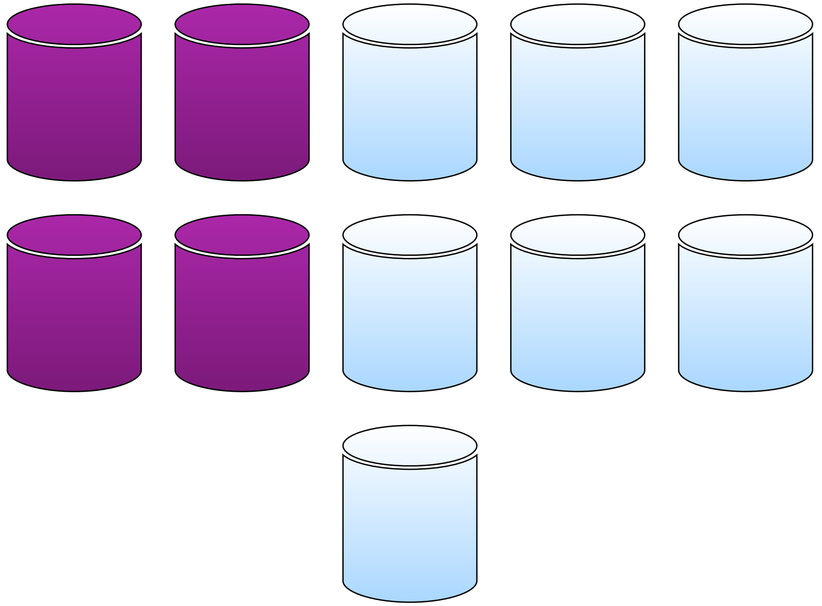
Good Grape

$3:4$



Jane's Juice

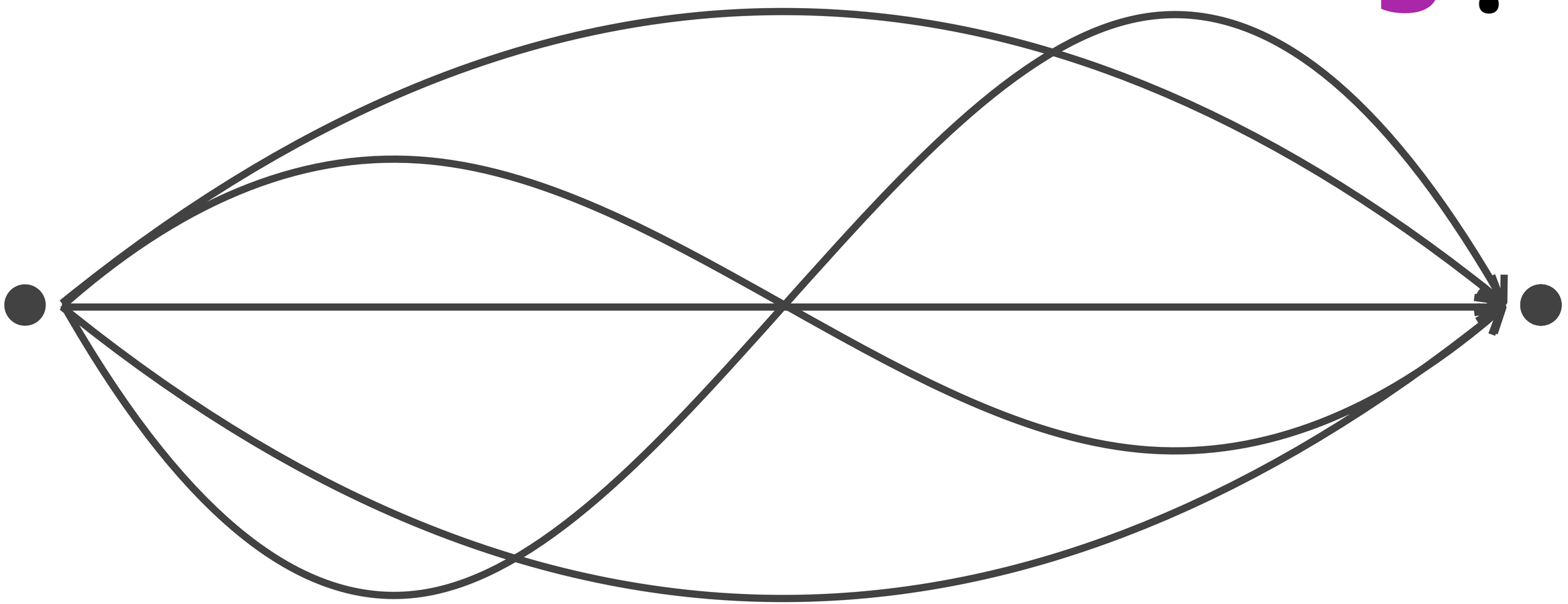
$4:7$



Which tastes the **juiciest**?

Good Grape

3 : 4



beginning

middle

open

end

closed

Links

- https://chrishunter.ca/2021/03/02/open-middle-math/
- https://chrishunter.ca/2020/04/29/egg-head/
- https://chrishunter.ca/2018/12/13/a-function-of-freedom-and-constraints/
- https://chrishunter.ca/2017/11/01/alike-different-which-one-doesnt-belong-more/
- https://chrishunter.ca/2014/10/27/cola-comparison/
- https://wodb.ca/
- https://samedifferentimages.wordpress.com/
- https://www.openmiddle.com/

Thank you!

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