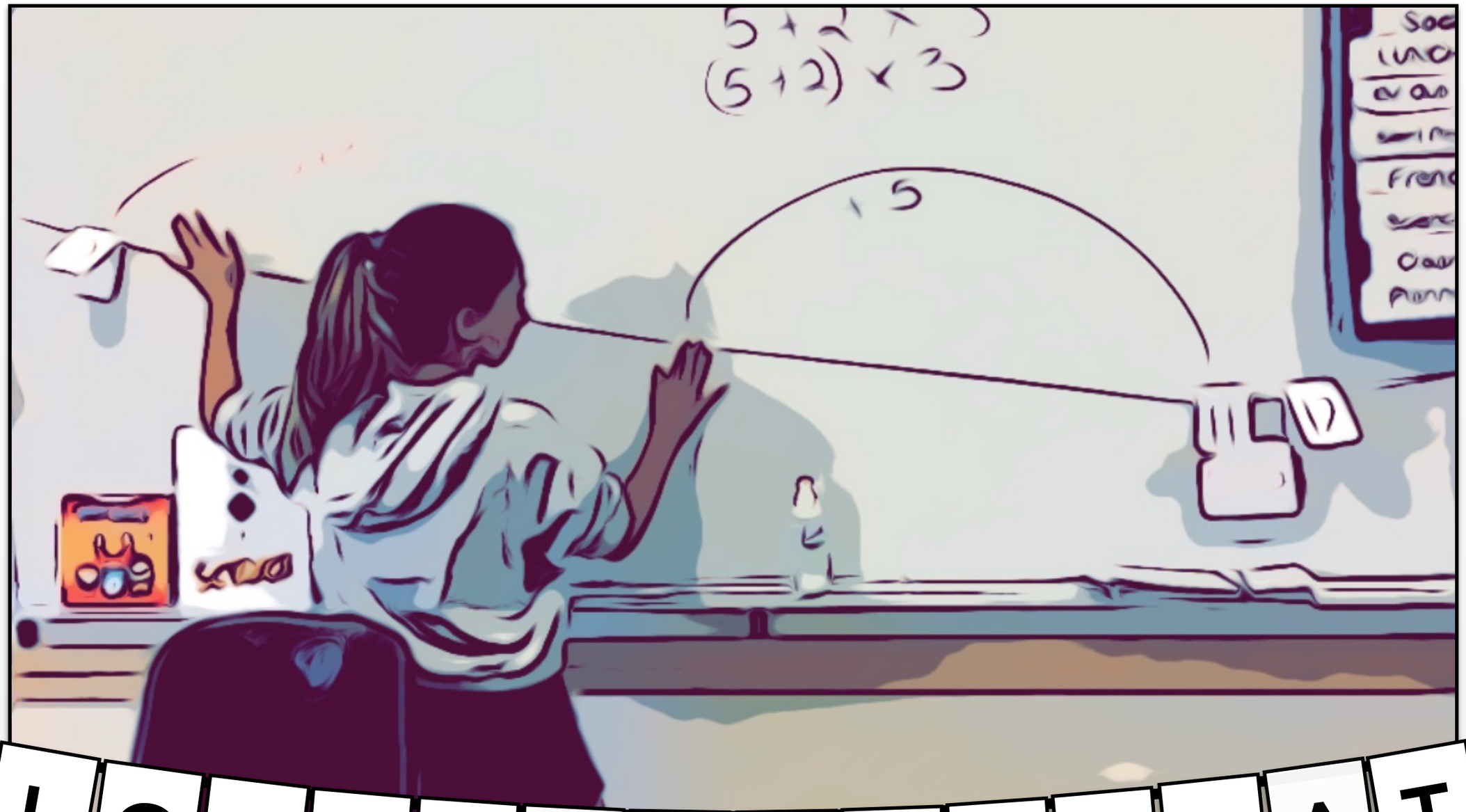


The Master Number Sense Maker

BCAMT Fall Conference • October 2019

Welcome!

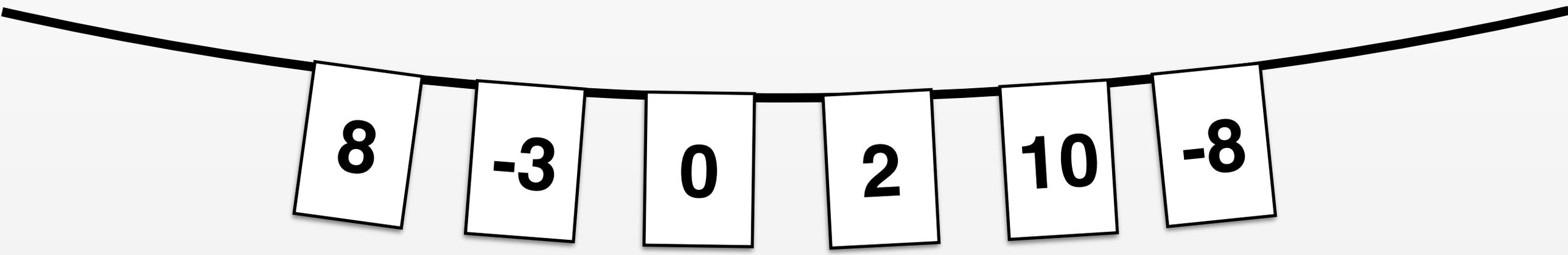
Alex Sabell

Grade 5/6 Teacher
email: **sabell_a@surreyschools.ca**
twitter: **@sabell_alex**

Chris Hunter

K-12 Numeracy Helping Teacher
email: **hunter_c@surreyschools.ca**
twitter: **@ChrisHunter36**
blog: **reflectionsinthewhy.wordpress.com**

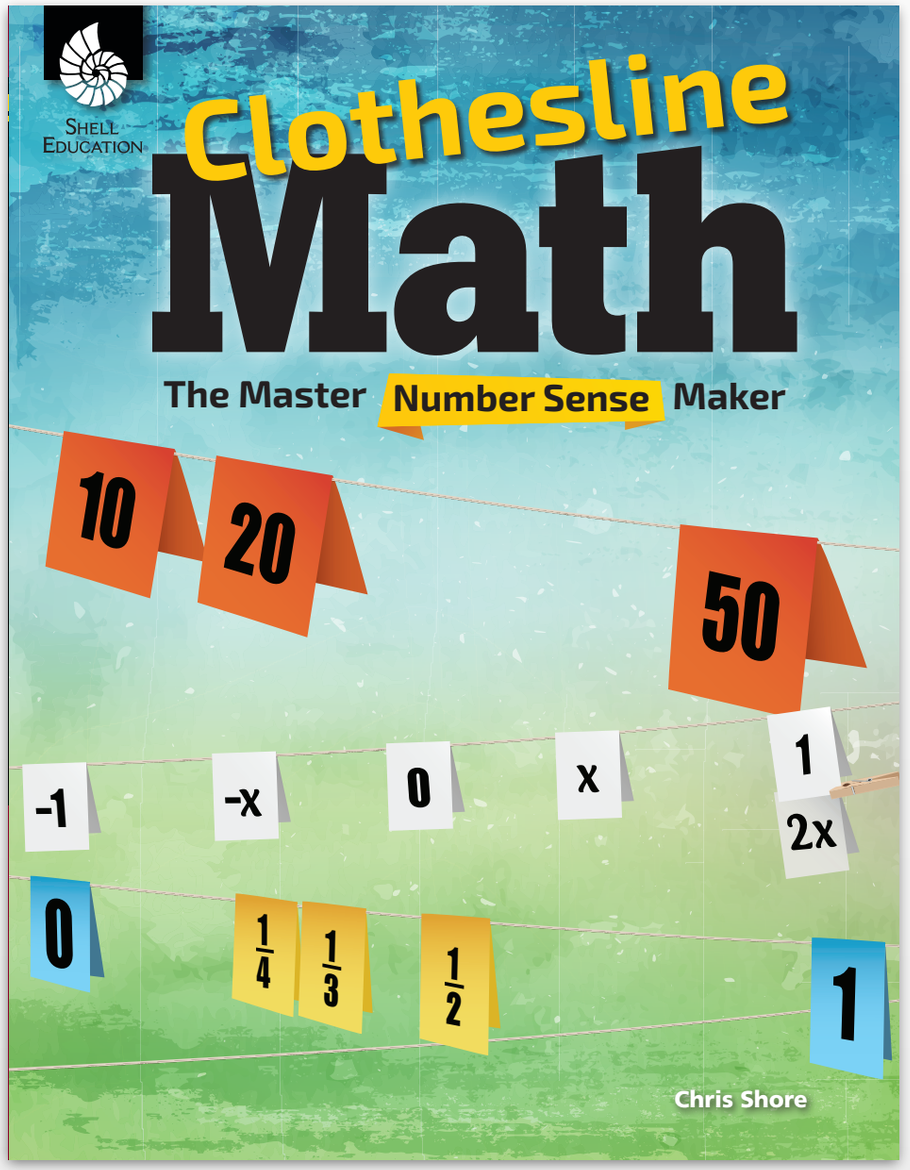
Place…



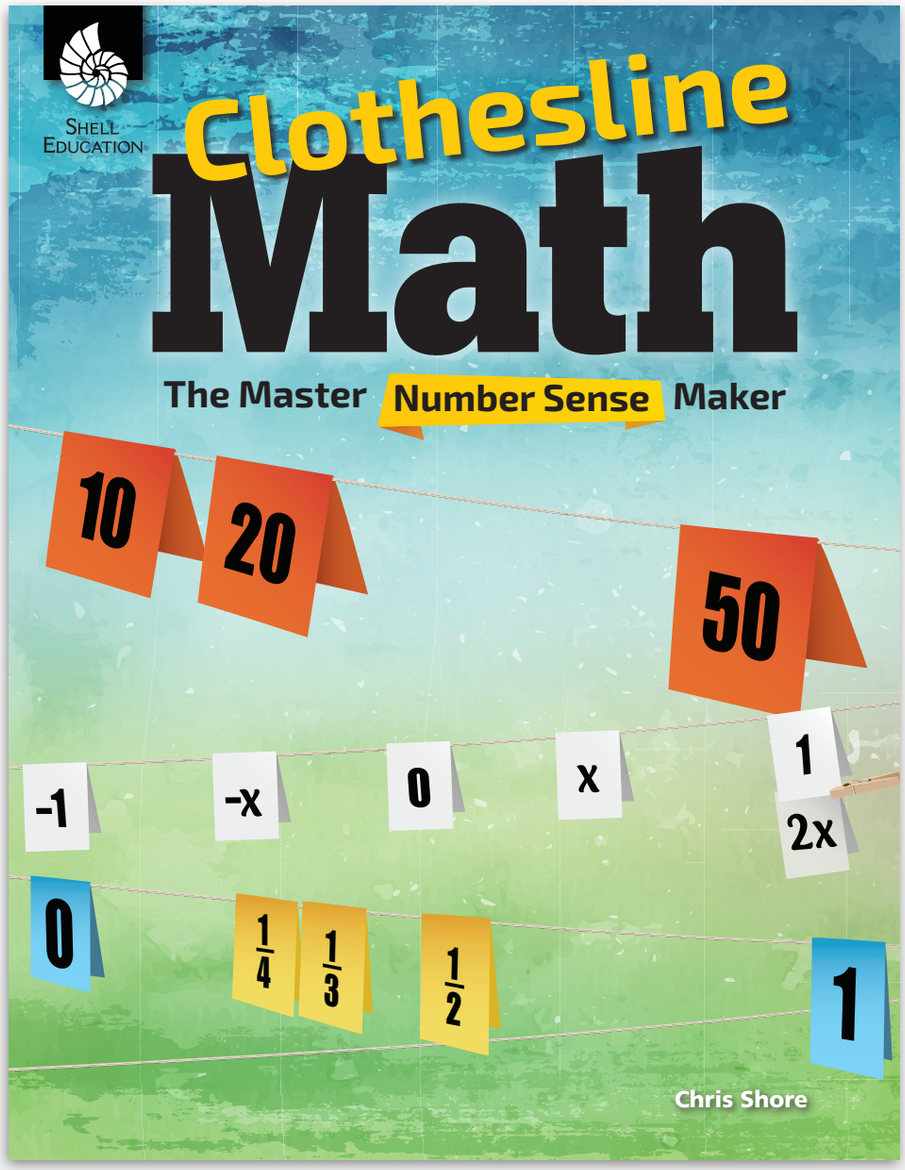
… then Space!

What is Clothesline Math?

- a **tool**
  - **open & dynamic** number line
  - requires students establish **benchmarks** and a **scale**
- helps students build understanding of **cardinality**, a sense of **magnitude**, and **proportional reasoning**



What is Clothesline Math?



- a **routine**
  - intended for classroom **discourse**

Shell Education

Clothesline Math

The Master Number Sense Maker

What is Number Sense?

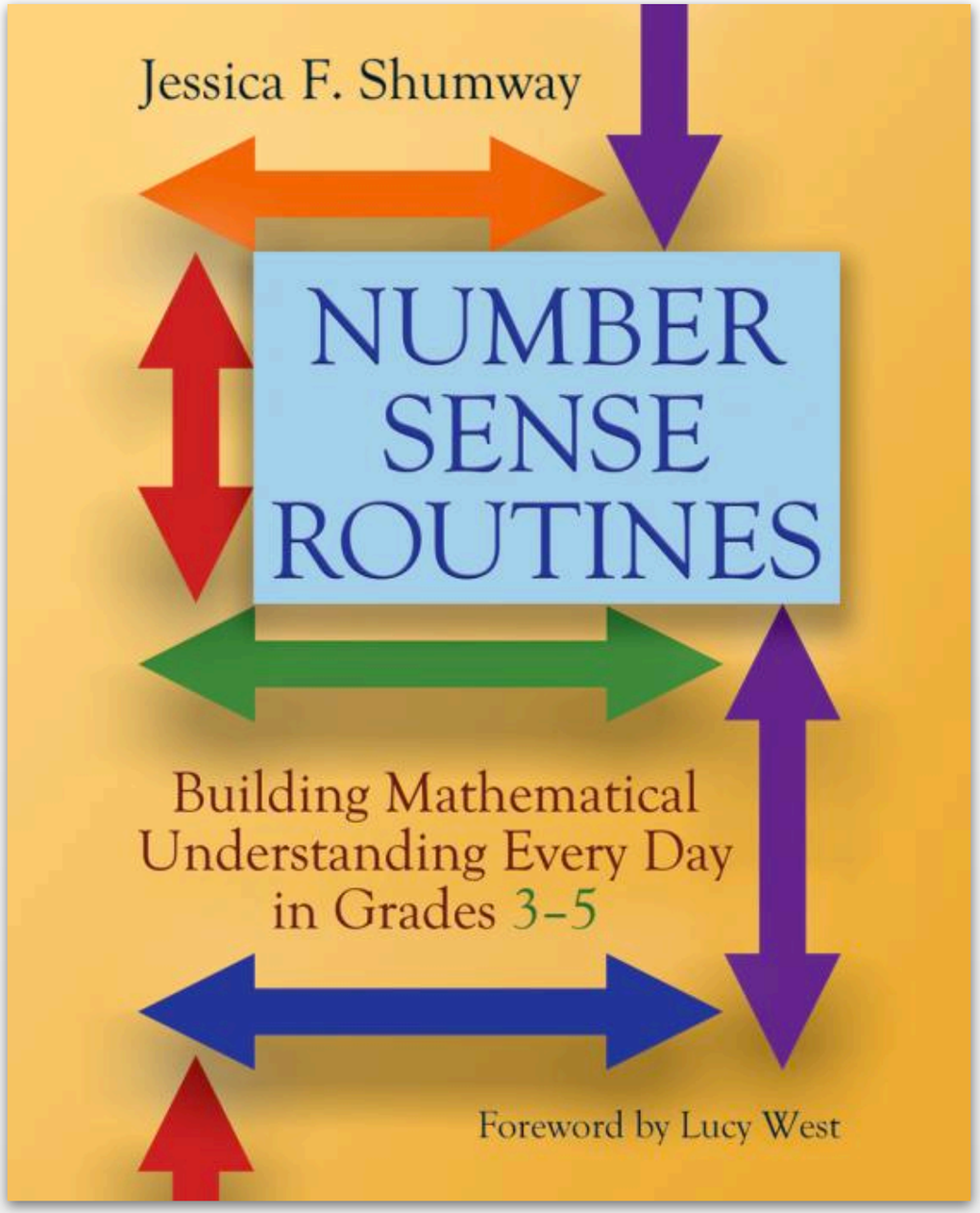
Think of a student you would describe as having number sense.

What understandings and skills does this student have?

Number Sense Understandings & Skills

- a sense of what numbers mean
- an ability to look at the world in terms of quantity and numbers
- an ability to make comparisons among quantities
- flexibility, automaticity, and fluidity with numbers
- an ability to perform mental math
- flexibility with problems
- automatic use of math information
- an ability to determine reasonableness of an answer
- an ability to decide upon a strategy based on the numbers in a problem

pp. 9-10

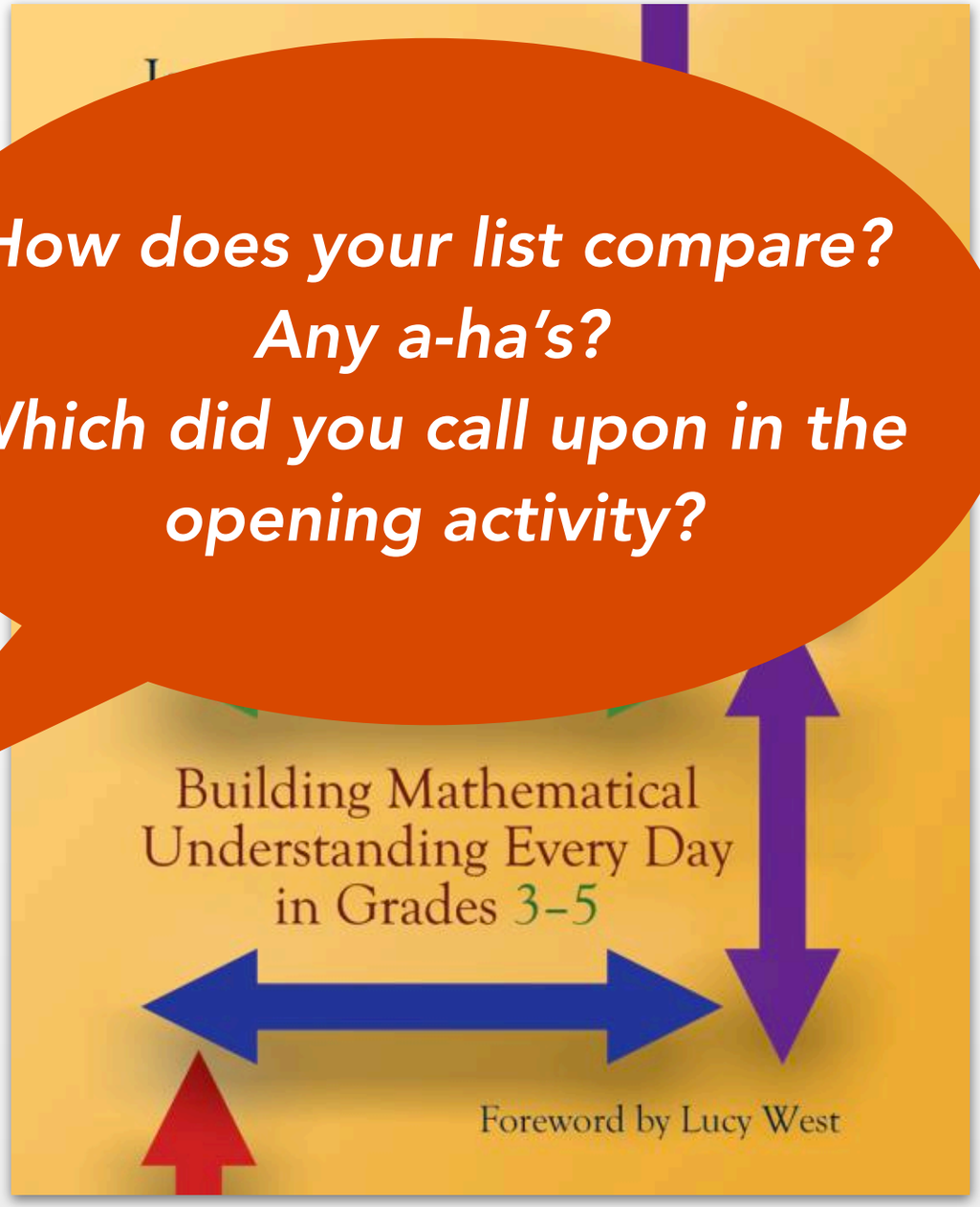


Number Sense Understandings & Skills

- a sense of what numbers mean
- an ability to look at the world in terms of quantity and numbers
- an ability to make comparisons among quantities
- flexibility, automaticity, and fluidity with numbers
- an ability to perform mental math
- flexibility with problems
- automatic use of math information
- an ability to determine reasonableness of an answer
- an ability to decide upon a strategy based on the numbers in a problem

pp. 9-10

How does your list compare? Any a-ha's? Which did you call upon in the opening activity?



Fractions

$\frac{1}{2}$

$\frac{1}{3}$

$\frac{1}{4}$

Fractions

What misconceptions might students have?

How might you respond?

$\frac{1}{2}$

$\frac{1}{3}$

$\frac{1}{4}$

McDonald's New Third-Pounder May Not Add Up

April 16, 2015 | Taubman

The announcement last week that McDonald's will be adding a new third-pound burger to its menu brought back some unpleasant memories for me. I don't have anything against McDonald's and I wish the company's new CEO Steve Easterbrook the best of luck in revitalizing the brand. But from my experience as owner of A&W Restaurants from 1982 to 1994, I'm concerned that the American consumer may not fully understand or value the third-pound promise.

As I point out in the chapter on A&W in my memoir *Threshold Resistance*:

> We were aggressively marketing a one-third-pound hamburger for the same price as a McDonald's Quarter Pounder. But despite our best efforts . . . they just weren't selling. Perplexed, we called in the renowned market research firm Yankelovich, Skelly and White to conduct focus groups and competitive taste tests.
>
> Well, it turned out that customers preferred the taste of our fresh beef over traditional fast-food hockey pucks. Hands down, we had a better product. But there was a serious problem. More than half the participants in the Yankelovich focus groups questioned the price of our burger. "Why," they asked, "should we pay the same amount of a third of a pound of meat as we do for a quarter-pound of meat at McDonald's? You're overcharging us." Honestly. People thought a third of a pound was less than a quarter of a pound. After all, three is less than four!*

Needless to say, we recalibrated our marketing. The customer, regardless of his or her

Categories

- ALS
- Art & Architecture
- Business
- Charitable Opportunities
- Detroit
- Development Theory
- Education
- Eva Feldman
- Family
- Jewish Life
- Life
- Max Wicha
- Medical Ethics
- Medical Research
- Michigan
- Politics
- Real Estate
- Retail Therapy
- Taubman Institute

McDonald's New Third-Pounder May Not Add Up

April 16, 2015 | Taubman

The announcement last week that McDonald's will be adding a new third-pound burger to its menu brought back some unpleasant memories for me. I don't have anything against McDonald's and I wish the company's new CEO Steve Easterbrook the best of

groups questioned the price of our burger. "Why," they asked, "should we pay the same amount of a third of a pound of meat as we do for a quarter-pound of meat at McDonald's? You're overcharging us." Honestly. People thought a third of a pound was less than a quarter of a pound. After all, three is less than four!*

as a McDonald's Quarter Pounder. But despite our best efforts . . . they just weren't selling. Perplexed, we called in the renowned market research firm Yankelovich, Skelly and White to conduct focus groups and competitive taste tests.

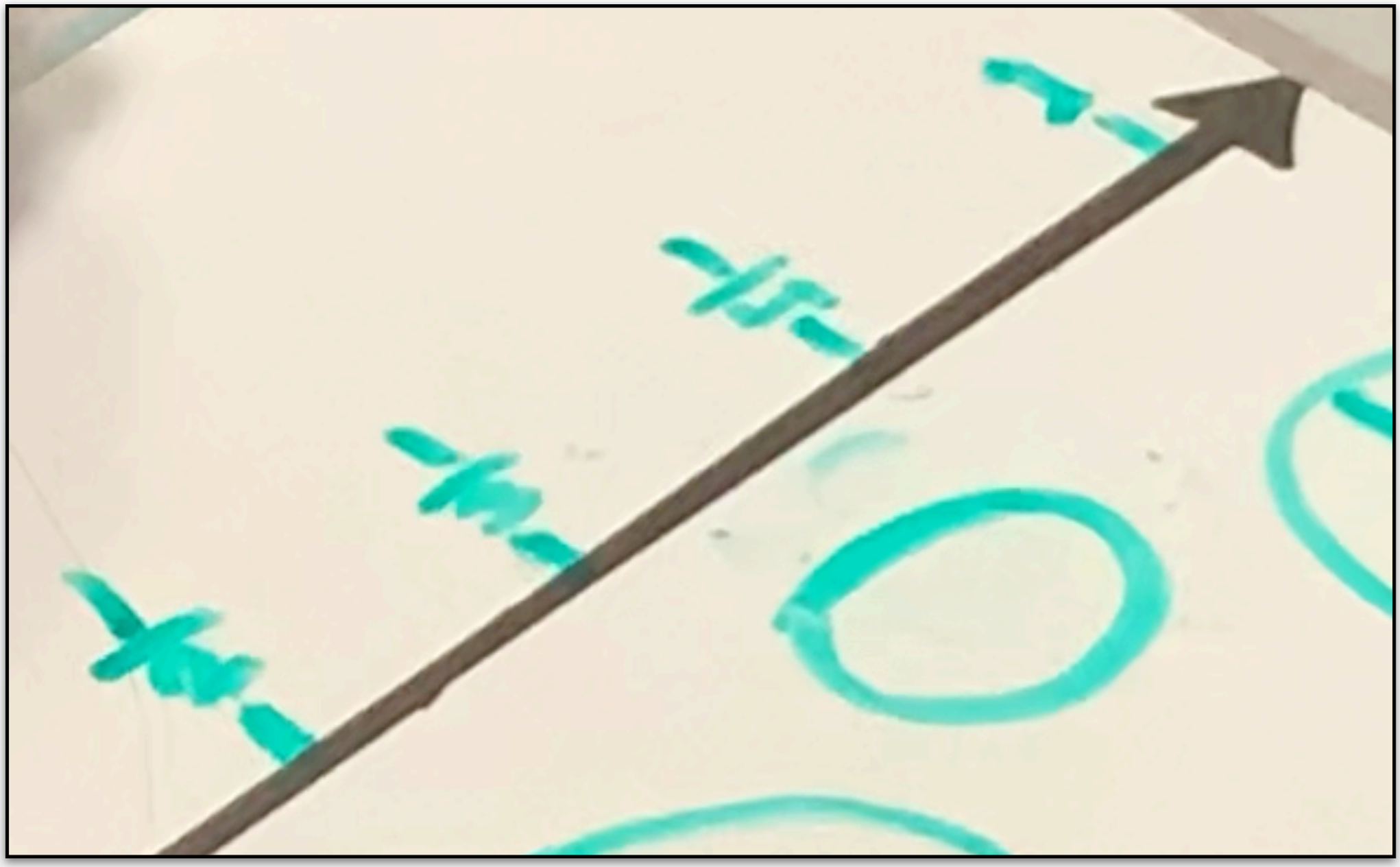
Well, it turned out that customers preferred the taste of our fresh beef over traditional fast-food hockey pucks. Hands down, we had a better product. But there was a serious problem. More than half the participants in the Yankelovich focus groups questioned the price of our burger. "Why," they asked, "should we pay the same amount of a third of a pound of meat as we do for a quarter-pound of meat at McDonald's? You're overcharging us." Honestly. People thought a third of a pound was less than a quarter of a pound. After all, three is less than four!*

Needless to say, we recalibrated our marketing. The customer, regardless of his or her

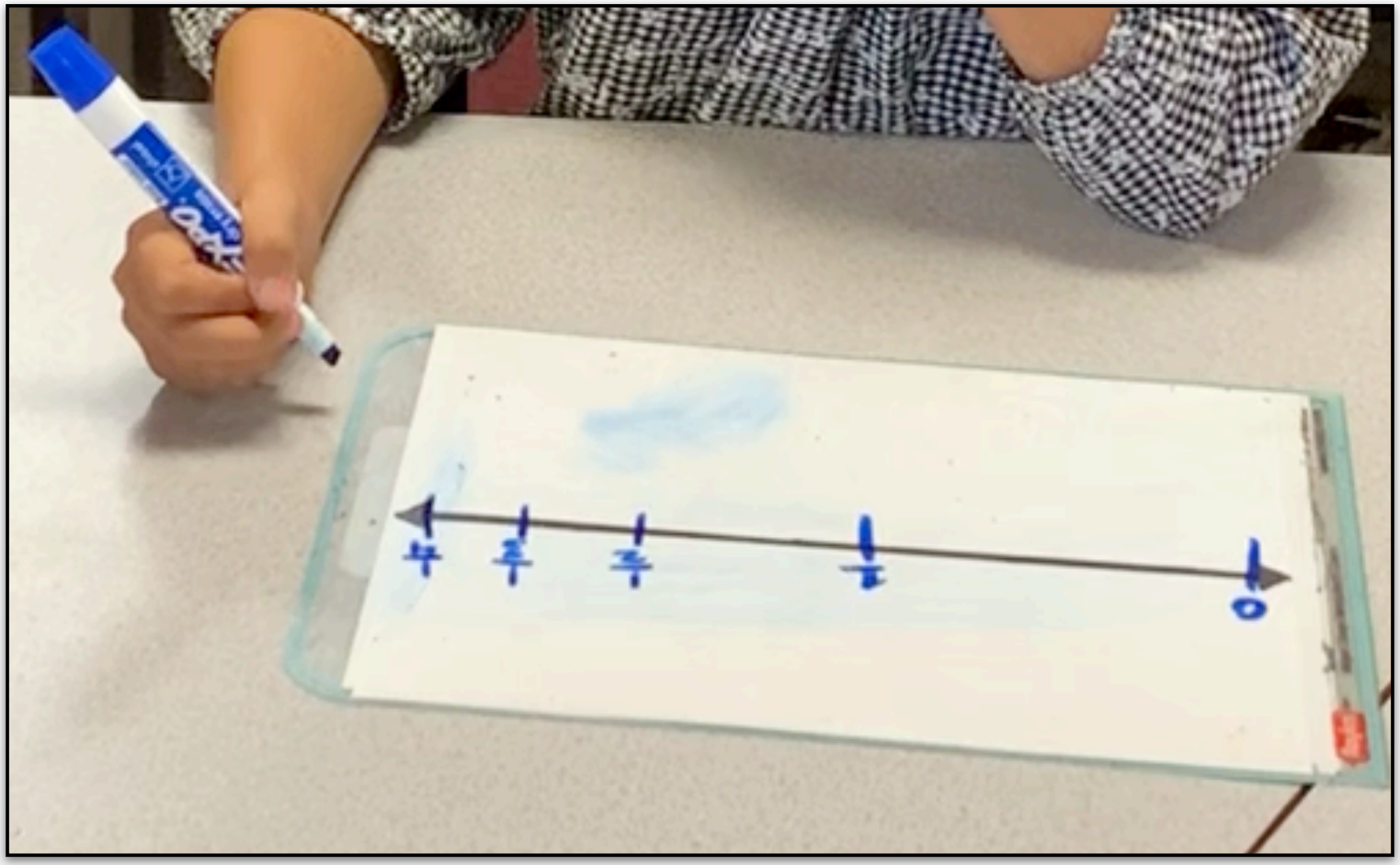
Categories

- ALS
- Art & Architecture
- Family
- Jewish Life
- Life
- Max Wicha
- Medical Ethics
- Medical Research
- Michigan
- Politics
- Real Estate
- Retail Therapy
- Taubman Institute

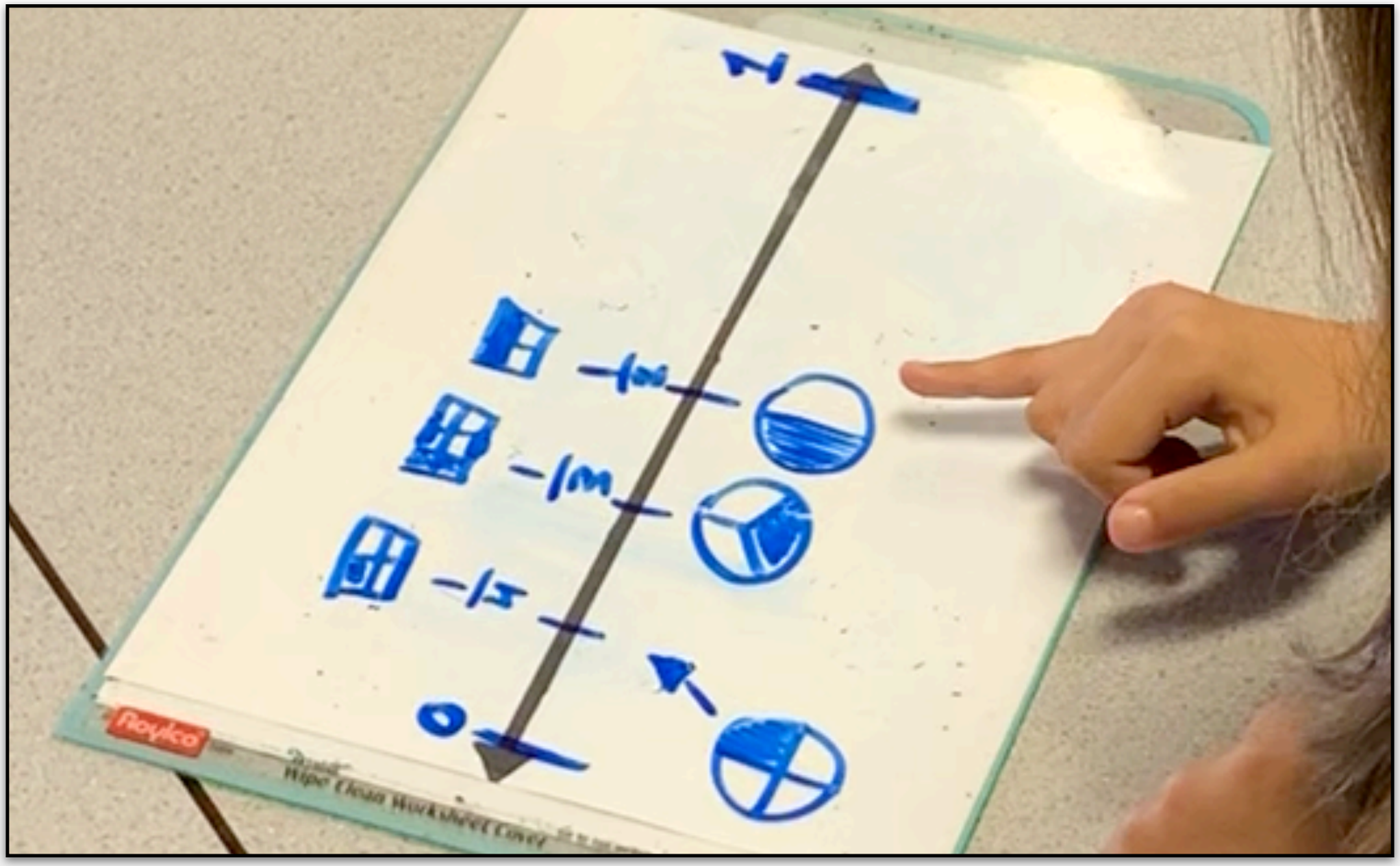
Place…



Place…



… and Space



Fractions

$\frac{1}{2}$

$\frac{1}{3}$

$\frac{1}{4}$

Fractions

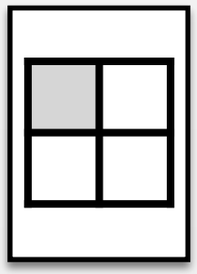
0

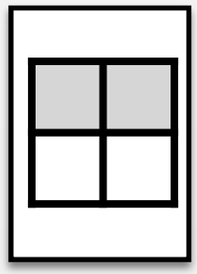
1

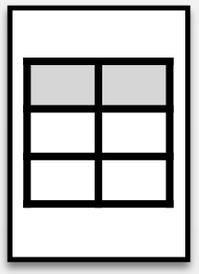
$\frac{1}{2}$

$\frac{1}{3}$

$\frac{1}{4}$







Fractions 2

Which is closer to 1?

$\frac{7}{6}$ ***or*** $\frac{4}{5}$***?***

0

2

$1\frac{3}{4}$

$\frac{7}{6}$

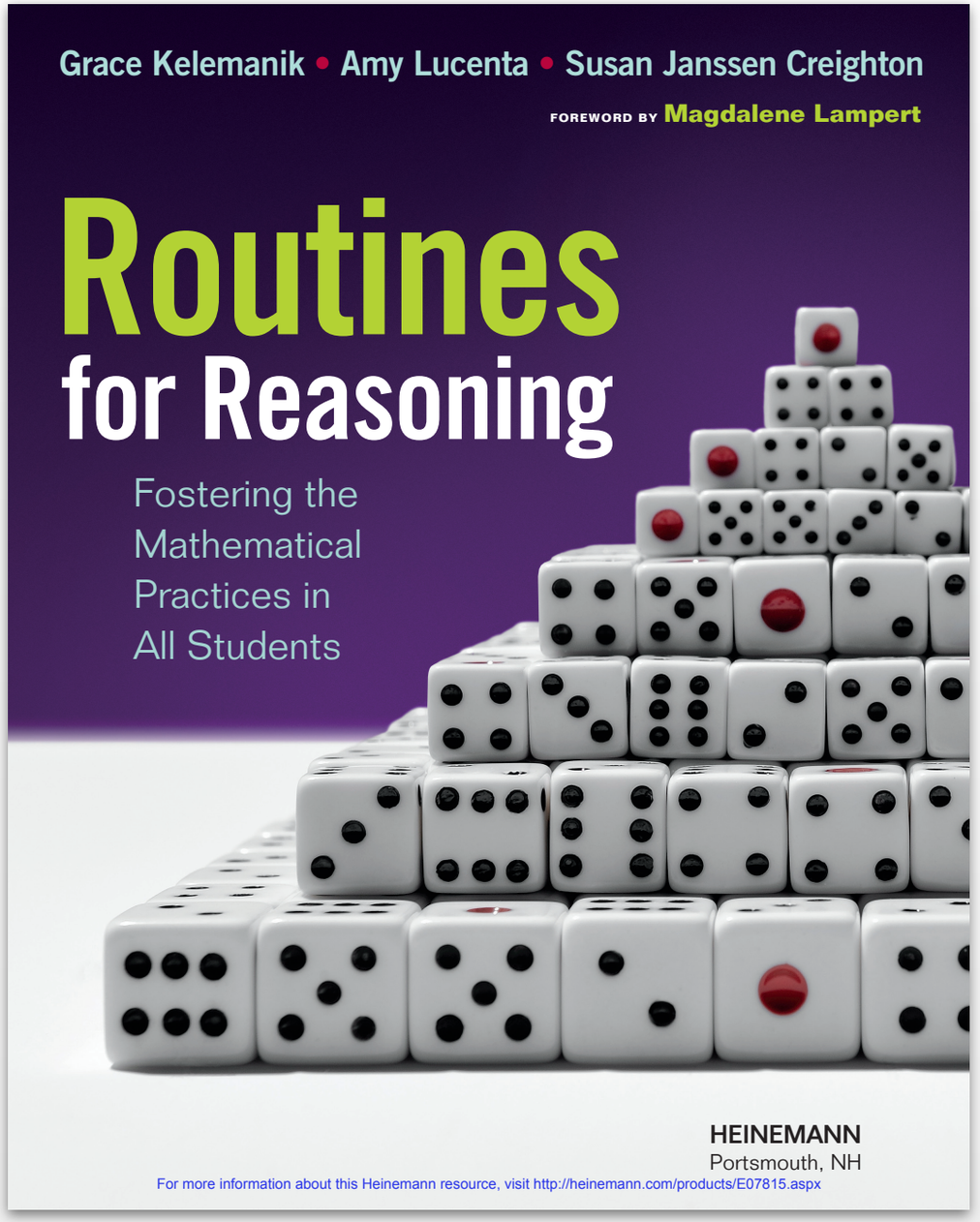
$\frac{2}{8}$

$\frac{4}{5}$

Instructional Routines

"Instructional routines are specific and repeatable designs for learning that support both the teacher and students in the classroom."

How?

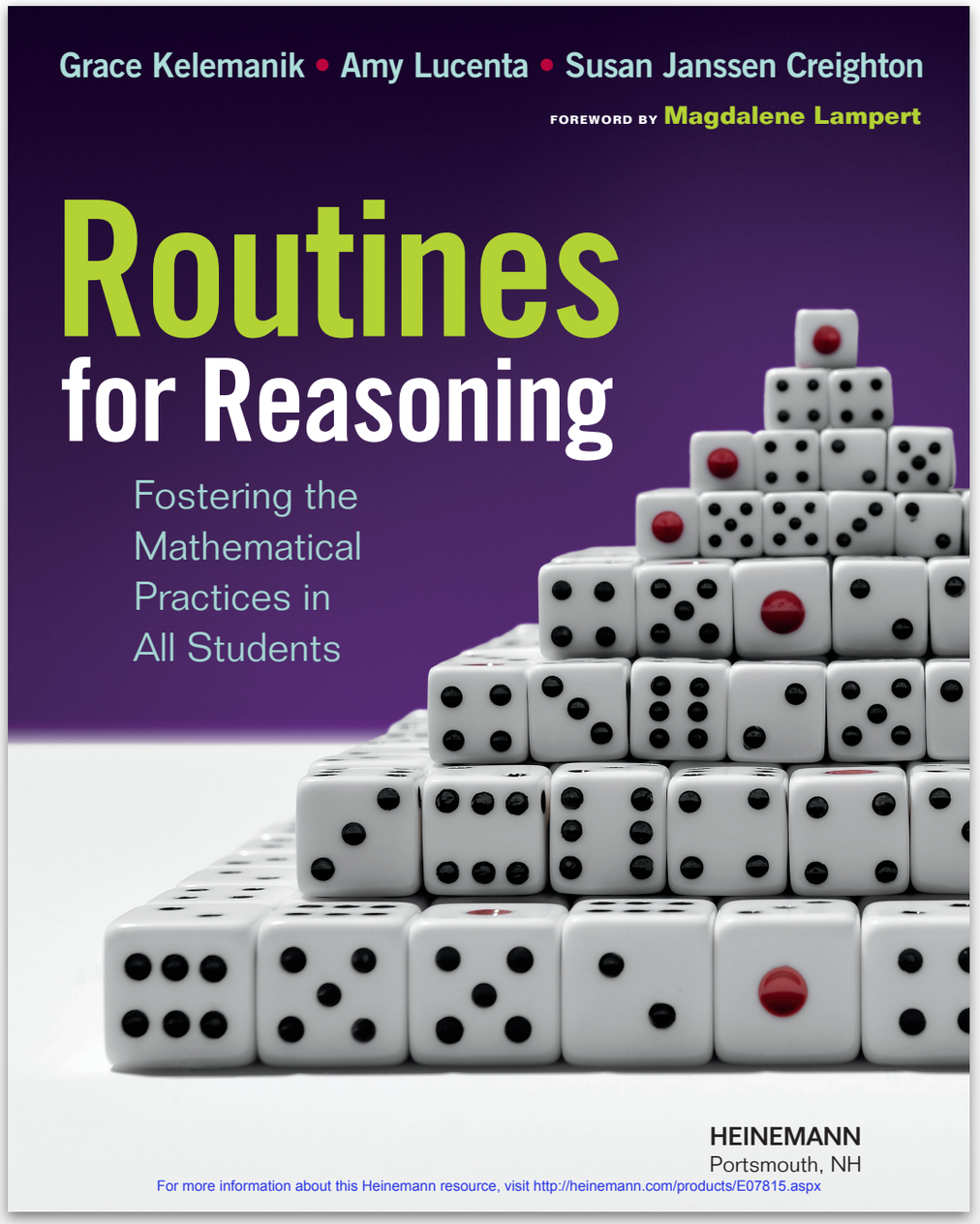


"The predictable structure lets students pay less attention to ['What is it that I'm supposed to be doing?,' 'What question will I be asked next?,' or 'How will things work today in the lesson?'] and more attention to the way in which they and their classmates are thinking about a particular math task. For you as the teacher, the routines keep the flow of the mathematics instruction deliberately predictable so that, as you gain familiarity with them, you can better attend to the most unpredictable elements of your mathematics instruction: how your students are making sense of the mathematics."

pp. 19-20

Why Use Instructional Routines?

- a greater focus on **learning**
- building crucial **mathematical thinking habits**
- **access** for a wide range of learners



Curricular Competency Connections

BRITISH COLUMBIA
Ministry of Education

Area of Learning: MATHEMATICS **Grade 5**

BIG IDEAS

Numbers describe quantities that can be represented by equivalent fractions.	Computational **fluency** and flexibility with numbers extend to operations with larger (multi-digit) numbers.	Identified regularities in number **patterns** can be expressed in tables.	Closed shapes have **area and perimeter** that can be described, measured, and compared.	**Data** represented in graphs can be used to show many-to-one correspondence.

Learning Standards

Curricular Competencies	Content
Students are expected to do the following: **Reasoning and analyzing** • Use reasoning to explore and make connections • **Estimate reasonably** • Develop **mental math strategies** and abilities to make sense of quantities • Use **technology** to explore mathematics • **Model** mathematics in contextualized experiences **Understanding and solving** • Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving • Visualize to explore mathematical concepts • Develop and use **multiple strategies** to engage in problem solving • Engage in problem-solving experiences that are **connected** to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures **Communicating and representing** • **Communicate** mathematical thinking in many ways • Use mathematical vocabulary and language to contribute to mathematical discussions • **Explain and justify** mathematical ideas and decisions • Represent mathematical ideas in **concrete, pictorial, and symbolic forms**	*Students are expected to know the following:* • **number concepts** to 1 000 000 • decimals to thousandths • equivalent fractions • whole-number, fraction, and decimal **benchmarks** • addition and subtraction of **whole numbers** to 1 000 000 • **multiplication and division** to three digits, including division with remainders • addition and subtraction of **decimals** to thousandths • **addition and subtraction facts to 20** (extending computational fluency) • multiplication and division **facts to 100** (emerging computational fluency) • rules for increasing and decreasing patterns with words, numbers, symbols, and variables • **one-step equations** with variables • area measurement of squares and rectangles • relationships between **area and perimeter** • duration, using measurement of **time** • **classification** of prisms and pyramids • single **transformations** • one-to-one correspondence and **many-to-one**
Connecting and reflecting • **Reflect** on mathematical thinking • Connect mathematical concepts to each other and to **other areas and personal interests** • **Incorporate** First Peoples worldviews and perspectives to **make connections** to mathematical concepts	**correspondence**, using double bar graphs • **probability experiments**, single events or outcomes • **financial literacy** — monetary calculations, including making change with amounts to 1000 dollars and developing simple financial plans

Curricular Competencies

Students are expected to do the following:

Reasoning and analyzing

- Use reasoning to explore and make connections
- **Estimate reasonably**
- Develop **mental math strategies** and abilities to make sense of quantities
- Use **technology** to explore mathematics
- **Model** mathematics in contextualized experiences

Understanding and solving

- Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Visualize to explore mathematical concepts
- Develop and use **multiple strategies** to engage in problem solving
- Engage in problem-solving experiences that are **connected** to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures

Communicating and representing

- **Communicate** mathematical thinking in many ways
- Use mathematical vocabulary and language to contribute to mathematical discussions
- **Explain and justify** mathematical ideas and decisions
- Represent mathematical ideas in **concrete, pictorial, and symbolic forms**

Connecting and reflecting

- **Reflect** on mathematical thinking
- Connect mathematical concepts to each other and to **other areas and personal interests**
- **Incorporate** First Peoples worldviews and perspectives to **make connections** to mathematical concepts

- Video

Curricular Competencies

Students are expected to do the following:

Reasoning and analyzing

- Use reasoning to explore and make connections
- **Estimate reasonably**
- Develop **mental math strategies** and abilities to make sense of quantities
- Use **technology** to explore mathematics
- **Model** mathematics in contextualized experiences

Understanding and solving

- Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Visualize to explore mathematical concepts
- Develop and use **multiple strategies** to engage in problem solving
- Engage in problem-solving experiences that are **connected** to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures

Communicating and representing

- **Communicate** mathematical thinking in many ways
- Use mathematical vocabulary and language to contribute to mathematical discussions
- **Explain and justify** mathematical ideas and decisions
- Represent mathematical ideas in **concrete, pictorial, and symbolic forms**

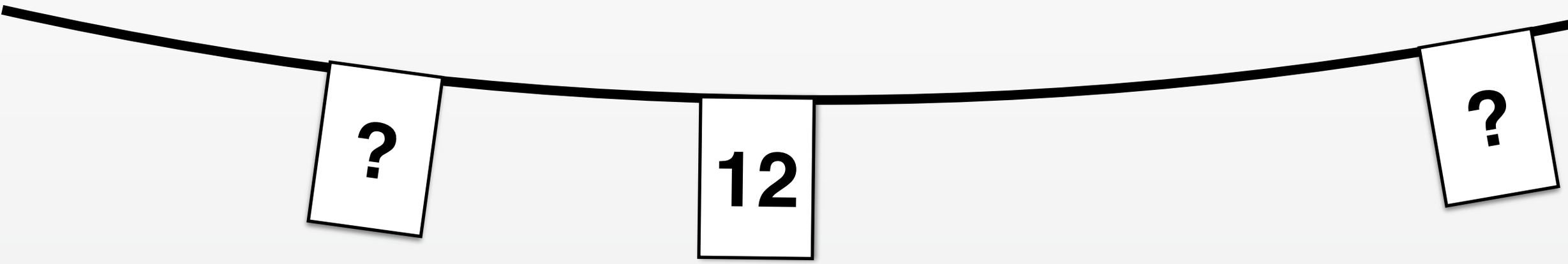
Connecting and reflecting

- **Reflect** on mathematical thinking
- Connect mathematical concepts to each other and to **other areas and personal interests**
- **Incorporate** First Peoples worldviews and perspectives to **make connections** to mathematical concepts

Which Curricular Competencies did you observe?

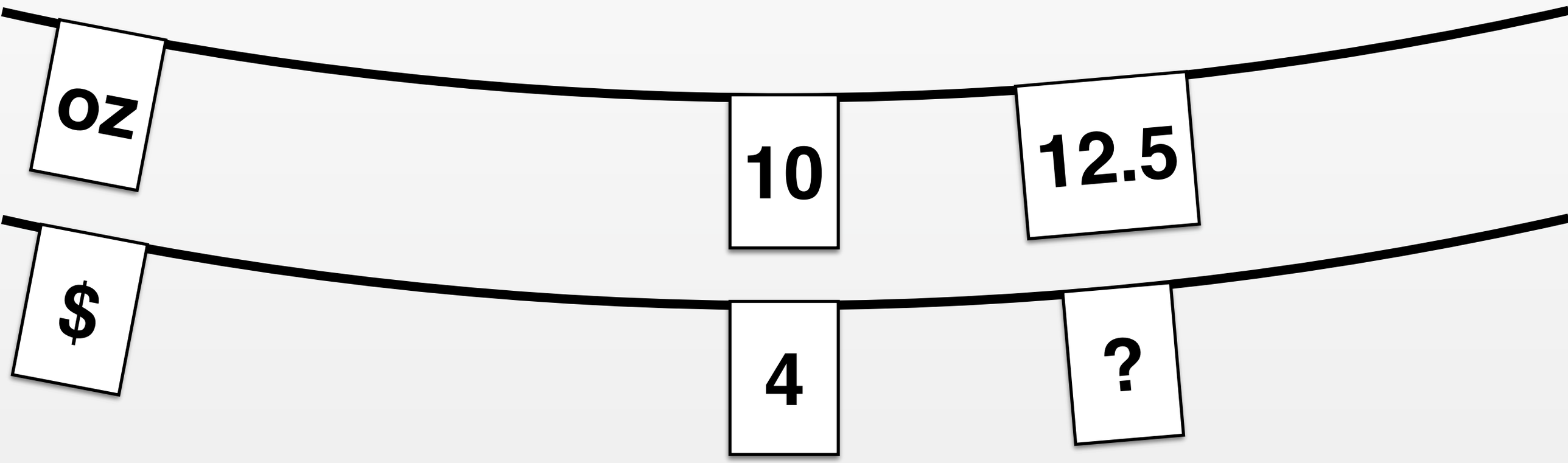
Mystery Number

Mystery Number 2



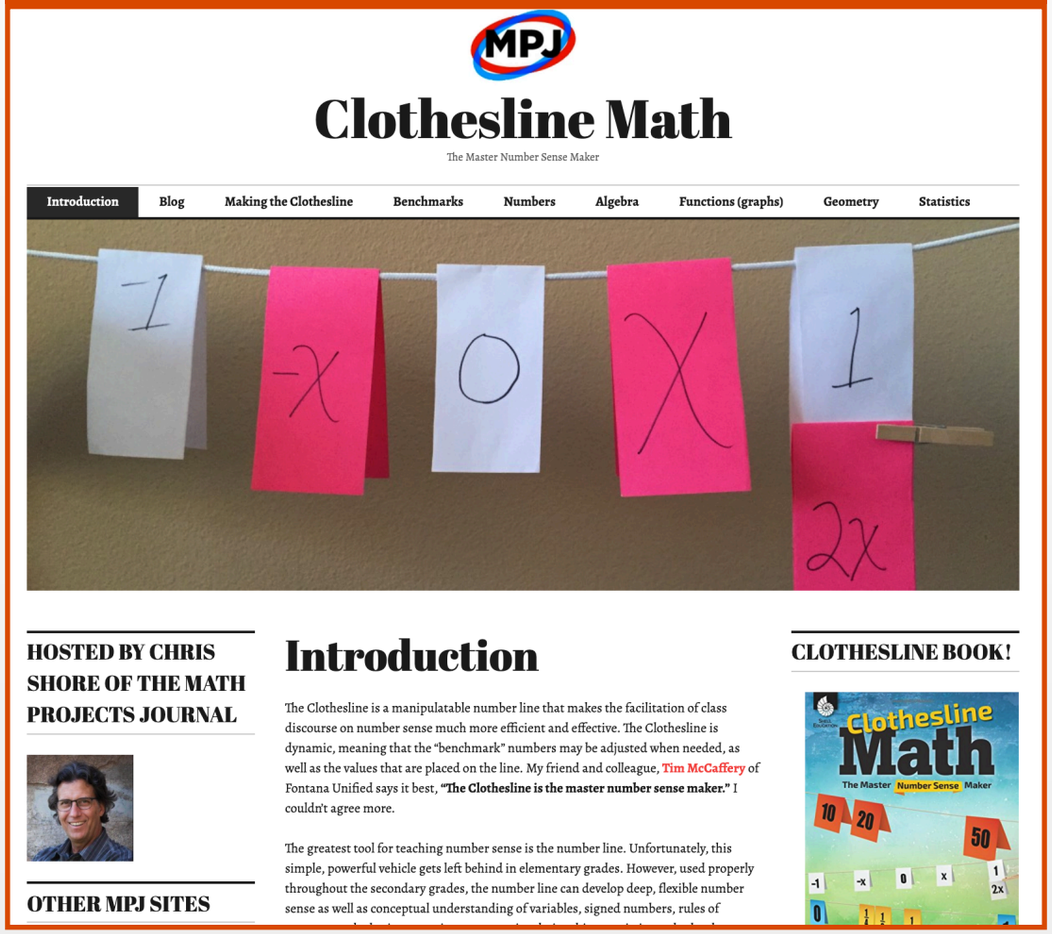
Andrew Stadel • @mr_stadel

Frozen Yogurt Problem

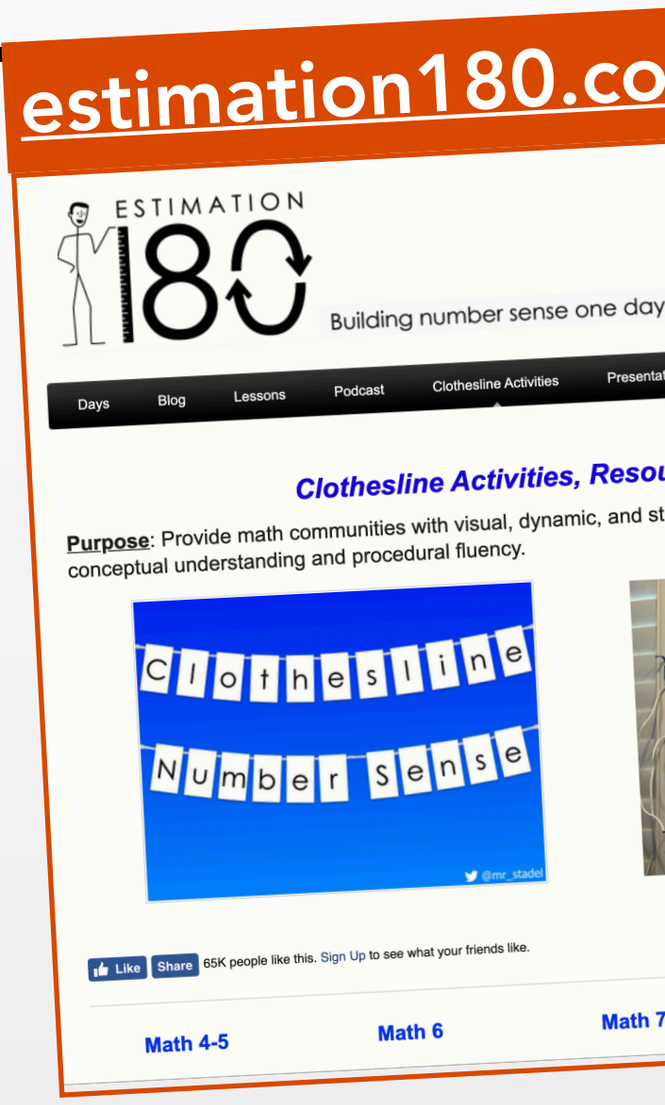


Resources

clotheslinemath.com



estimation180.co



Resources

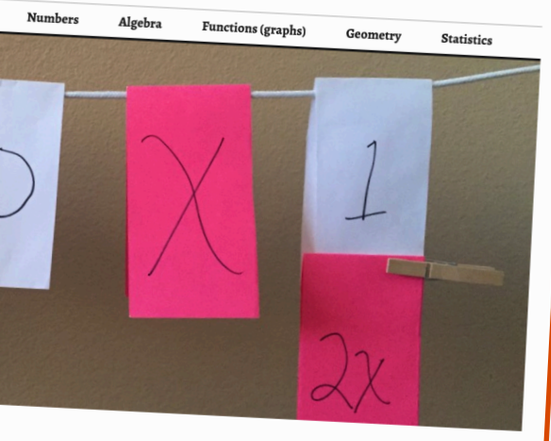
nemath.com

MPJ

esline Math

aster Number Sense Maker

Numbers | Algebra | Functions (graphs) | Geometry | Statistics

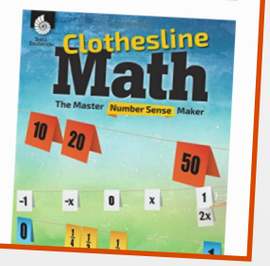


on

per line that makes the facilitation of class efficient and effective. The Clothesline is numbers may be adjusted when needed, as ine. My friend and colleague, Tim McCaffery of **sline is the master number sense maker."** I

se is the number line. Unfortunately, this n elementary grades. However, used properly nber line can develop deep, flexible number of variables, signed numbers, rules of

CLOTHESLINE BOOK!



estimation180.com/clothesline

ESTIMATION 180

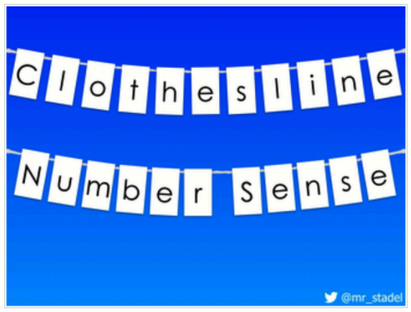
Building number sense one day at a time.

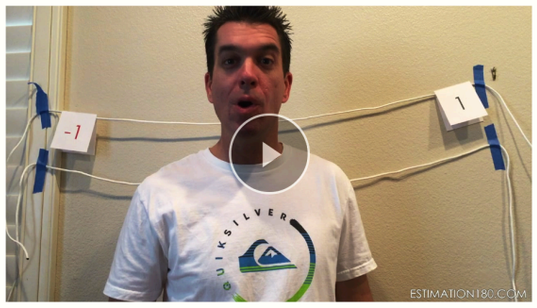
Search

Days | Blog | Lessons | Podcast | Clothesline Activities | Presentations & Workshops | About

Clothesline Activities, Resources, and Tutorials

Purpose: Provide math communities with visual, dynamic, and student-centered activities that build number sense, conceptual understanding and procedural fluency.





INTRODUCTION

Like Share 65K people like this. Sign Up to see what your friends like.

Math 4-5 | Math 6 | Math 7 | Math 8 | Algebra

kristenac

Home | About | Clotheslines

Clothesline Math has
it (back in 2015), how
shutting off, was por
aren't many element

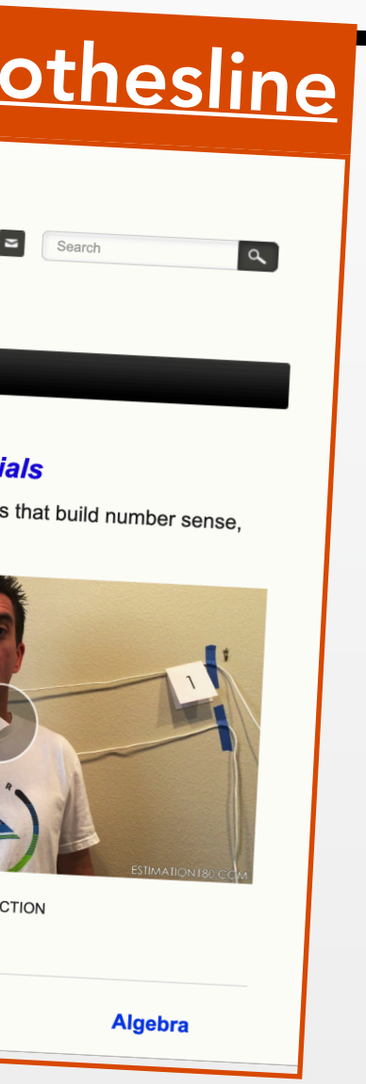
Clotheslines become
proportional reason
students' number se

Did you know that t
through 8th grade?

Each set of cards ha
PDF files.

Number Lin
0-5
0-8

Resources



kristenacosta.com/clotheslines

Home About Clotheslines Number Talk Images 3 Acts Conferences Blog Resources Contact Subscribe

Clotheslines

Clothesline Math has been a growing trend in mathematics education. I saw Andrew Stadel give a talk on it (back in 2015), however it was geared toward middle school and high school math. My mind, never shutting off, was pondering how to make it fit for my elementary teachers. And in my research, there aren't many elementary clothesline cards out there.

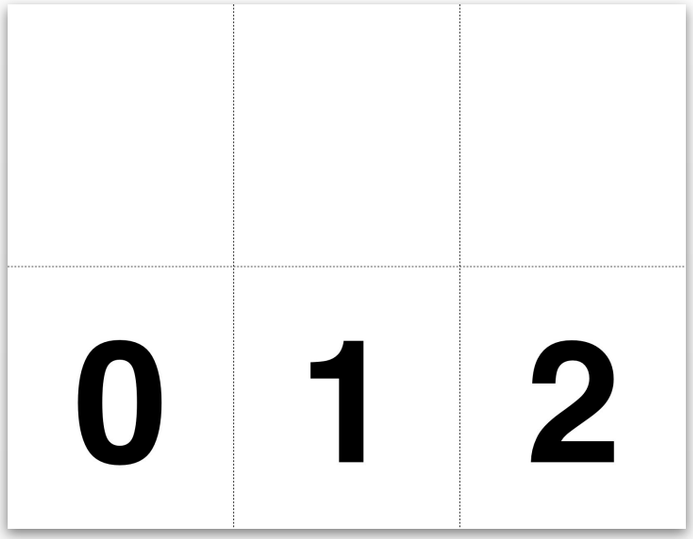
Clotheslines become interactive number lines. Students are able to manipulate cards to show proportional reasoning, precision, equality between numbers, and magnitude. The clothesline builds students' number sense. It's a routine that can work from kindergarten through high school.

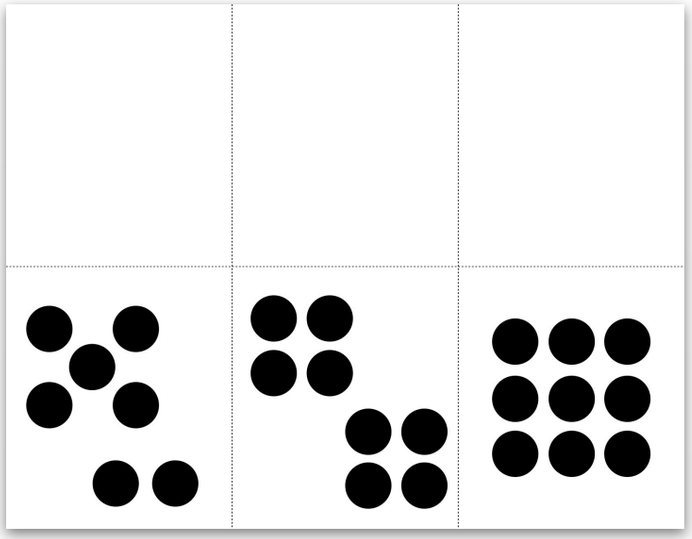
Did you know that the number line is mentioned in the Common Core Standards 26 times from 2nd grade through 8th grade?

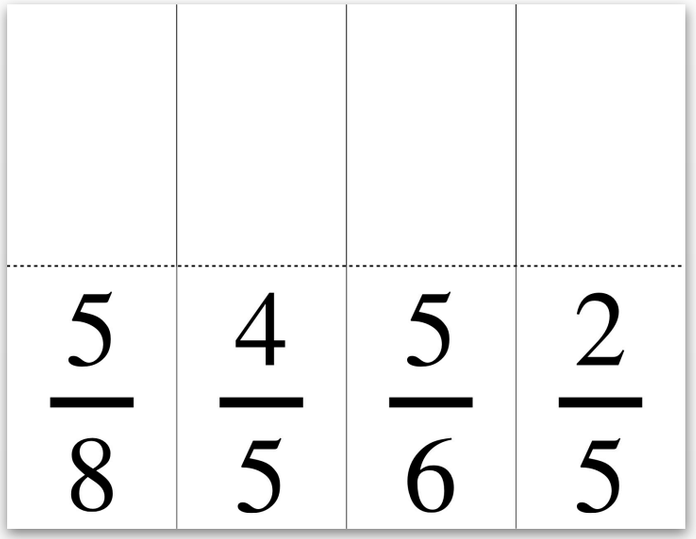
Each set of cards has been designed to have equal cards as well as multiple representations. They are all PDF files.

Number Lines	Suggested Grade Levels
0-5	TK, Kinder
0-8	TK, Kinder

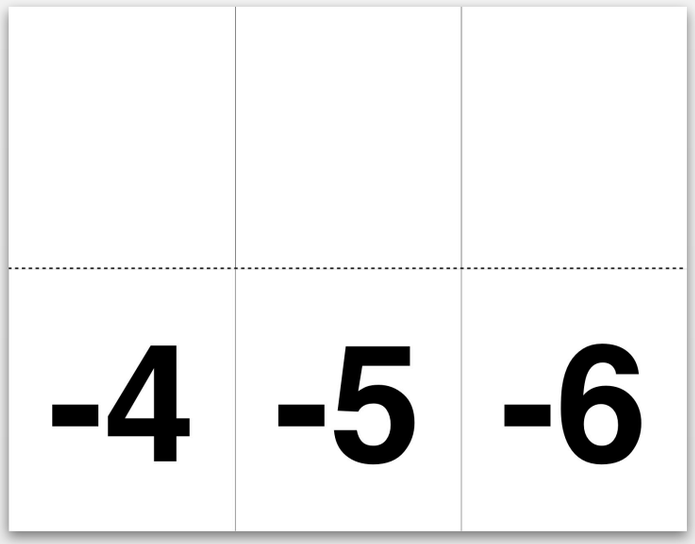
Resources

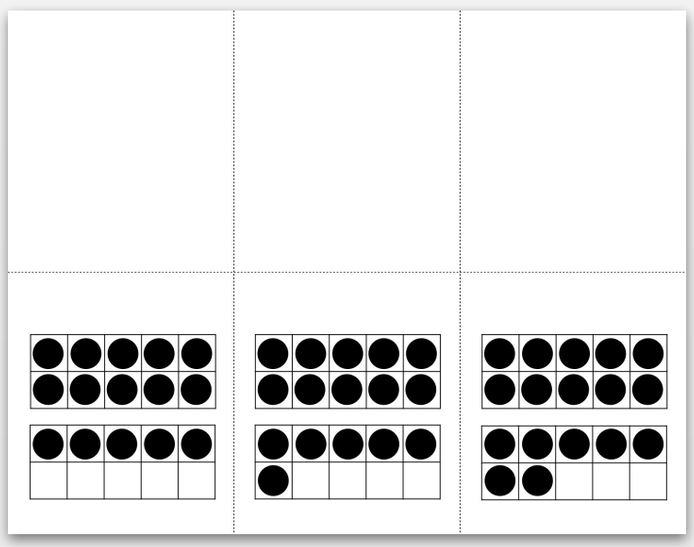


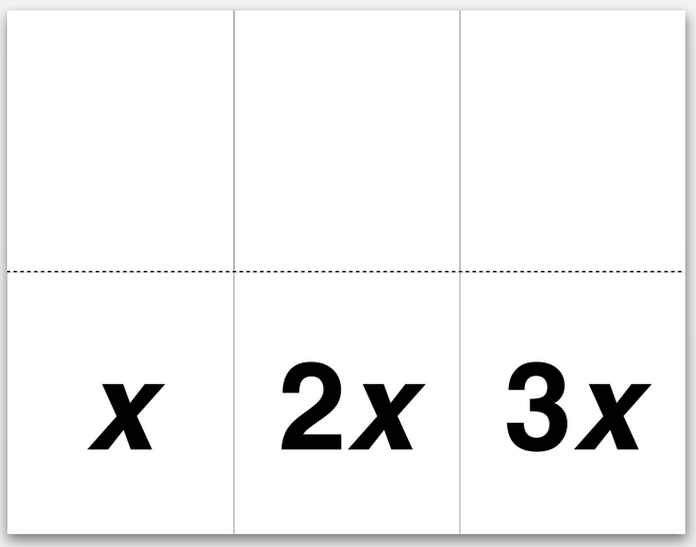




reflectionsinthewhy.wordpress.com/bcamt2019







CLOTHESLINE MATH

Numbers:

4100, 4700, 4300, 4000 & 5000

Learning Standards:

Curricular Competencies

- Use reasoning and logic to explore mathematical ideas
- Explain and justify mathematical ideas and decisions
- Use mathematical vocabulary and language to contribute to mathematical discussions

Content

- numbers concepts to 10 000

Anticipated Strategies:

- Students may notice a range of 1000 between 4000 and 5000
- Students may recognize that they can break up the distance between 4000 and 5000 into 10 parts and that each part represents 1/10th of this distance, or 100
- Students may choose the halfway point, 4500, as a benchmark
- The distance between 4300 and 4500 is equal to the distance between 4700 and 4500
- The distance between 4100 and 4000 is one-half the distance between 4300 and 4500, etc.

Questions:

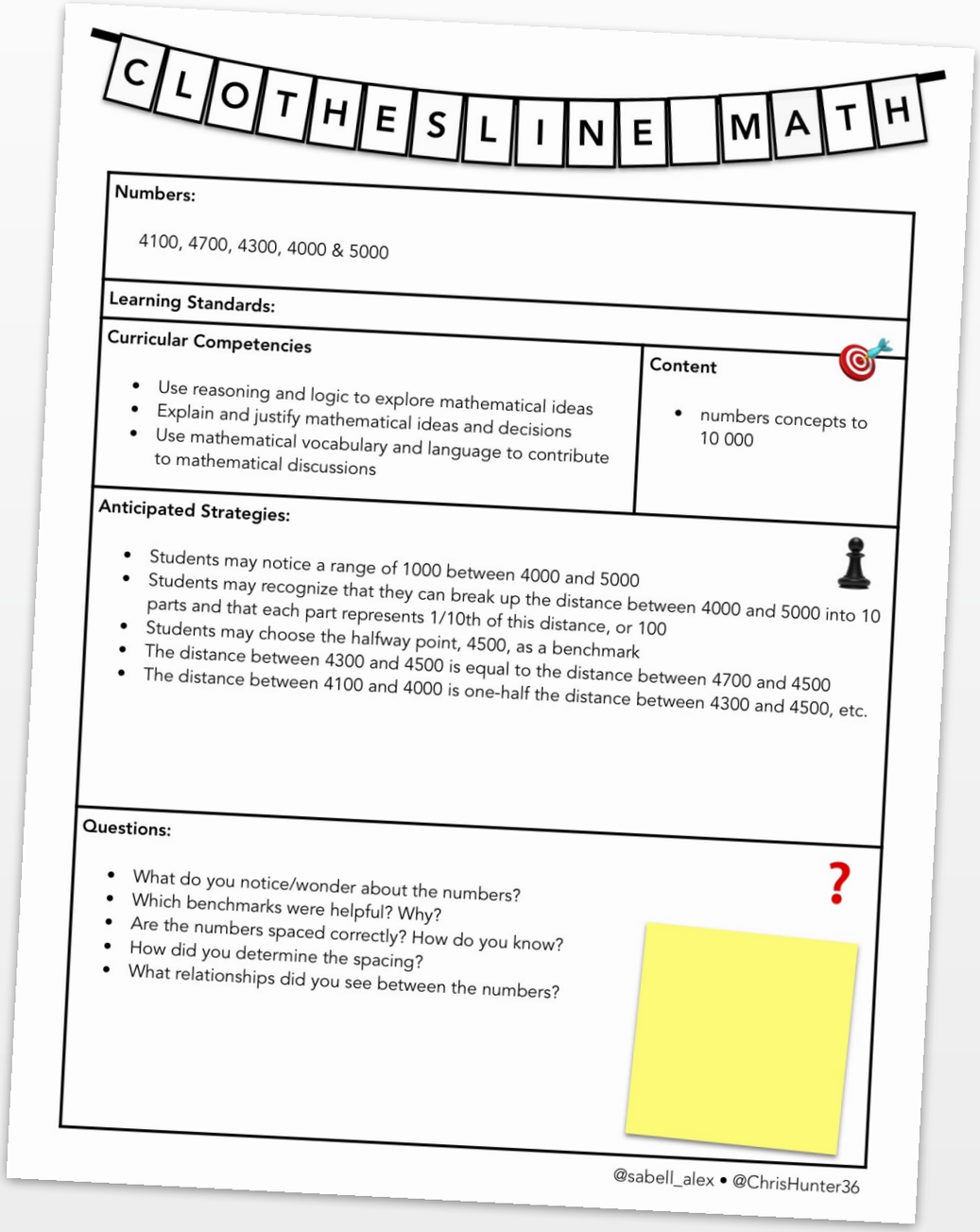
- What do you notice/wonder about the numbers?
- Which benchmarks were helpful? Why?
- Are the numbers spaced correctly? How do you know?
- How did you determine the spacing?
- What relationships did you see between the numbers?

@sabell_alex • @ChrisHunter36

Planning

Your Turn…

- What **numbers** will you choose?
- What **strategies** do you anticipate?
- What **questions** will you ask?



Thank-you!

Alex Sabell

Grade 5/6 Teacher
email: **sabell_a@surreyschools.ca**
twitter: **@sabell_alex**

Chris Hunter

K-12 Numeracy Helping Teacher
email: **hunter_c@surreyschools.ca**
twitter: **@ChrisHunter36**
blog: **reflectionsinthewhy.wordpress.com**