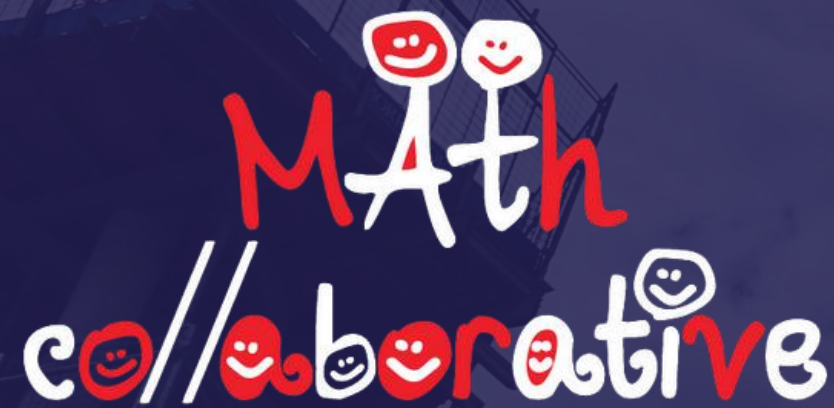


# Number Line Power:

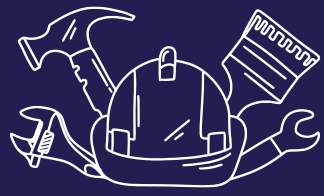
Unlock the mystery of how numbers relate & fit together for your students. Discover how humble number lines enhance understanding of foundational meanings, number sense, relationships, & magnitude.



Carlie Oelke  
Karen Henen



COLUMBUS STATE  
UNIVERSITY



Share



- Where is the number line in your classroom?
- Where is the number line in most classrooms?
  - How do you use it?
  - How do your learners use it?





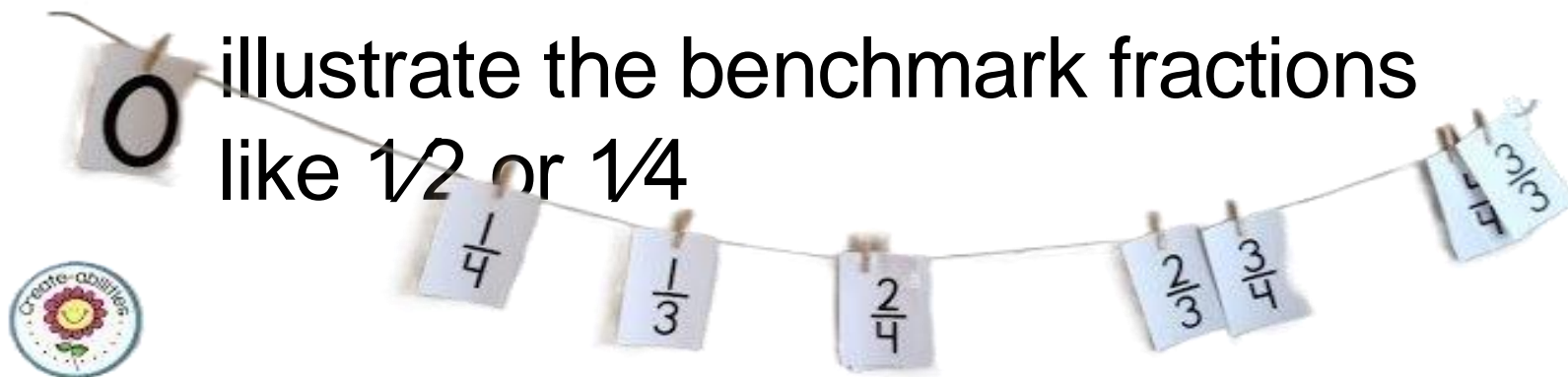
# Number Lines



## Fundamental Representation:

- Underutilized Model/tool
  - memorize and practice counting with ordinal numbers.

illustrate the benchmark fractions like  $\frac{1}{2}$  or  $\frac{1}{4}$



Visualize and understand numerical concepts

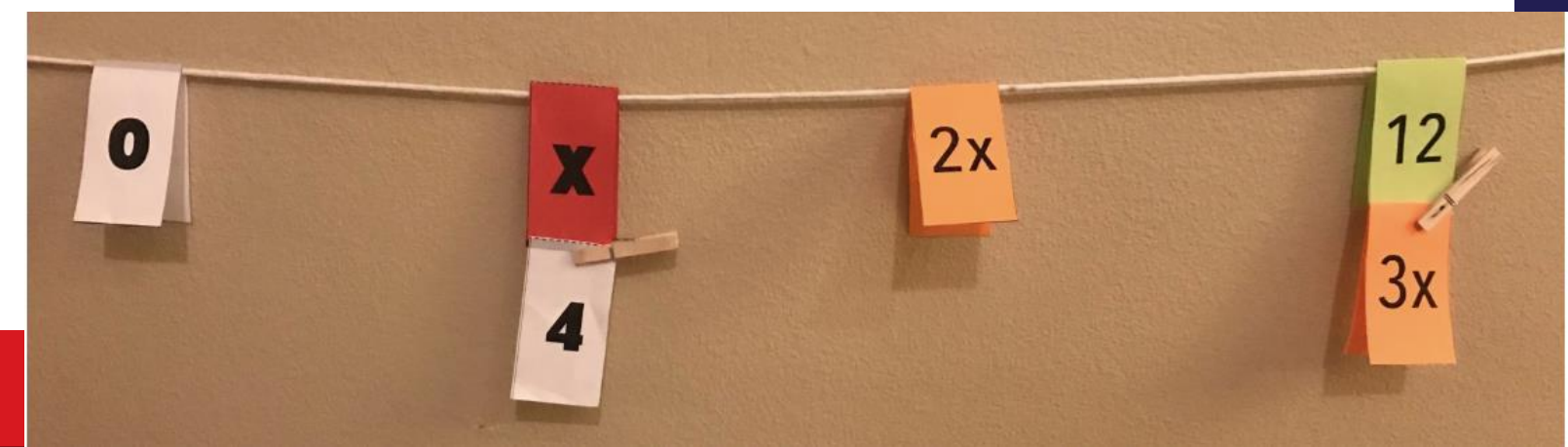
## Intuitive Explanations:

Enhance understanding of mathematical operations

- easy model to understand
- show relative magnitude
  - position of numbers
  - visualize operations

## Versatile Applications:

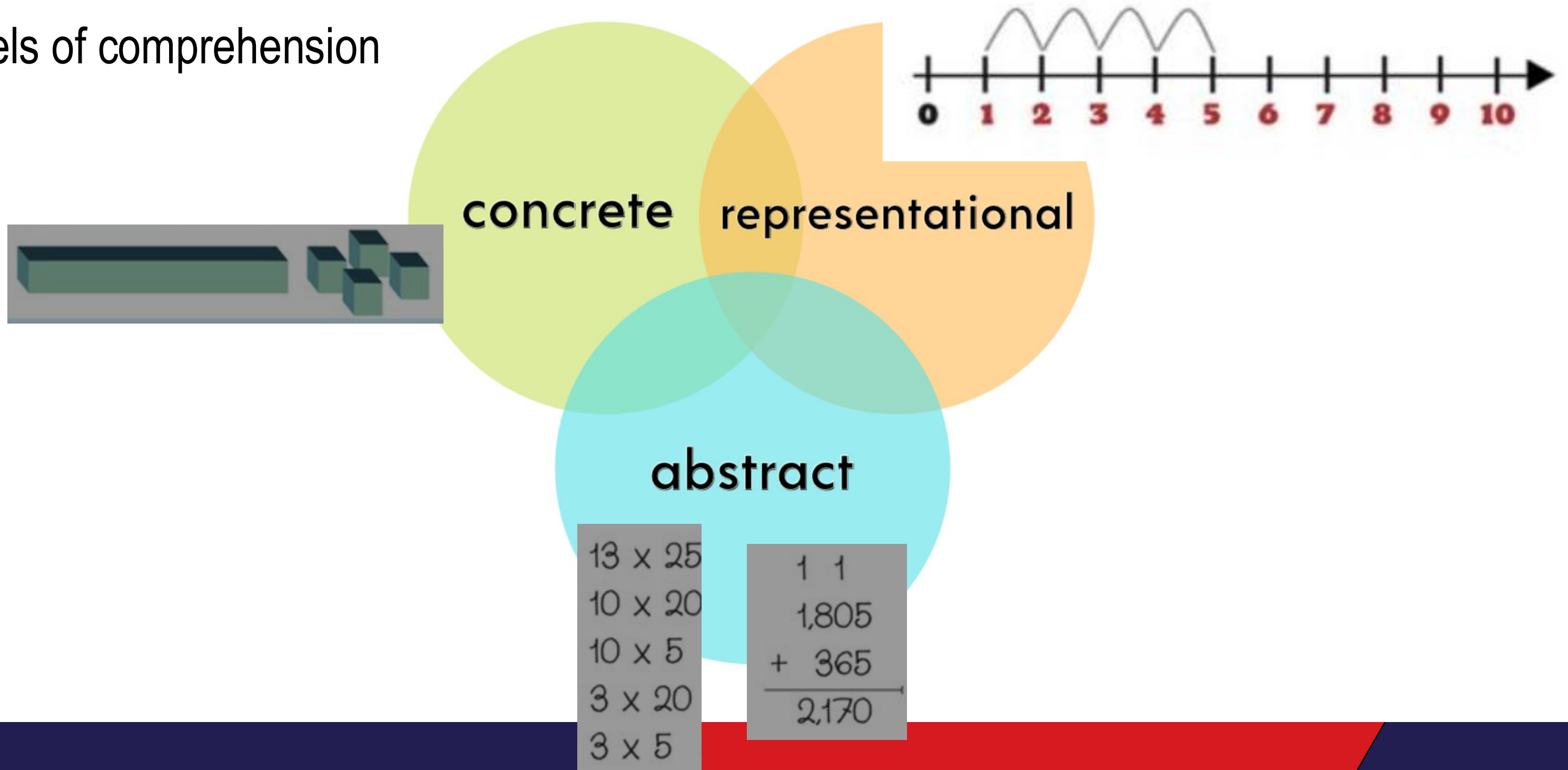
From basic arithmetic to advanced math





# GADOE standards GOAL is for students to...

1. Understand the mathematics
2. High levels of comprehension





# Key Idea #1: The number line's linear character .

support informal thinking strategies because of its inherent linearity  
VS

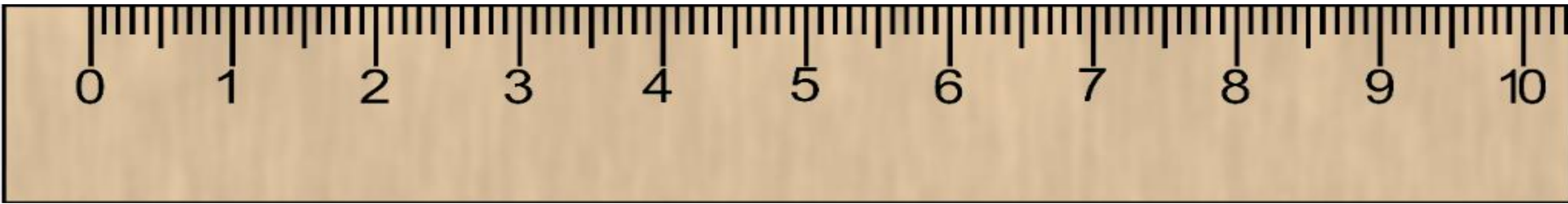
“set-representation” orientation using blocks or counters



Open number line:



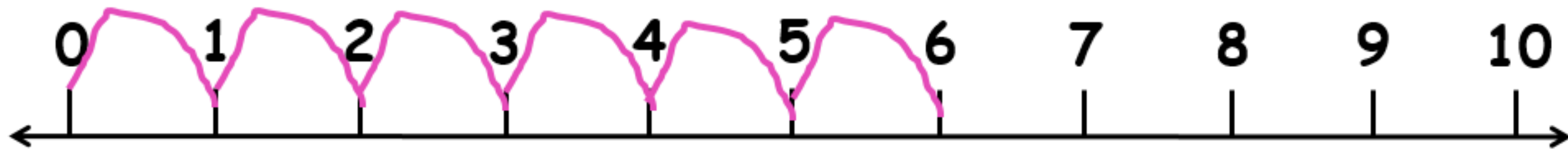
note the difference



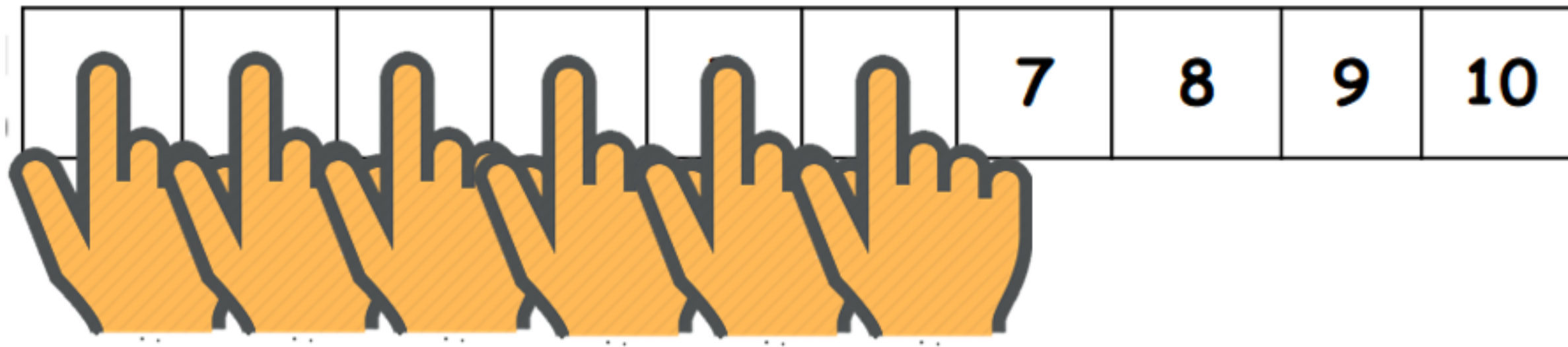


# Number path vs number line

Number line



Number path





# Open number line



0

scale or  
magnitude of  
numbers  
being  
considered?

Closed number lines



0

1



0

100



# Magnitude & Developing Nearness

12







# Magnitude & Developing Nearness

574

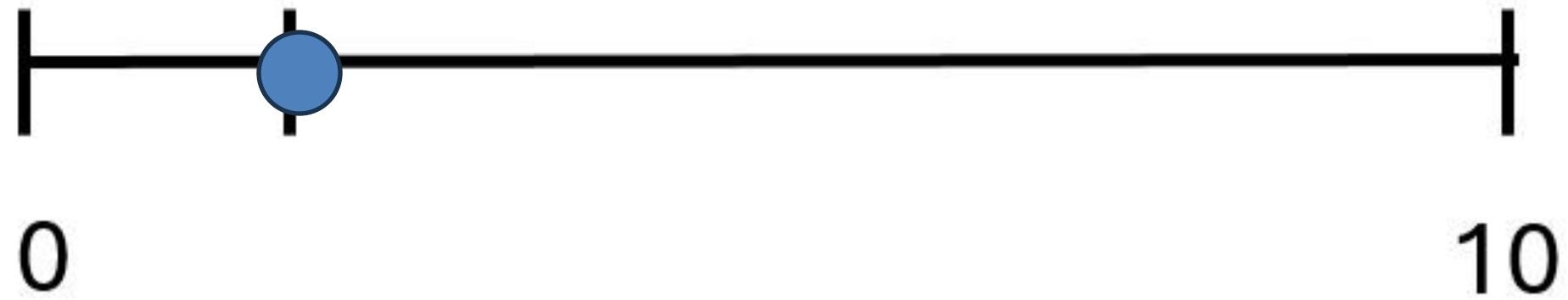




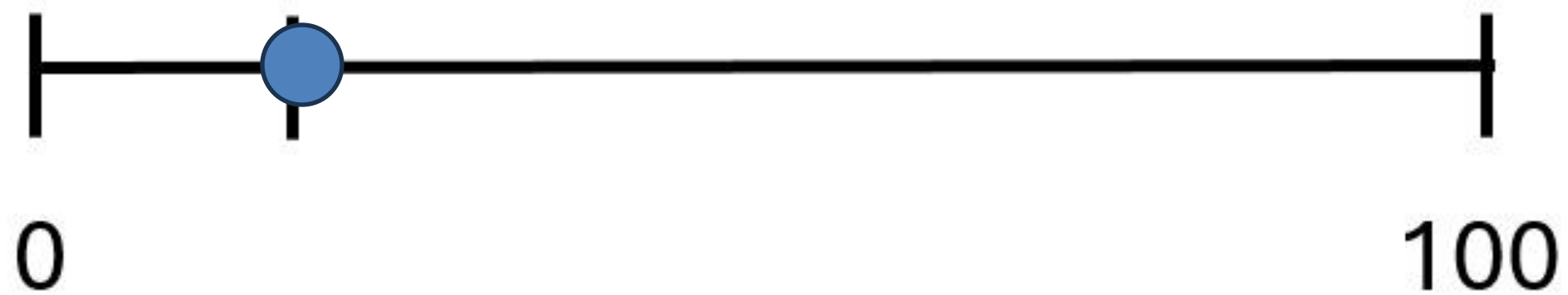
What number on the line does the dot represent?

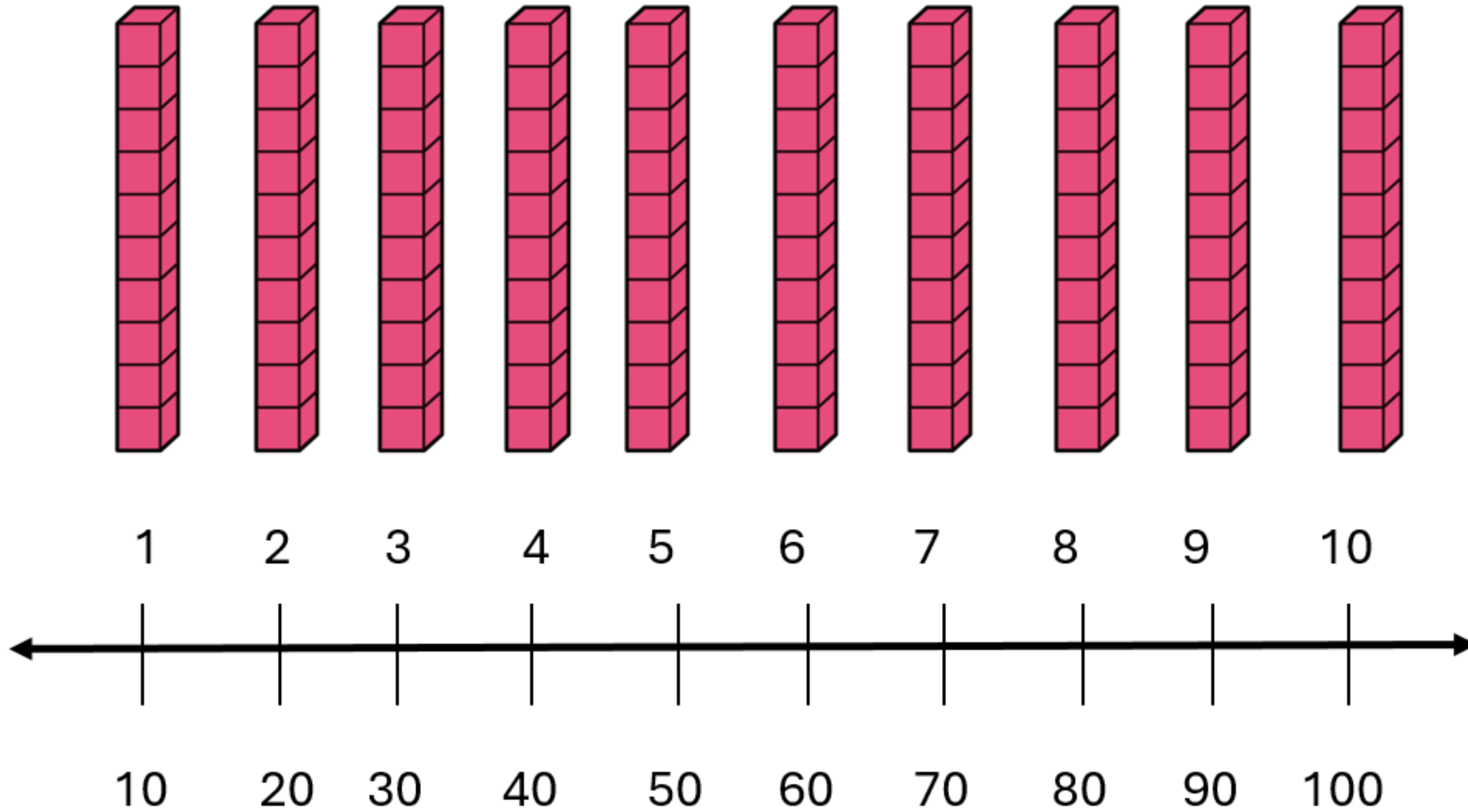


Choice 1



Choice 2







$$48 + 37$$



# Key Idea #2: Promotes intuitive reasoning and creative solution strategies.

The Georgia standards focus

- **Flexibility**

- as it relates to the solution paths
- use the method that makes sense for you

- **Thinking Tool**

1. Model mathematical contexts
2. Represent methods
3. Thinking progressions
4. Solution strategies

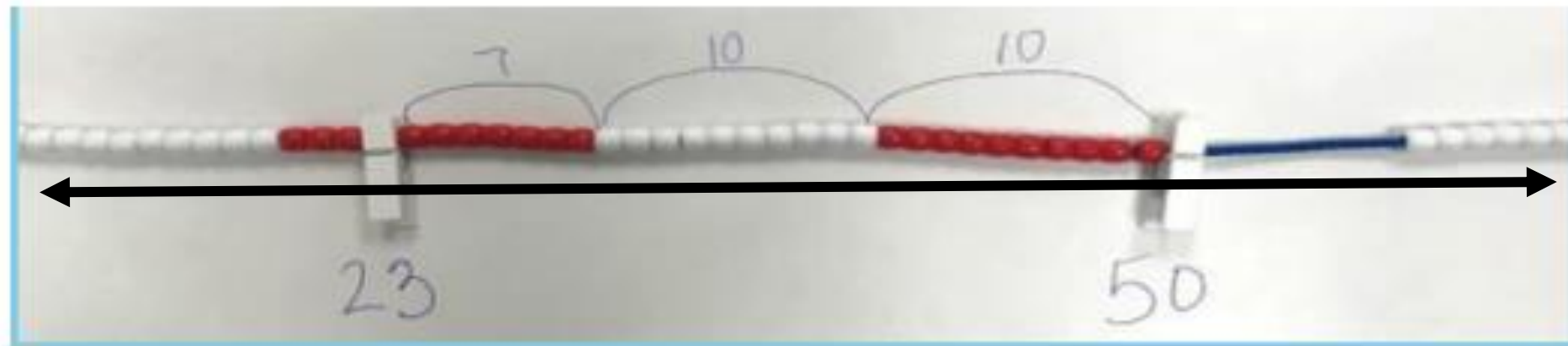
## Students' Freedom

- develop their own solution strategies
- does NOT mean allowing students to solve a problem however they choose

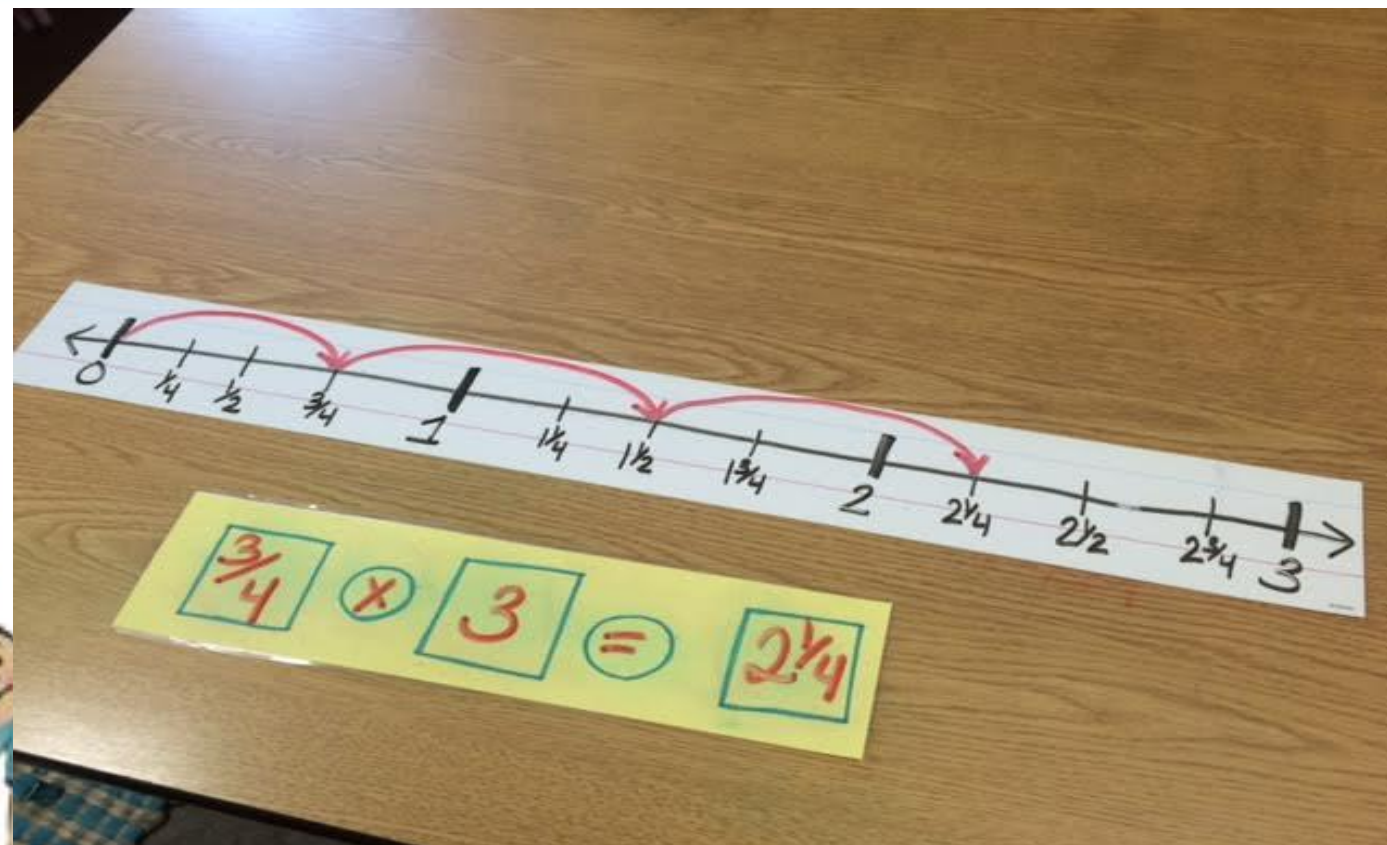
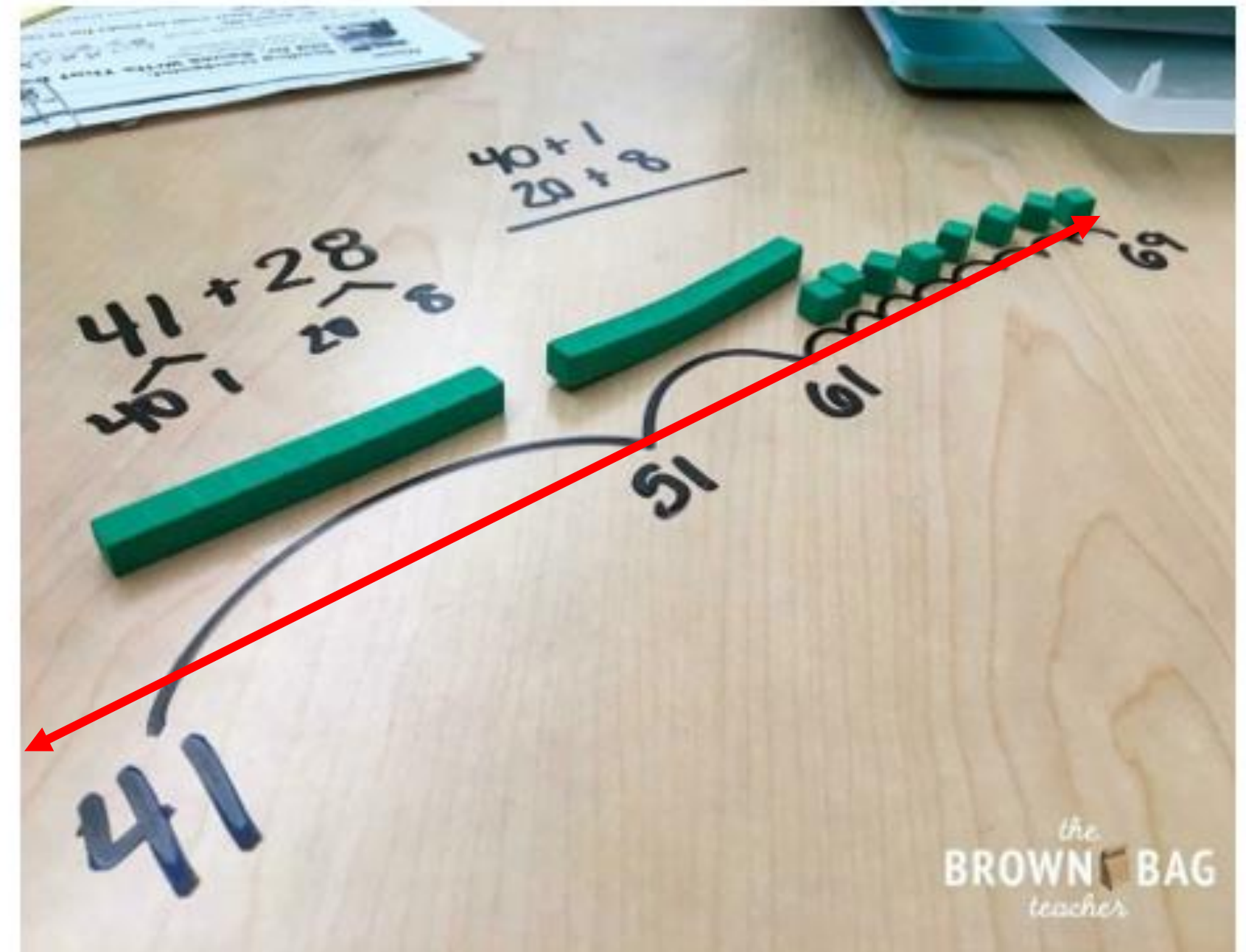
## Teacher Power

Teacher promoted models refine and push students toward more sophisticated and reliable strategies/procedures

$$23 + \underline{\quad} = 50$$




$$41 + 28$$





# Learning to Think Mathematically with the Number Line

## Subtraction on a number line - wholly shift

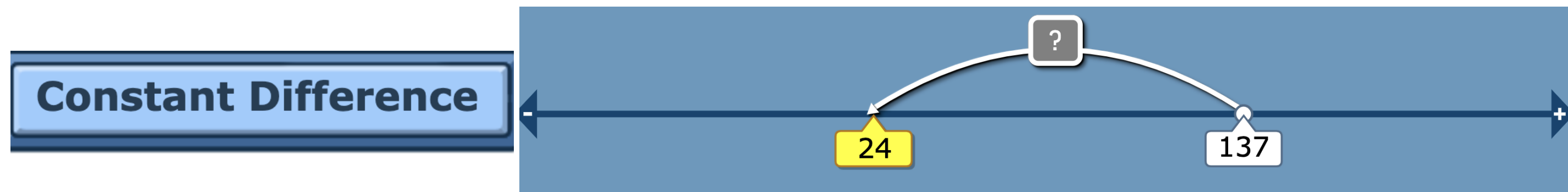


[DreamBox Teacher Tools | Discovery Education](https://www.dreambox.com/teacher-tools)

Find online math tools for teachers for use with your interactive white board or projector to make math lessons clear for your whole class. Each lesson includes tutorials on how to use the manipulatives and ideas for incorporating the tools into classroom lessons.

[www.discoveryeducation.com](https://www.discoveryeducation.com)

- A representation of the number system that is ongoing, natural, and intuitive to students
- Transparent and intuitive match with existing cognitive structures
  - Some subtraction problems require regrouping strategies common to block and algorithmic procedures.



Scroll down to Subtraction on a Number Line Using Constant Difference

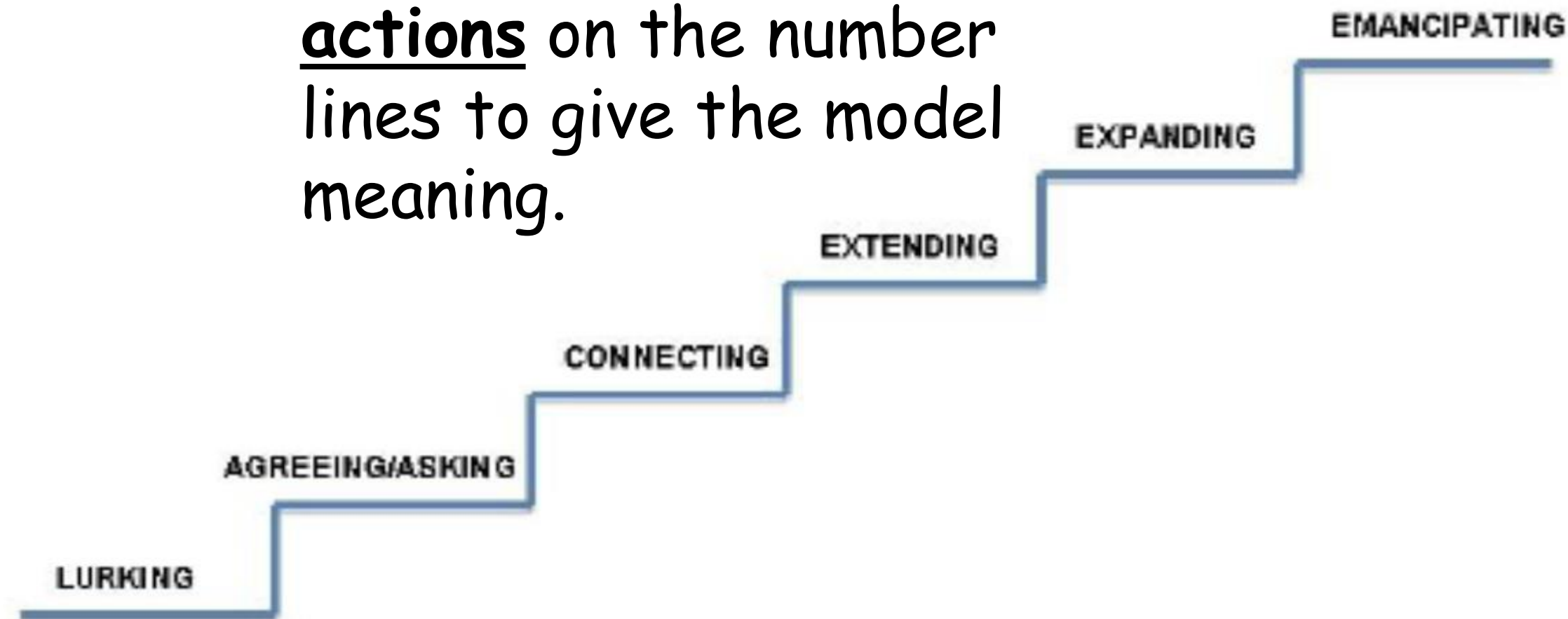


## Key Idea #3: Cognitive engagement

Allows students

- engage more consistently in the problem
  - as they jump along the number line in ways that resonate with their intuitions
- better keep track of the steps they are taking
  - decrease in the memory load otherwise necessary to solve the problem

Students quickly recognize that they need to create their own actions on the number lines to give the model meaning.



Levels of Cognitive Engagement

\*Instruction should be about the **process** and **connections** more than just a final answer\*





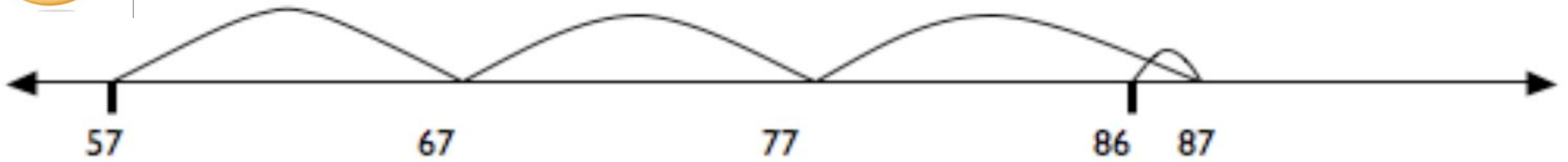
## Solve using a Number Line

Kerri was trying to set her record for juggling a soccer ball. On her first attempt, she juggled the ball a total of 57 times before it hit the ground. On her second attempt, she only got a total of 29 juggles. Combining both her first and second attempts, how many times did she juggle the ball in total?





# Thinking Strategies?



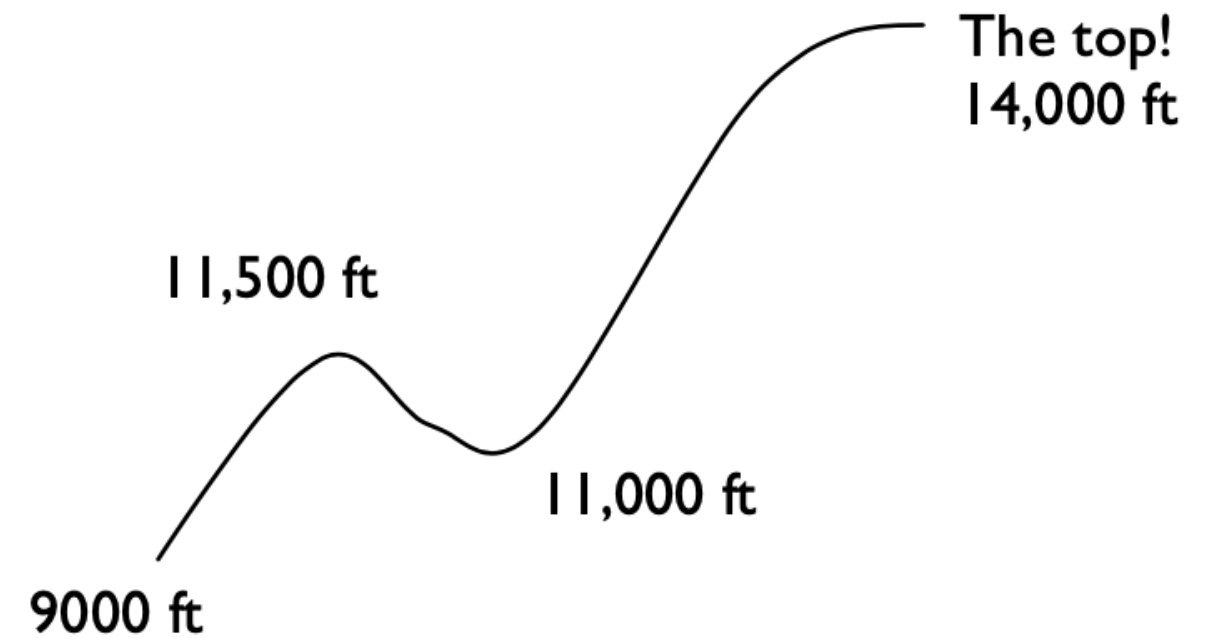
Blank white space for student response.

Blank white space for student response.

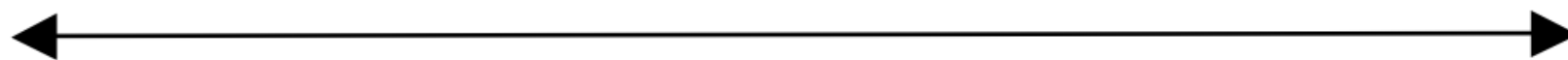
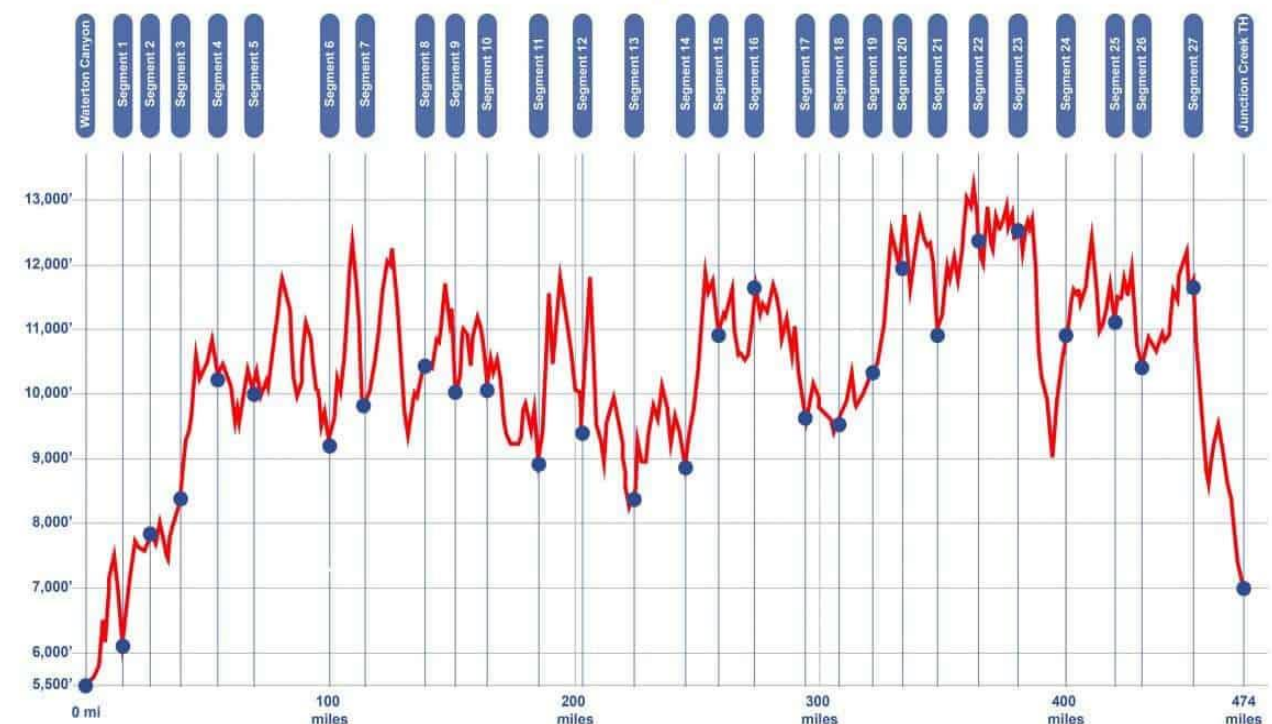




Jamarie went hiking to the top of a mountain in Colorado. He started at an elevation of 9000 feet above sea level. He climbed to the top of a hill that was at 11,500 feet of elevation. The trail then went down to the bottom of a valley at 11,000 feet of elevation. The trail then went up steeply again for the last 4 miles to the top, at 14,000 feet high! How many **total feet of elevation** did Jamarie climb during the hike up? Use a number line and skip jumps to help find your answer.



Colorado Trail | Elevation Profile



Explain:



# Using Number Lines for Problem-Solving

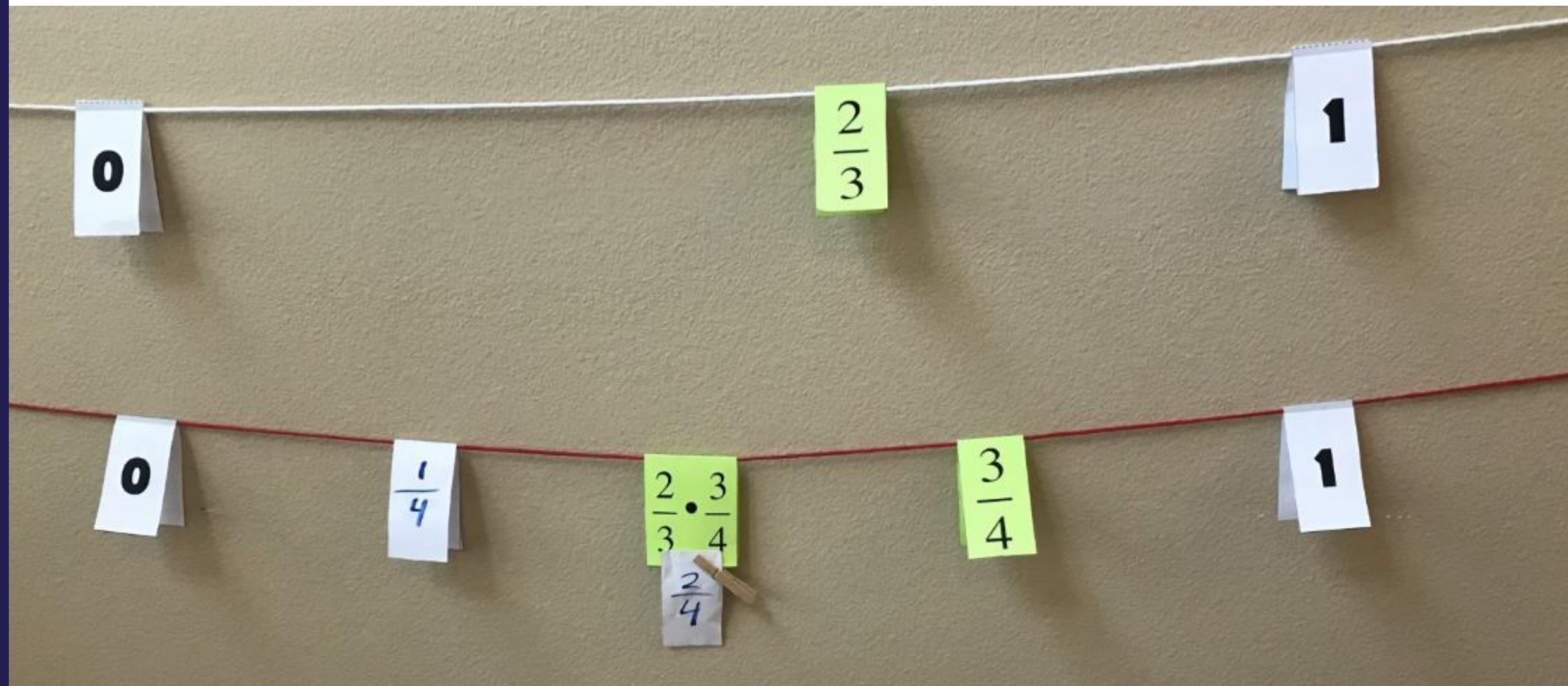
- **Ordering Sequence:** Arrange numbers from smallest to largest
- **Greater Than/ Less Than:** Approximate numbers based on position
- **Estimating Values:** Determine relative position on the line
- **Addition:** Represent as movement along the line
- **Subtraction:** Interpret as distance between two points
- **Multiplication & Division:** Scale the number line accordingly
- **Fractional Parts:** Represent and compare complex values
- **Decimal Notation:** Precisely locate and interpret decimals
- **Mixed Numbers:** Combine whole numbers and fractions
- **Visualizing Relationships:** Understand connections between quantities
- **Step-by-Step Reasoning:** Break down complex problems incrementally
- **Conceptual Understanding:** Develop deeper insights into math concepts



# Life Size Number Line

## Clothesline

- Across a large, open space in the classroom
- large number cards
- Students can
  - place numbers on the line as required in a given lesson progression
  - stand in locations as representations of numbers



"Can you show me  
where the number  
 $\frac{2}{3} \times \frac{3}{4}$  belongs?"



# Raffle Link

<https://wipebook.com/53jg74>

## Winner

email with instructions to claim their prize

## Participants (who did not win)

email with a 20% off coupon for our website.



**ENTER TO WIN!**  
**FREE WIPEBOOK FLIPCHART**

Only **33** entries so far.

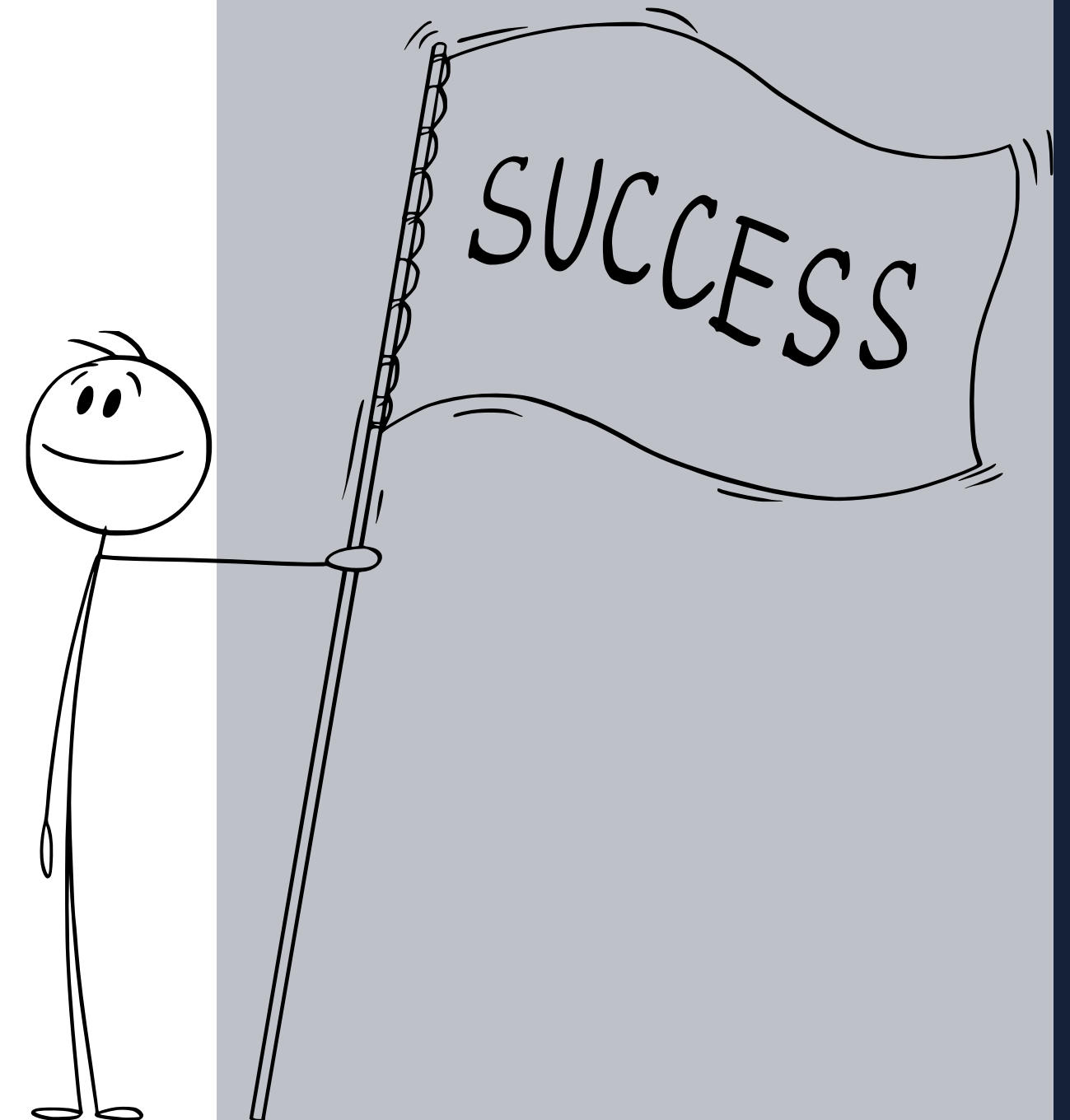
<input type="text" value="Email"/>	
<input type="text" value="First Name"/>	<input type="text" value="Last Name"/>
<input type="text" value="Select Job"/>	<input type="button" value="ENTER"/>

# Session Evaluation Forms

Complete the survey at

<http://bit.ly/2024GMCsessions>

Scan the QR code



# NOTES to NERDS

The official newsletter of the Math Collaborative



WE ARE PROUD OF OUR  
BI-MONTHLY NEWSLETTER!  
EVERY EDITION INCLUDES:

A HEART-FELT MESSAGE FROM  
OUR CRMC DIRECTOR,  
PROFESSIONAL DEVELOPMENT OPPORTUNITIES,  
TEACHING RESOURCES,  
...AND SO MUCH MORE!

PRESENT AND PAST EDITIONS  
ARE POSTED ON OUR WEBSITE @  
[WWW.COLUMBUSSTATE.EDU/CRMC/DIRECTORS-  
BLOG.PHP](http://WWW.COLUMBUSSTATE.EDU/CRMC/DIRECTORS-BLOG.PHP)

WANT TO RECEIVE YOUR OWN COPY?  
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SCAN  
ME!







# THANK YOU

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