



# **Ready to POP!**

## **A Dynamic Approach to Spotting Mathematical\* Points of Promise in English Learners\***

**Susan Dulong Langley, Melanie Caughey, Sierra Gareau, and Del Siegle**



# Agenda

**Introduction to  
Project EAGLE**

**Points of Promise**

**Behaviors that  
POP!**

**Opportunities to  
Participate**

# **Introduction to Project EAGLE**





# Research Team



**Del Siegle**



**Betsy McCoach**



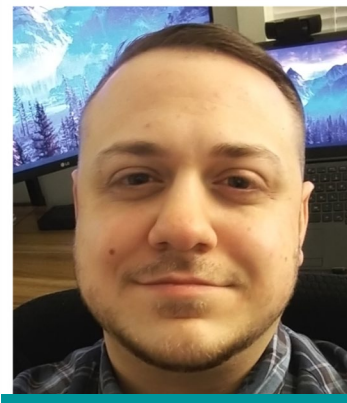
**Susan Dulong  
Langley**



**John Burrell**



**Sierra Gareau**



**Anthony Gambino**



**Melanie Caughey**



# Advisory Board



**Kathy Escamilla**



**Dina Brulles**



**Kathy Gavin**



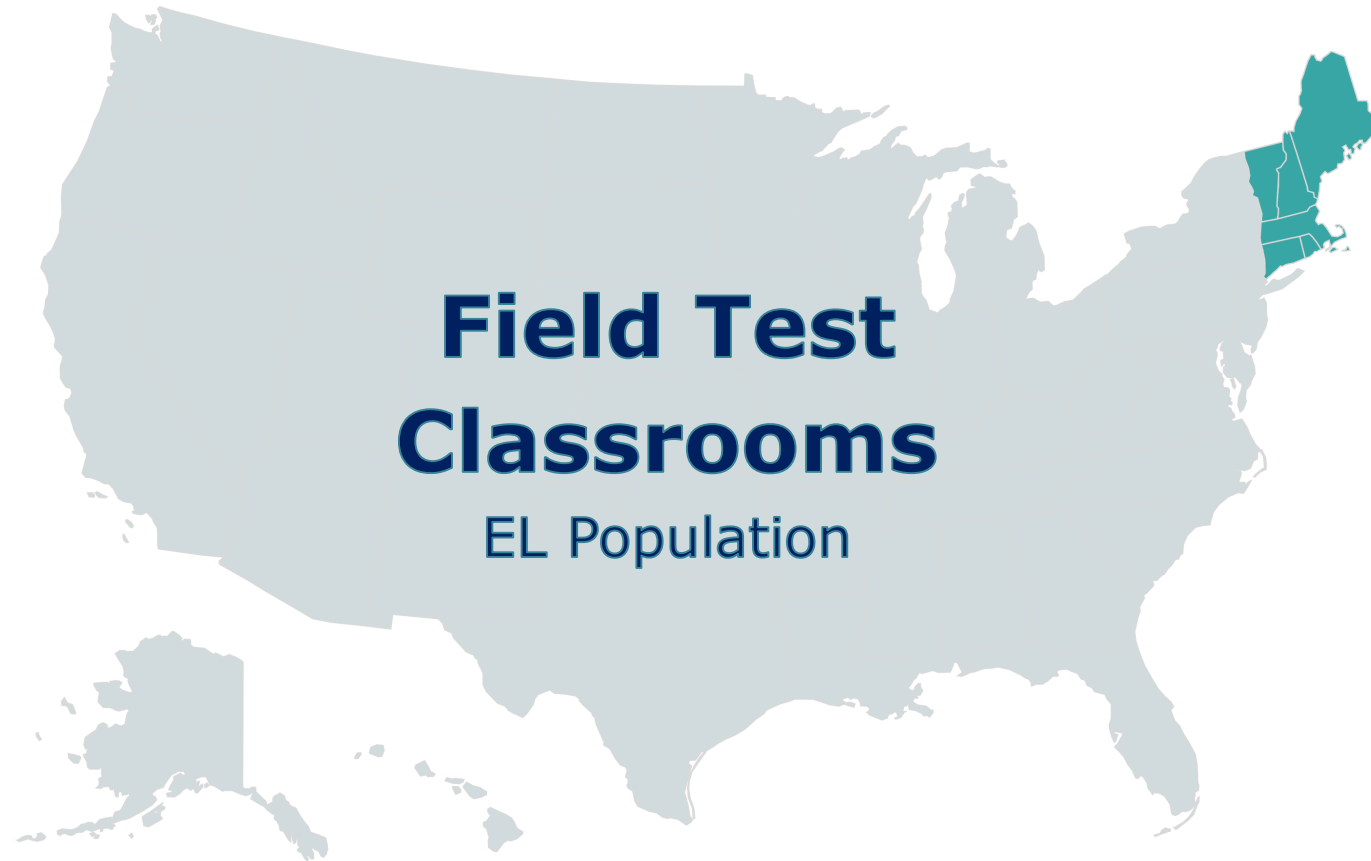
**Jaime Castellano**



**Marcy Voss**



# Phase 1 – Years 1-3



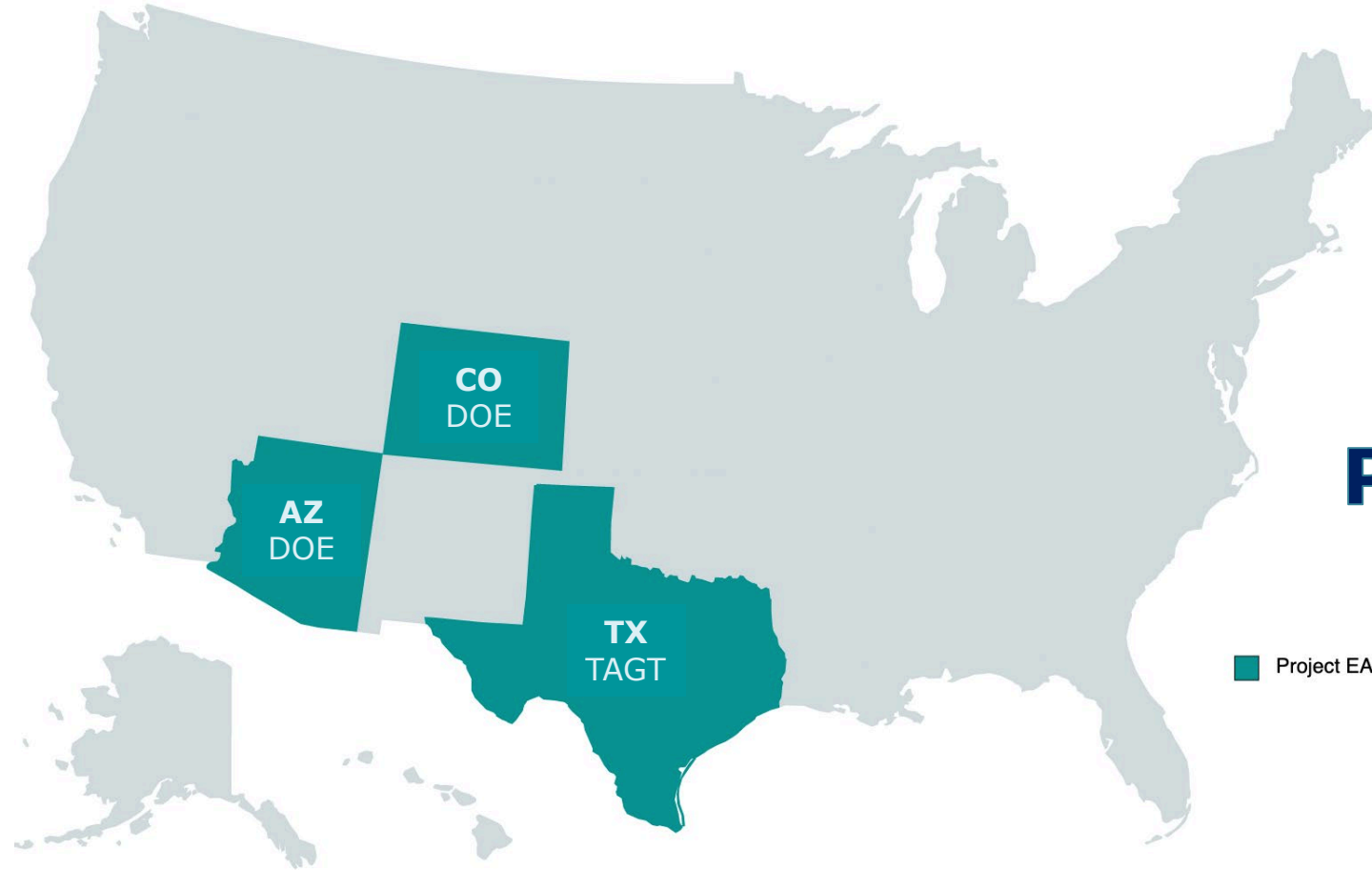
**New  
England**

**Field Test  
Classrooms**

EL Population



# Phase 2 – Years 4-5



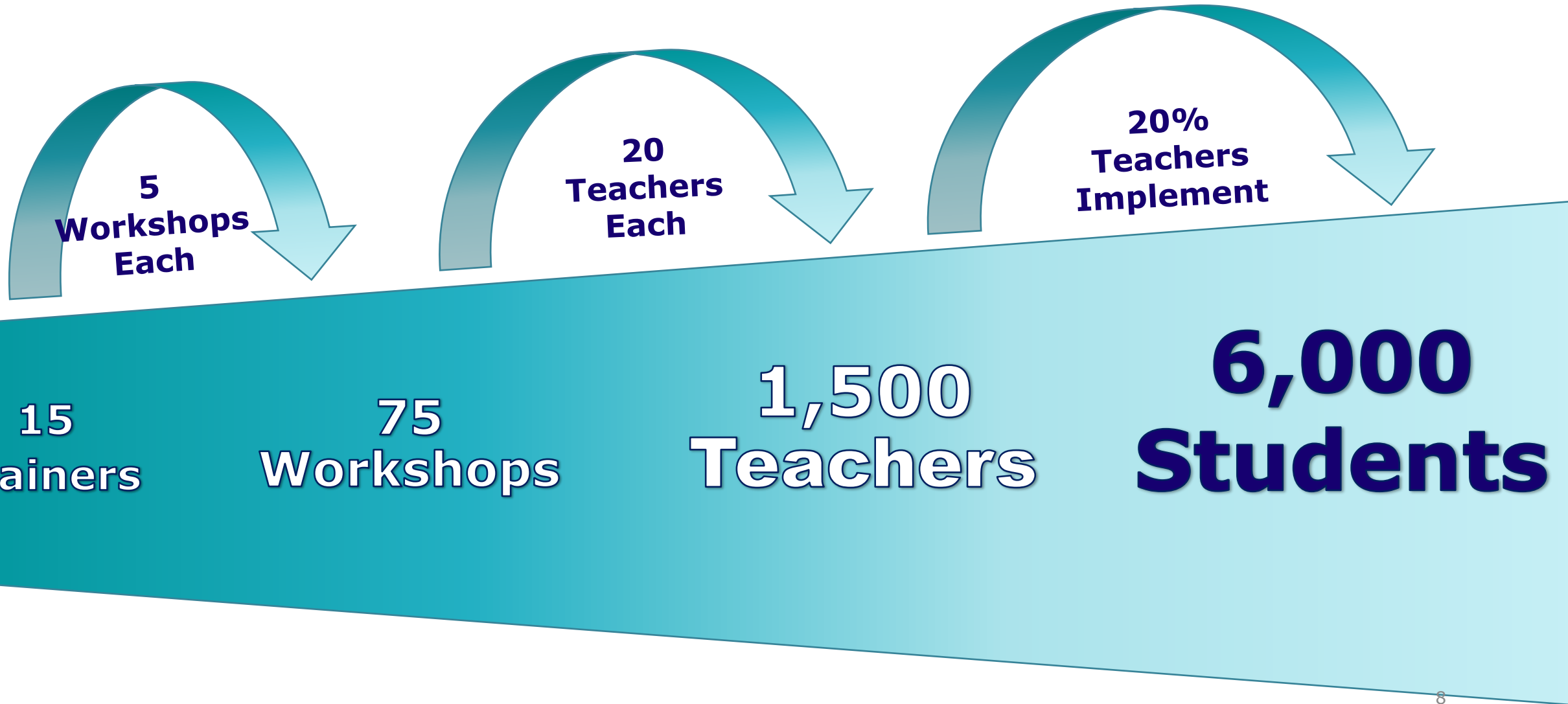
**State  
Partners**

■ Project EAGLE Partners





# By the Numbers





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# Turn & Talk

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- What do you KNOW about spotting mathematical talent?
- What do you WONDER about spotting mathematical talent?





**Share**



# Rationale



Underrepresentation of gifted ELs



Little attention to EL mathematical thinking



# Recommendations

- Professional learning on fostering and spotting EL talent
- Linguistic and cultural considerations
- Measures
  - Multiple
  - Beyond standardized
  - Strength-based
  - Dynamic



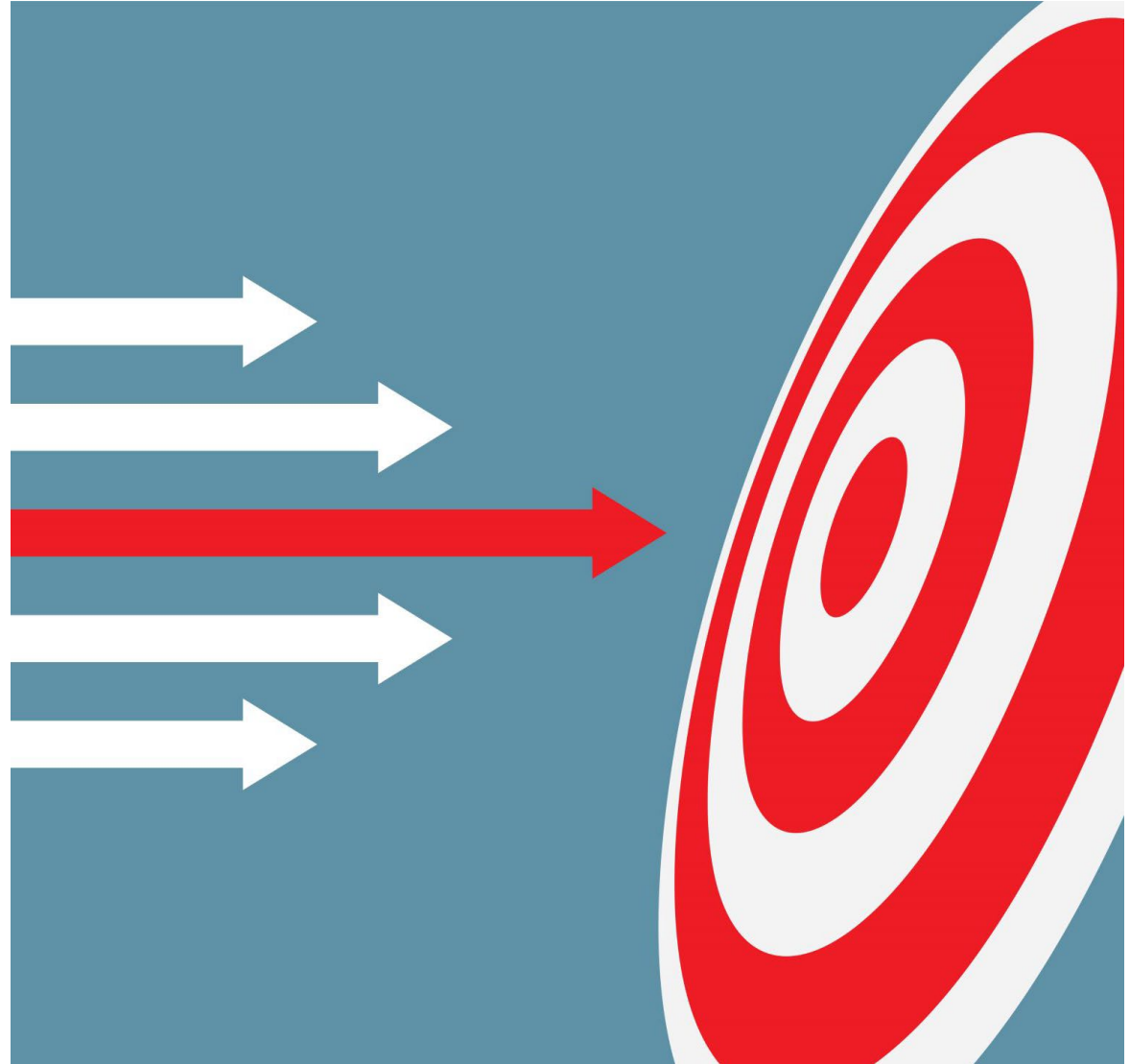




# Goals

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- Create dynamic EL ID
- Increase capacity for spotting EL talent
- Increase EL nominations





# Benefits

**Familiarity**

**Task-based**

**Insight into  
thinking**



# Project EAGLE



## **Points of Promise (POP) Classroom Observation Checklist**



## **Lessons to Elicit POP Behaviors**

- EL scaffolds
- 
-





# Points of Promise

**Classroom Observation Checklist**












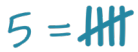

# Why Points of Promise?

- **Foster and spot mathematical talent**
  - Research-based
  - Expert advisory board
- **Utilize a checklist**
  - Any indication of behavior is acknowledged
  - Behaviors “POP” out





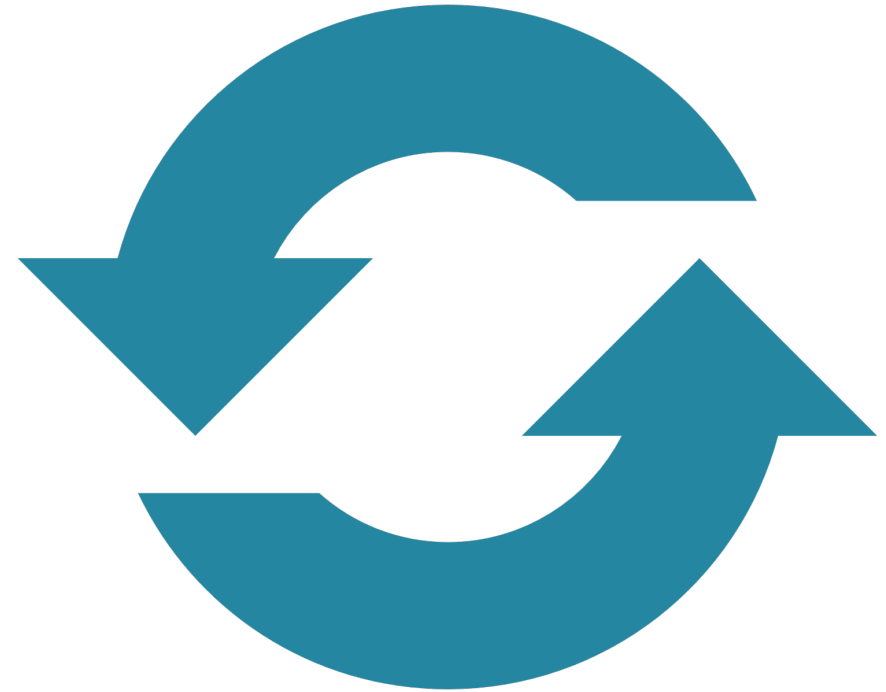
# POP Overview

	1. Is motivated and persists in solving complex math problems.
	2. Learns new concepts in mathematics easily.
	3. Applies mathematical concepts to real-world situations.
	4. Shows flexibility in using a variety of thinking or problem-solving strategies.
	5. Makes inferences based on logical reasoning.
	6. Demonstrates original ways of approaching math problems.
	7. Organizes information in a variety of ways to discover mathematical patterns.
	8. Demonstrates a strong number sense.
	9. Displays spatial abilities.



# **1. Is motivated and persists in solving complex math problems**

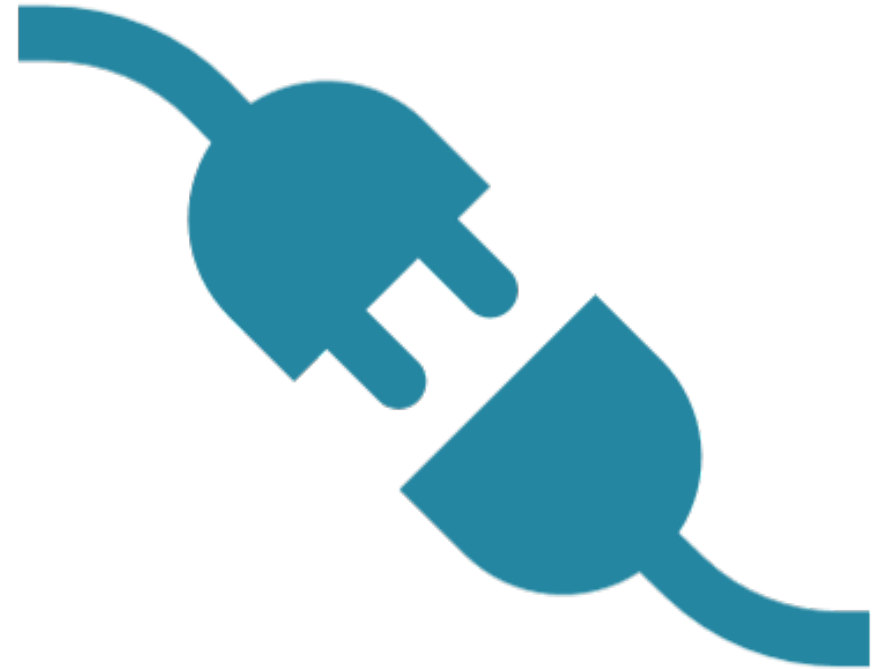
- Persistence of effort
- Makes meaningful, sustained progress on a challenging task
- Persists despite setbacks
- Is curious or intrigued by math





## **2. Learns new concepts in mathematics easily**

- Sees connections between new material and past material
- Makes relationships between different mathematical ideas
- Connects ideas to other broader concepts





### **3. Applies mathematical concepts to real-world situations**

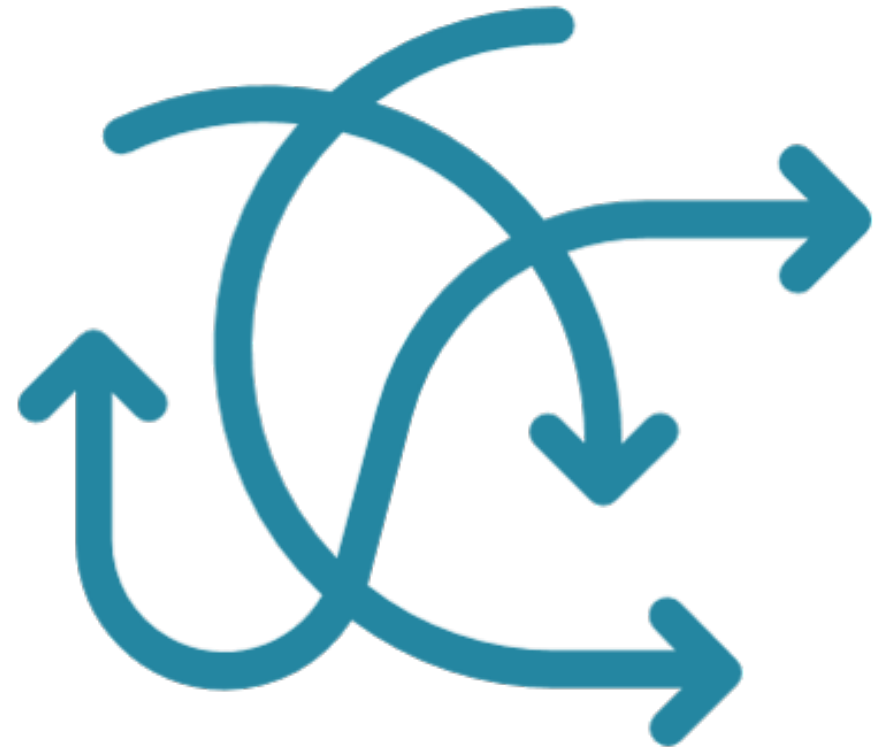
- Identifies real-world problems where math might be useful
- Connects mathematical concepts to personally meaningful experiences
- Recognizes patterns in real-world phenomena or experiences





## 4. Shows flexibility in using a variety of thinking or problem-solving strategies

- Changes strategies to a more efficient approach, as needed
- Restructures a problem to find a more workable form
- Utilizes relational thinking







## **5. Makes inferences based on logical reasoning**

- Draws logical conclusions from key ideas
- Generalizes based on specific examples
- Able to think a few steps ahead





## **6. Demonstrates original ways of approaching math problems**

- Devises a novel approach or strategy for solving a problem
- Generates unique questions or problems to solve





## 7. Organizes information in a variety of ways to discover mathematical patterns

- Draws inferences from recognizing patterns
- Groups multiple pieces of information together
- Recognizes and uses patterns to solve problems





## 8. Demonstrates a strong number sense

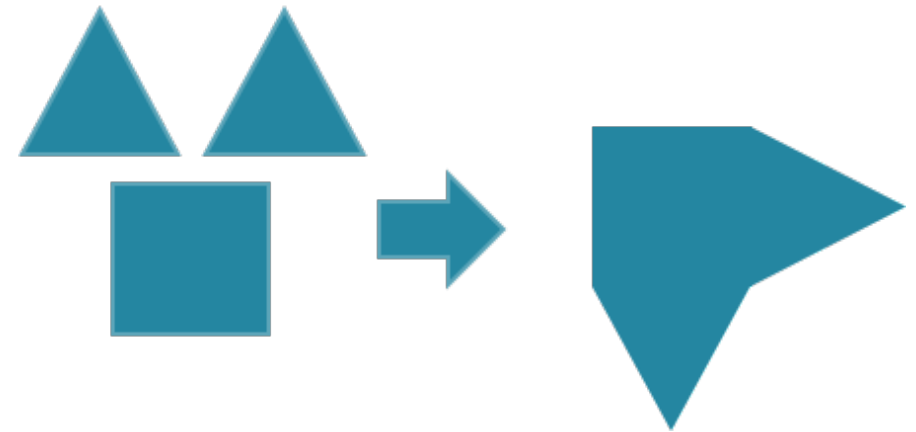
- Demonstrates an understanding of place value, including how it is represented
- Uses mental computations easily
- Uses appropriate numerical operations intuitively
- Compares and orders large numbers or fractions easily

$$5 = \text{||||}$$



## 9. Displays spatial abilities

- Mentally manipulates an object without physically touching it
- Solves problems using spatial representations
- Composes an object from component parts





As you observe students working, look for the following behaviors. You may use the sample “Ask a student” questions or others of your own to look more closely at student thinking. Note any students who demonstrate the behaviors in the boxes to the right.











Sub-behavior	Ask a student...	Students Who Demonstrate POP
1. Is motivated and persists in solving complex math problems.		
Persistence of effort	<ul style="list-style-type: none"><li>• <i>Would another number work for this input rule? Why or why not?</i></li><li>• <i>If their rule is not the same as the Machine Operator or their rule is wrong, do they keep trying?</i></li></ul>	
Student sees value in making mistakes		
Makes meaningful, sustained progress on a challenging task		
Is curious, intrigued by or interested in math		
2. Learns new concepts in mathematics easily.		
Sees connections between new material and past material	<ul style="list-style-type: none"><li>• <i>Does the In and Out Machine connect to any previous concepts we have learned?</i></li><li>• <i>Can you explain how this works?</i></li><li>• <i>Does your rule work for every number? Why or why not?</i></li></ul>	
Connects ideas to other broader concepts		
Makes relationships between different mathematical ideas		
3. Applies mathematical concepts to real-world situations		
Identifies real-world problems where a math model might be useful		
Connects mathematical concepts to personally meaningful experiences		
Recognizes patterns in real-world phenomena or experiences		
4. Shows flexibility in using a variety of thinking or problem-solving strategies.		
Changes strategies to a more efficient approach, as needed	<i>Why did you choose these numbers?</i> <i>How did you compute the value of the output?</i>	
Utilizes relational thinking		
Restructures a problem to a more workable form (e.g., modeling a problem)		



Sub-behavior	Ask a student...	Students Who Demonstrate POP
5. Makes inferences based on logical reasoning.		
Draws logical conclusions from key ideas	<ul style="list-style-type: none"><li>How do you know you have found all the rules for a set of data?</li><li>What do these examples have in common?</li><li>Could the rule have been determined with fewer input guesses?</li></ul>	
Generalizes based on specific examples		
Can think a few steps ahead		
6. Demonstrates original ways of approaching math problems.		
Generates unique questions or problems to solve	<ul style="list-style-type: none"><li>What would happen to the output values if I changed the rule?</li></ul>	
Devises a novel approach or strategy for solving a problem		
7. Organizes information in a variety of ways to discover mathematical patterns		
Draws inferences from recognizing patterns	<ul style="list-style-type: none"><li>Why did you choose these numbers?</li><li>Why did you organize the information the way you did?</li></ul>	
Recognizes and uses patterns to solve problems		
Groups multiple pieces of information together		
8. Demonstrates a strong number sense		
Demonstrates understanding of and can represent place value	<ul style="list-style-type: none"><li>If the rule was (add/subtract 0), could it have been (subtract/add 0)? Why or why not?</li><li>If the rule was (multiply/divide) by 1, could it have been (multiply/divide) by 1? Why or why not?</li><li>Could you use a different method here? Why or why not?</li><li>How did you compute the input from the output?</li><li>Why do you think you are getting these results?</li></ul>	
Uses mental computations easily		
Uses appropriate numerical operations intuitively		
Compares and orders large numbers or fractions easily		
9. Displays spatial abilities		
Mentally manipulates an object without physically touching it		
Solves problems using spatial representations		
Composes an object from component parts		








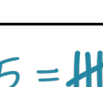





 <b>Points of Promise:</b> <b>Classroom Observation Checklist</b>		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	1. Is motivated and persists in solving difficult math problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2. Learns new concepts in mathematics quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Applies mathematical concepts to real-world situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Shows flexibility in using a variety of thinking or problem-solving strategies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Makes inferences based on logical reasoning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Demonstrates original ways of approaching math problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Organizes information in a variety of ways to discover mathematical patterns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8. Demonstrates a strong number sense	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	9. Displays spatial abilities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



# I am thinking mathematically when...

	1. I enjoy working on math and continuing to try to find the answer even when the problems are difficult.
	2. I connect what I am learning to what I have learned before in math.
	3. I relate the math we are learning to everyday life outside of math class.
	4. I try different strategies to solve math problems.
	5. I use logical reasoning to make sense of math problems and determine what to do next.
	6. I think of new ways to solve math problems and new problems to solve.
	7. I recognize patterns in math and use them to organize information.
	8. I understand and use relationships between numbers to order, compare, and estimate.
	9. I can figure out how shapes fit together in different ways.

# **Behaviors That POP!**

## **Math Tasks**





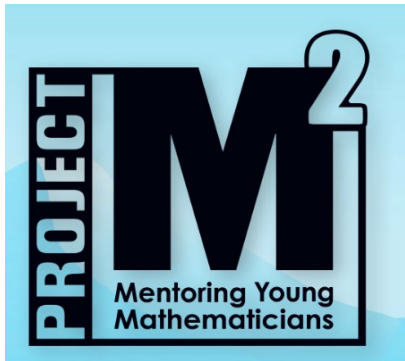
# Lessons to Elicit POP Behaviors

- Problem-based math tasks
- EL scaffolds
- Dynamic approach
  - Prompts
  - Probes





# Problem-Based Math Tasks



Co-Developed with Dr. Kathy Gavin

Include tiered games and activities

*\*Lessons are not for distribution*



# Math Task Domains

Lesson	Domain
<b>As a Rule</b>	Numbers and Operations Algebraic Thinking
<b>Keep Your Balance</b>	Algebraic Thinking Numbers and Operations
<b>A Feast of Fractions</b>	Fractions
<b>Is it Worth It?</b>	Geometry Measurement
<b>Measuring Up</b>	Measurement Geometry



# EL Recommendations

- 🌱 Cultural considerations
- 🌱 EL scaffolds
  - 🌱 Language load
  - 🌱 Vocabulary
  - 🌱 Word walls
  - 🌱 Building background
  - 🌱 Sentence starters and frames
  - 🌱 Turn and talk
  - 🌱 Modalities of expression







# Dynamic Approach

- In the lessons and POP checklists



**Prompt  
(Urge)**

**Probe  
(Delve)**



**Prompt  
(Urge)**

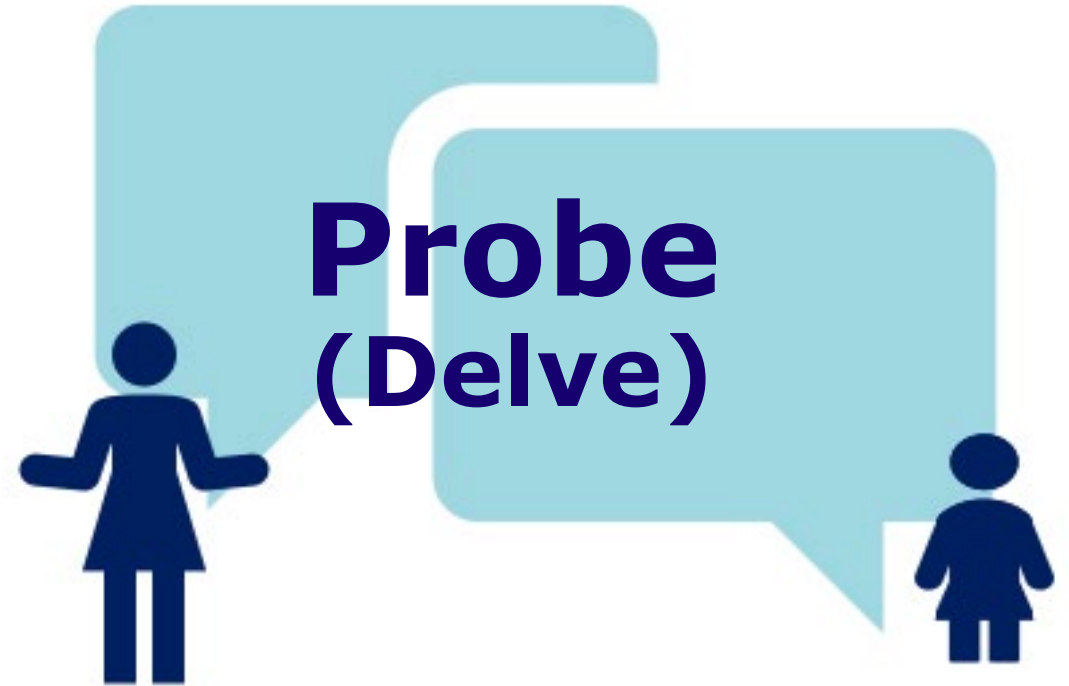
 **From the teacher to the student**

 **Help students by**

- Engaging
- Explaining
- Encouraging



- **To elicit student responses**
- **Delve into student thinking with**
  - Global Probes
  - Focused Probes





# Structure



**BUILDING  
BACKGROUND  
AND ACADEMIC  
KNOWLEDGE**



**ACTIVITY**



**TALK ABOUT IT**



**A CLOSER  
LOOK**



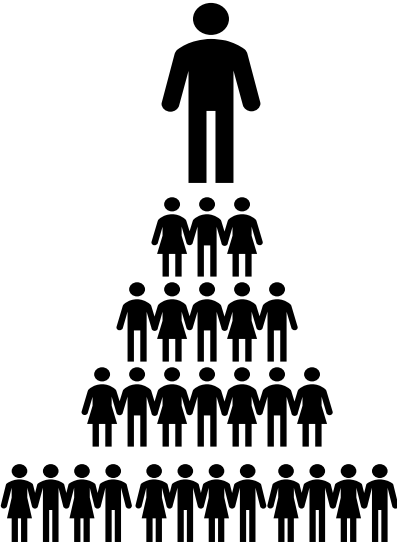
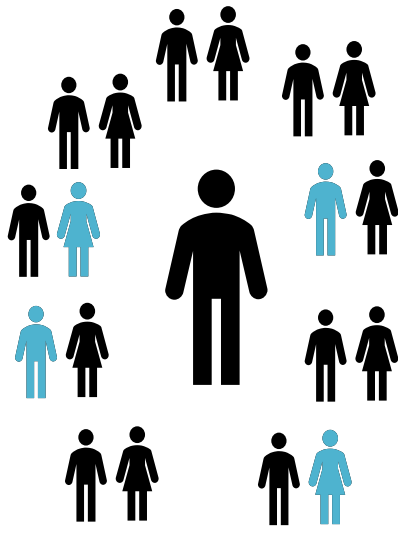
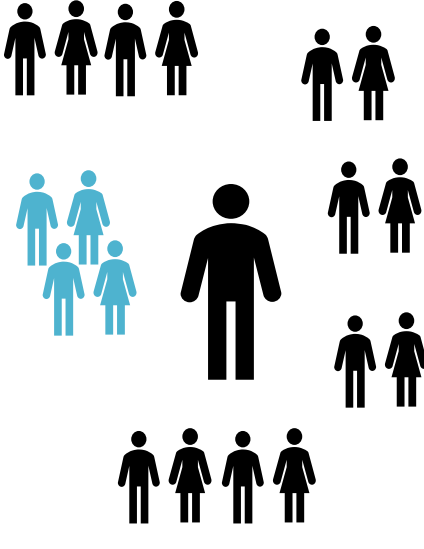
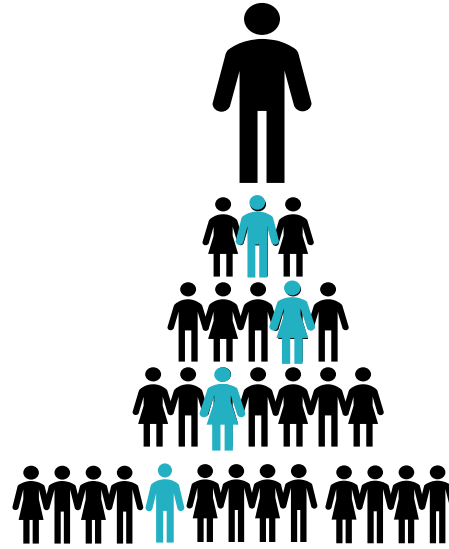
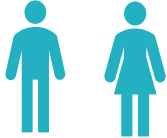
**WRAP IT UP**



# Project EAGLE

## POP Lesson Format

### Five 60-Minute Lessons

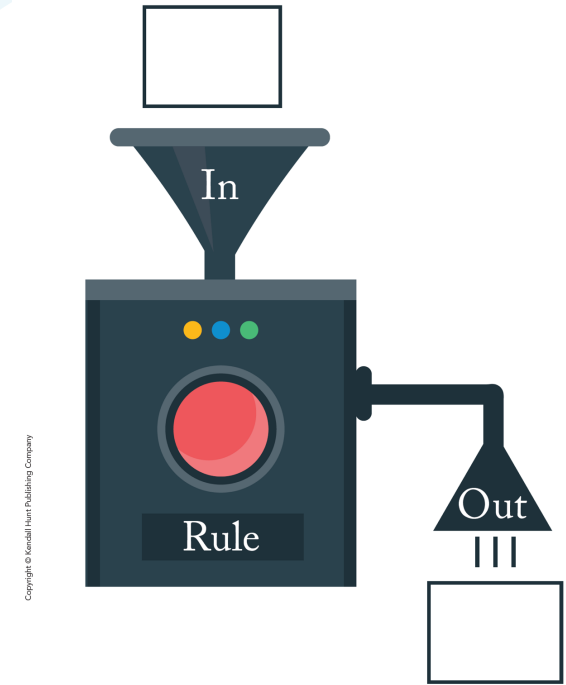
				
<i>Building Background and Developing Vocabulary</i>	<i>Activity</i>	<i>A Closer Look</i>	<i>Talk About It and Wrap It Up</i>	Students That POP!
Whole Class <b>Introduction and Discussion</b> (Including Prompts)	Partners/Small Groups <b>Task</b>	Individuals <b>Prompts and Probes</b>	Whole Class <b>Debrief</b> (Including Probes)	Individuals <b>Students on the Teacher's Radar</b>

Points of Promise Classroom Observation Checklist



# As a Rule

- Guess the rule based on input/output numbers
- Closer Look Group(s)
  - Spinner has rules with two operations (e.g., add 1 then multiply by 2)



Project A: Awesome Advanced Activities  
for Mentoring Mathematical Minds

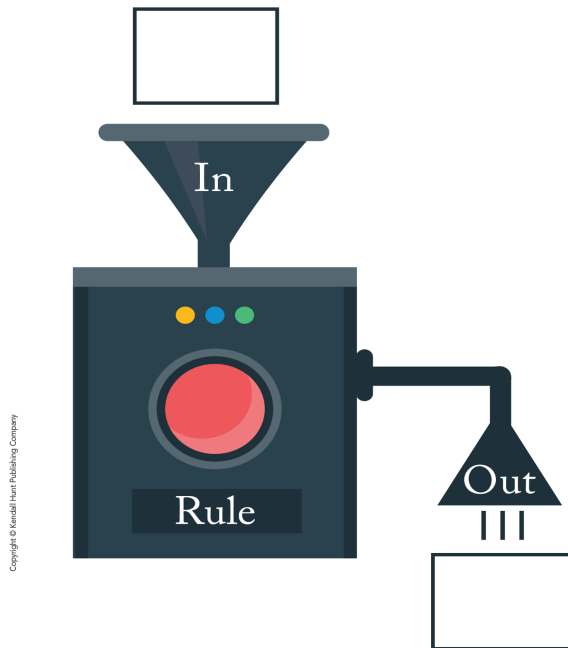
115

Amazing Algebra  
As a Rule



# Let's Play!

Guess the rule based on input/output number

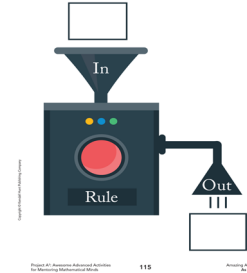


## As a Rule

Record Sheet

In	Out

Rule: \_\_\_\_\_



# Activity

Listen to the audio clip from  
"As a Rule."

Use the checklist to note  
behaviors you spot.

Bonus: Note any specific  
examples!

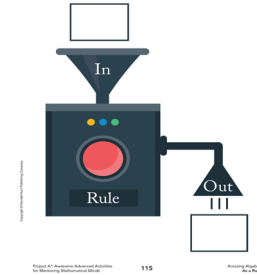






# As a Rule

## Behaviors That POP!



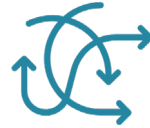
### 1. Motivation

- **Persistence**

- Continues to offer suggestions/ideas for the rule

- **Curious/interested**

- Tries to use larger (harder) numbers for input



### 4. Flexibility

- **Relational thinking**

- Explains multiple rules that could work

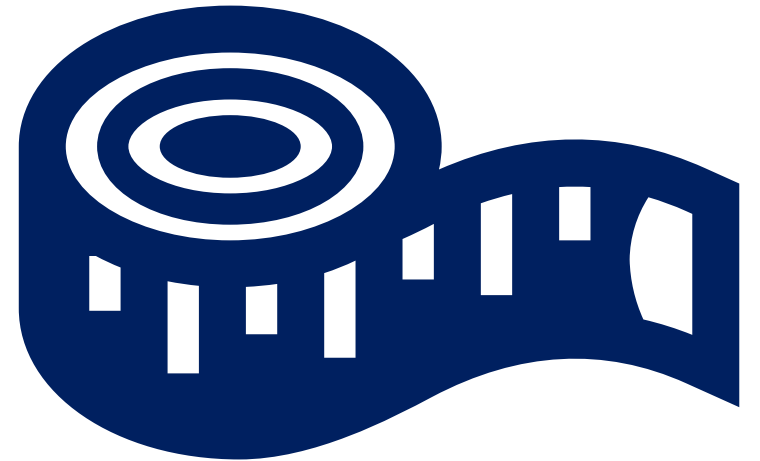
- **Strategies**

- Recognizes small input numbers make it easier to figure out rules



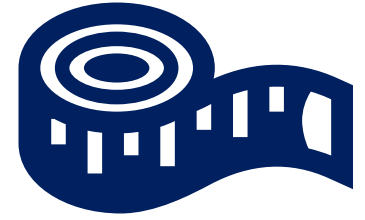
# Measuring Up

- Fill in missing measurements; find area and perimeter
- Closer Look Group(s)
  - More challenging activities
  - Exploration of relationships between area and perimeter





# Measuring Up Behaviors That POP!



## 2. New concepts 9. Spatial abilities

- **Connections**

- Discusses angles and triangles to find missing side

- **Relationships**

- Applies equivalence to finding area and perimeter

- **Problem-solving**

- Configures the shapes in the room to find the area

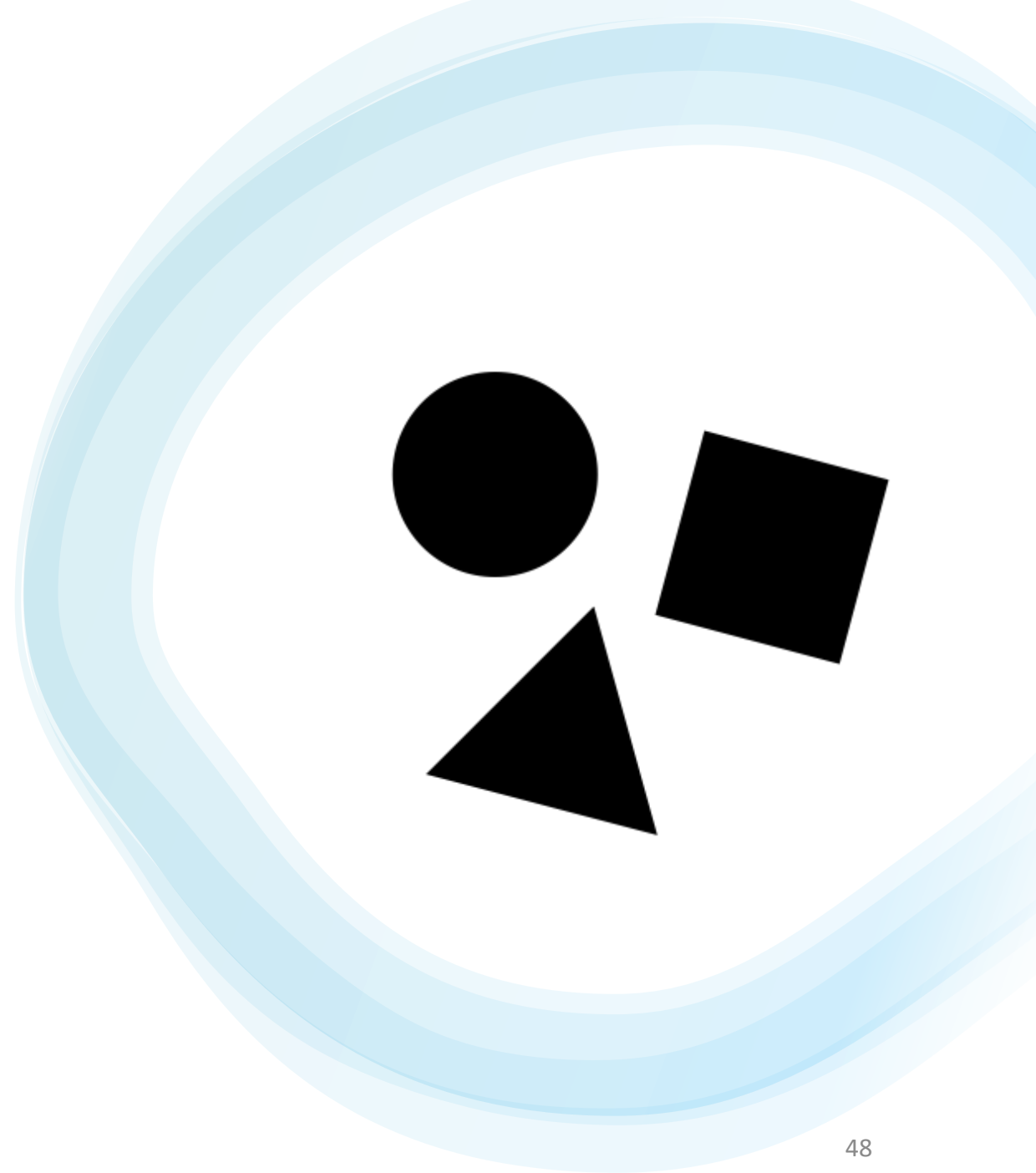
- **Mental manipulation**

- Visualizes length of missing side without doing the math



# Is It Worth It?

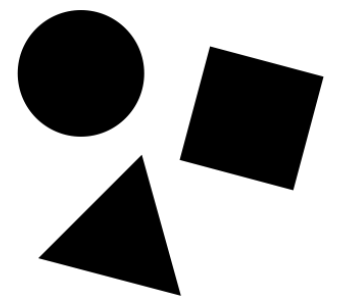
- Pattern block game to form shapes based on number of blocks, perimeter, cost
- Closer Look Group(s)
  - Students work with the teacher and continue the game





# Is It Worth It?

## Behaviors That POP!



### 3. Real world

- **Identifies real problems**
  - Example of how the shape can change cost
- **Meaningful experiences**
  - Describe deciding if something is worth the cost



### 6. Original ways

- **Novel approach**
  - Solves card in a way or devises new strategy
- **Unique questions/problems**
  - Creates own game card



# Keep Your Balance

- Balance a scale using shapes/equations
- Closer Look Group(s)
  - Students use a different balance scale
  - Encouraged to think without using counters





# Keep Your Balance Behaviors That POP!



## 7. Patterns

$$5 = \text{|||||}$$

- **Inferences**

- Explains patterns that helped balance the scales

- **Grouping**

- Organizes data to determine whether all equations have been found

## 8. Number Sense

- **Mental computations**

- Completes addition in their head

- **Intuition**

- Balances scales quickly and/or correctly without teacher explanation



# A Feast of Fractions

- Figure out how much pizza students get and how it could be distributed more evenly
- Closer Look Group(s)
  - Recalculate and redistribute pizza based on additional information







# Feast of Fractions

## Behaviors that POP!



## 2. New concepts

5 = ~~||||~~

- **Connections**

- Puts fractions in their lowest form without being asked

- **Relationships**

- Understands how fractions relate to equivalence

## 8. Number sense

- **Intuition**

- Shows how to calculate the amount each student gets to eat using fractions without the teacher having to demonstrate

- **Compare and Order**

- Determines which groups are getting more to eat in different activities without having to write it out



## Other Applications

# Turn & Talk

What do you still want to  
**LEARN?**





## **Project EAGLE Webpage**

[identifygifted.education.uconn.edu/](https://identifygifted.education.uconn.edu/)

## **Contact or Email List**

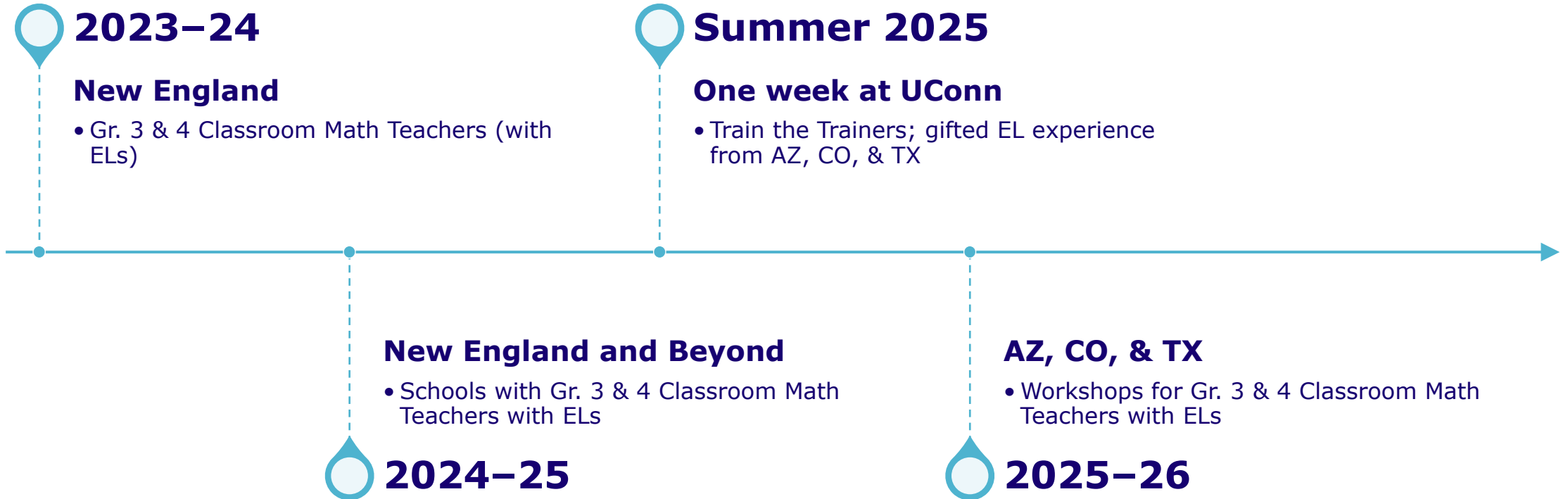
[projecteagle@uconn.edu](mailto:projecteagle@uconn.edu)

# Opportunities to Participate





# Timeline







## **2023-24 School Year**

- Gr. 3 & 4 classroom math teachers (ELs)
- New England

## **Compensated**

- Professional learning
- 5 lessons
- Feedback

**Today**

# **Information Session**

*Business Building  
Room 226  
5:15 – 5:45 p.m.*



**Questions?**