



# BetterLesson Professional Learning Webinar

Math Language Routines



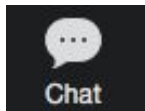
**Session 4: Promoting Language Use in Math: Maximizing Meta-awareness**

**Ohio Department of Education & Workforce**

April 24th, 2024

Megan Nagel/Padraic O'Donnell

# Welcome!



Share in the chat:

**Where are you joining us from today  
and what is your current role?**

**When your students share out their mathematical  
thinking, have you ever been surprised by what  
they say?**

# Aligned & Tailored for Ohio ESC Partnership



## Aligned

Our partnership is specifically designed to amplify the impact of other state-wide infrastructure and initiatives.

Our coaches will be familiar with key efforts, including:

- Materials Matter
- HQIM-related work streams with EdReports & Instruction Partners
- Ohio Standards for Math Practice



## Tailored

Our team has worked with leadership from the ESC of Central Ohio, OESCA, and the Department of Education to tailor our workshop, coaching, and learning walk content to the unique needs of ESC Math Specialists

# Your Hosts



**Padraic O'Donnell**  
Instructional Coach



**Megan Nagel**  
Instructional Coach

## Let's Check In!

Share one way you create opportunities for students to reflect on their understanding and ways of learning.

# Zoom Poll

Which option represents your class in terms of who talks to who about the math concepts/procedures during class?

A

More teacher to student talk

B

About equal

C

More student to student talk

# Our Series: Math Language Routines



## Goal

Plan to use Mathematical Language Routines as practical ways to maximize meta-awareness to promote language use in math

**DEFINE**

**Maximizing  
Meta-Awareness**

**EXPLORE**

**Info Gap  
+  
Co-Craft  
Questions &  
Problems**

**BUILD**

**A Plan for  
Implementation**

**TRY, MEASURE, LEARN**

# What are the Math Language Routines?

“A ‘math language routine’ refers to a structured but adaptable format for **amplifying**, assessing, and **developing** students’ language.”

**Understanding Language/Scale**  
Stanford Graduate School of Education



# Promoting Language *and* Content Development

## SUPPORT SENSE-MAKING:

Scaffold tasks & amplify language so students can make their own meaning.

## OPTIMIZE OUTPUT:

Expand opportunities for students to describe their mathematical thinking to others orally, visually, & in writing.

## CULTIVATE CONVERSATION:

Increase constructive mathematical conversations (pairs, groups, & whole class).

## MAXIMIZE META-AWARENESS:

Help students reflect on their own math ideas, reasoning & language.

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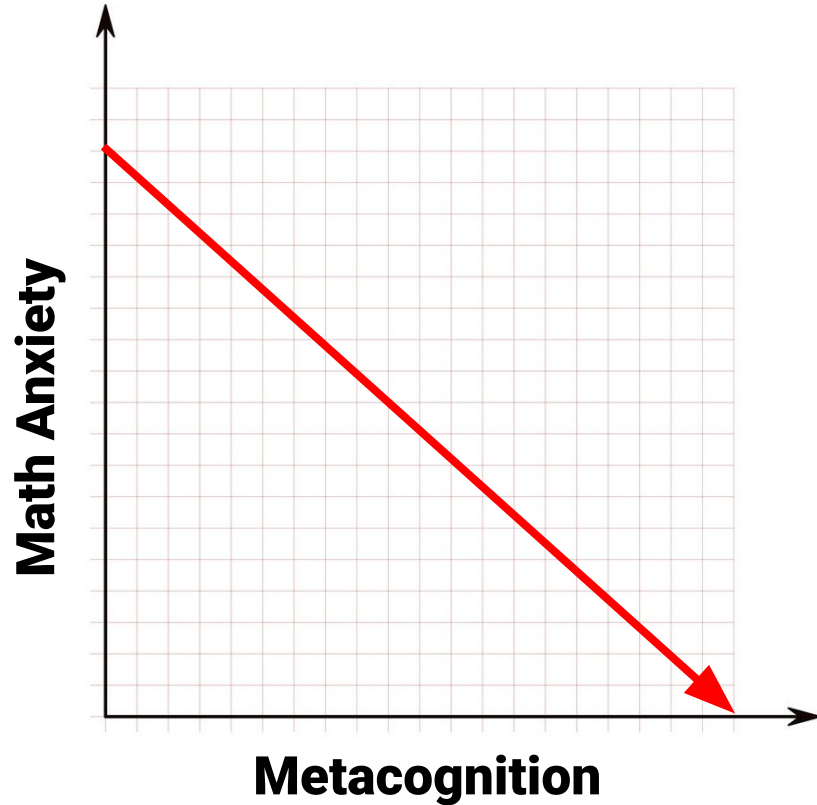
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# Why is Meta-Cognition Important?



**Plan/Strategize:**  
What do I know?

**Check/Monitor:**  
How do I do things?

**Evaluate:**  
Why and when do I do things?

# MAXIMIZE META-AWARENESS DEFINED

- Meta-awareness is consciously thinking about one's own thought processes or language use.
- When students are using language in ways that are purposeful and meaningful for themselves, in their efforts to understand—and be understood by—each other.
- They are motivated to attend to ways in which language can be both clarified and clarifying.

# Mathematical Language Routines (MLR's)

1: Stronger and Clearer Each Time

2: Collect and Display

3: Critique, Correct, and Clarify



4: Information Gap

5: Co-Craft Questions and Problems

6: Three Reads

7: Compare and Connect

8: Discussion Supports

## MLR 4: Information Gap

**Purpose:** To create a need for students to communicate (Gibbons, 2002). This allows teachers to **facilitate meaningful interactions** by giving partners or team members different pieces of necessary information that must be used together to solve a problem or play a game. With an information gap, students need to orally (and/or visually) share their ideas and information in order to **bridge the gap and accomplish something that they could not have done alone**. Teachers should model how to ask for and share information, clarification, justification, and elaboration.

# Information Gap

## Partner A

### Problem Card

- context

## Partner B

### Data Card

- quantities

# Information Gap

## Partner A

*(reads the problem card out loud)*

### Problem Card

- context

What specific information do you need?

Can you tell me...?

Why do you need this information?

I need this information because...

*(Provides the information)*

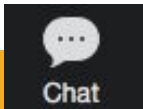
## Partner B

### Data Card

- quantities



# What do you need to know to be able to answer the question?



**Ask me for the specific information that you need.**

**Explain how you are using the information to solve the problem.**

## **Problem Card**

A cake recipe called for using some sugar before baking and more sugar after baking. A baker has some sugar already. How much more sugar does the baker need before she can make this cake?

# What do you need to know to be able to answer the question?

The data card has the quantities.

Not all of the info might be used, and that's intended

## Data Card

- Before Baking:  $6 \frac{5}{9}$  cups of sugar
- After Baking:  $5 \frac{4}{9}$  cups of sugar
- The baker already has 12 cups of sugar
- The baker is making 8 dozen cookies

## Planning for Information Gap

Take the numbers out and put them on a data card.

What is left goes on the problem card.

A cake recipe called for  $6 \frac{5}{9}$  cups of sugar before baking and another  $5 \frac{4}{9}$  cups of sugar after baking. A baker already has 12 cups of sugar. How much more sugar does the baker need before she can make this cake?

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## MLR 5: Co-Craft Questions and Problems

**Purpose:** To allow students to **get inside of a context** before feeling pressure to produce answers, to create space for students to **produce the language of mathematical questions themselves**, and to provide opportunities for students to **analyze how different mathematical forms can represent different situations**. Through this routine, students are able to use conversation skills to **generate, choose (argue for the best one), and improve questions, problems, and situations** as well as develop meta-awareness of the language used in mathematical questions and problems. Teachers should push for clarity and revoice oral responses as necessary.

# MLR 5: Co-Craft Questions and Problems

- 1 Co-craft **QUESTIONS**
- 2 Co-craft **PROBLEMS**
- 3 Co-craft **SITUATIONS**

# Co-Craft QUESTIONS

Matthew and his brother Shawn played swimming-pool basketball. Each basket was worth 3 points.  
Matthew scored 9 points.  
Shawn scored 6 points.

How many baskets would Shawn need to win?

**Create a question that could be answered using this mathematical situation.**

What is the total number of baskets made during this game?

If Shawn makes 9 baskets, how many points would he have?

**How is solving for these questions similar and different?**



# Co-Craft PROBLEMS

Lin rode a bike 20 miles in 150 minutes. If she rode at a constant speed,

- How far did she ride in 15 minutes?
- How long did it take her to ride 6 miles?

**Create a similar word problem.**

Carl got 2 problems wrong for every 5 problems right on a math test. How many problems did Carl get wrong if there were 35 problems altogether on the test?

For every \$10 Helen takes home, her employer withholds \$3 for taxes and social security. Helen's gross pay each month is \$1950. How much does she take home each month?

**How is solving you and your partner's problems similar to and different from the original problem?**

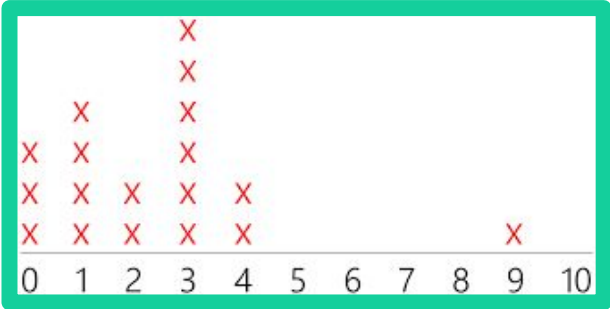
# Co-Craft Situations

Create a situation or story that would go with this \_\_\_\_\_.

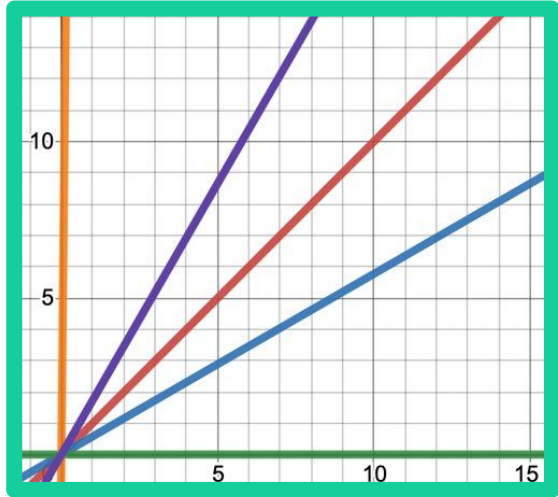
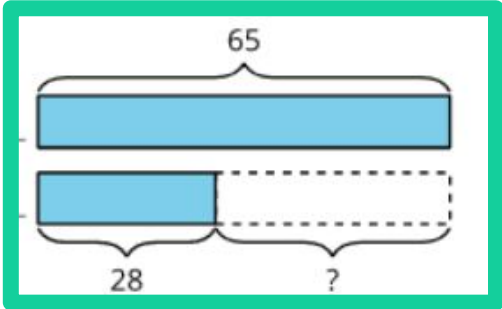


$$2 + 2 + 2 + 2 + 1 = 9$$

$$f = 201.50 + 6.50(21)$$



A	B	C	D	F	Total
17	8	14	11	3	53
12	11	13	6	5	47
29	19	27	17	8	100



# MLR 5: Co-Craft Questions and Problems

1

Co-craft questions: **Provide a situation context** and ask students to create, answer, then compare their questions to a specific math goal.

2

Co-craft problems: **Provide a problem** and ask students to create then compare their problem to a set of parameters in relation to a specific math goal.

3

Co-craft situations: **Provide a mathematical representation** and ask students to create then compare their situation to a set of parameters in relation to a specific math goal.

# Build

How can we make this work actionable?

# Let's Explore: Strategy Choice Board

Choose any of the sections below and explore the related BL resources & strategies.

**MLR Deep Dive:**  
**Information Gap**

**MLR Deep Dive:**  
**Co-Craft**  
**Questions and**  
**Problems**

**Review All**  
**MLR's and**  
**Planning Guides**  
**Planning Guides**

## Q & A

**What questions do you have about our conversation today?**





**We value your feedback!**

**Your input is important to us, please take a moment to complete our survey using the link in the chat.**

# Thank you!

