

# Using Mathematical Language Routines in Linguistically Diverse Classrooms



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## mELd Design Framework





1. Consistent conceptual focus with carefully chosen contexts
2. Interweave math & language goals
3. Use language structures to promote equitable student engagement

## Math Language Routines





MLRs 1-8 are from Zwiers et al., 2017. MLRs 9-10 are from Driscoll et al.

Name	Description
 <b>MLR 1</b> <b>Stronger and Clearer</b>	<p><b>What it is:</b> A structured and interactive opportunity for students to revise and refine both their ideas and their verbal and written output</p> <p><b>Example:</b> Ask students to write an explanation. Next, discuss as a class. Then, ask students to revise their explanation after the discussion.</p>
 <b>MLR 2</b> <b>Collect and Display</b>	<p><b>What it is:</b> Capture students' oral words and phrases into a stable, collective reference</p> <p><b>Example:</b> Do a "notice and wonder" activity and record student answers on a poster.</p>



 <p><b>Critique, Correct, and Clarify</b></p>	<p><b>What it is:</b> give students a piece of mathematical writing that is not their own to analyze, reflect on, and develop.</p> <p><b>Example:</b> Ask students to comment on what is correct and incorrect about a mathematical argument from a fictional student.</p>
 <p><b>Information Gap</b></p>	<p><b>What it is:</b> Giving partners or team members different pieces of necessary information that must be used together to solve a problem</p> <p><b>Example:</b> Give students cards with different representations (e.g., graphs, tables, equations, stories). Ask each group to match the cards.</p>
 <p><b>Co-Crafted Questions</b></p>	<p><b>What it is:</b> Allowing students to generate mathematical questions for a situation. This creates space for students to produce the language of math questions.</p> <p><b>Example:</b> Present a situation... “What do you notice and what do you wonder? Write a question.” Discuss. Then transition a problem to solve as a class.</p>
 <p><b>Three Reads</b></p>	<p><b>What it is:</b> A structured reading routine to ensure students know what they are being asked to do. Creates opportunity for reflection on ways math questions are presented.</p> <p><b>Example:</b> Read #1: What is this about. Read #2: What is this asking me to do? Read #3: What information do I have?</p>



 <p><b>Compare and Connect</b></p>	<p><b>What it is:</b> Compare and contrast different mathematical approaches, representations, examples, concepts, and language.</p> <p><b>Example:</b> Ask students with different solutions to post publicly. Then ask the class to reflect on similarities and differences.</p>
 <p><b>Discussion Supports</b></p>	<p><b>What it is:</b> A set of talk structures, routines, and moves for supporting participation and engagement.</p> <p><b>Example:</b> Structured sharing (A-B partner sharing); Teacher using discussion moves such as revoice, repeat, press, wait time; Group and individual accountability.</p>
 <p><b>Co-Constructed Word Wall</b></p>	<p><b>What it is:</b> A public display of words that will support a discussion. This can help students use academic language more naturally.</p> <p><b>Example:</b> Brainstorm terms related to a certain topic (e.g. interpreting graphs). Then post a list for discussion.</p> <p><b>Non-Example:</b> “Frontloading” definitions.</p>
 <p><b>Acting it Out</b></p>	<p><b>What it is:</b> When a problem involves an action or a story, ask students to enact the story while introducing the problem, or at the conclusion when the problem is solved.</p> <p><b>Example:</b> Read a story problem about a race with a headstart. Then ask students to act out a race and show the difference (IRL) between a distance head start and a time-delay head start. [Next, use MLR7 to connect the different acting out routines to]</p>



# Mathematical Language Routines

## 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

Zwiers, Dieckmann, Rutherford-Quach, Daro, Skarin, Weiss, & Malmut. Principles for the Design of Mathematics Curricula: Promoting Language and Content Development. A project of Understanding Language.

<http://ell.stanford.edu>. Full URL:

[https://ell.stanford.edu/sites/default/files/u6232/ULSCALE\\_ToA\\_Principles\\_MLRs\\_Final\\_v2.0\\_030217.pdf](https://ell.stanford.edu/sites/default/files/u6232/ULSCALE_ToA_Principles_MLRs_Final_v2.0_030217.pdf)

## Stronger and Clearer

This routine provides a purpose for student conversation as well as fortifies output. The main idea is to have students

- **think or write individually** about a response,
- **use a structured pairing strategy** to have **multiple opportunities to refine and clarify the response through conversation**, and then finally
- **revise their original written response.**

Throughout this process, students should be pressed for details, and encouraged to press each other for details. Subsequent drafts should show evidence of incorporating or addressing new ideas or language. They should also show evidence of refinement in precision, communication, expression, examples, and/or reasoning about mathematical concepts.

## 3 Reads

Students are supported in reading a situation/problem three times, each time with a particular focus:

1. Students read the situation with the goal of comprehending the text (describe the situation without using numbers),
2. Students read the situation with the goal of analyzing the language used to present the mathematical structure.
3. Students read the situation in order to brainstorm possible mathematical solution methods.



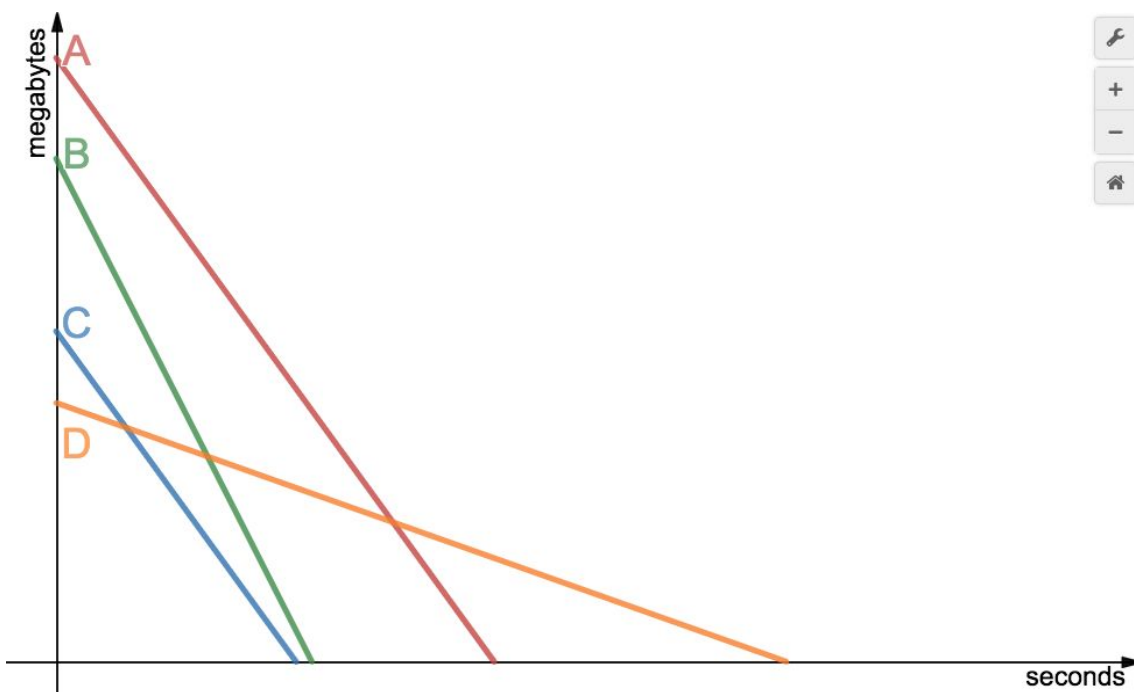
## Sample Task: Download Rates

Four friends disagree about whose phone is faster at downloading videos.

They test their phones by downloading different videos. Each friend writes down how large the video file is and how much time the phone used to download the video.



They use their information to make a graph showing the time each phone used to download a video. The phones are labeled A, B, C, and D.



1) Which phone downloaded the biggest video file? (Circle one)  
Explain: where do you see this on the graph?

A   B   C   D

I know that Phone \_\_\_\_\_ downloaded the biggest file because on  
the graph \_\_\_\_\_

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2) Which phone completed the download in the smallest amount of time?  
Where do you see this on the graph?

A   B   C   D

Explanation: \_\_\_\_\_

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3) Which phone downloads fastest? How do you know?

A   B   C   D

Phone \_\_\_\_\_ downloaded the fastest. I know this because \_\_\_\_\_

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4) What else do you notice about this graph?

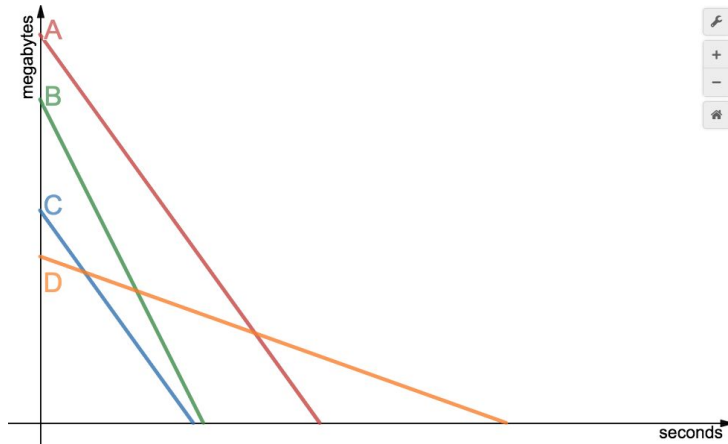
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## Stronger and Clearer



3) Which phone downloads fastest? How do you know?

A B C D

Phone \_\_\_\_\_ downloaded the fastest. I know this because \_\_\_\_\_

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3) Which phone downloads fastest? How do you know?

A B C D

Phone \_\_\_\_\_ downloaded the fastest. I know this because \_\_\_\_\_

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