

Integrating Language Routines Into Instruction

Compare and Connect

Students need opportunities to reflect on and linguistically respond to comparisons. Using routines that prompt meta-cognitive and meta-linguistic awareness supports students in mathematically productive conversations.

Grades K–2

Language Routine: Compare and Connect

The purpose of this routine is to foster students' meta-awareness as they identify, compare, and contrast different mathematical approaches, representations, concepts, examples, and language.

Routine	
SET-UP	Students are tasked with understanding one another's solution strategies by relating and connecting other students' approaches to their own approach. Ways to set this up so that multiple strategies are likely to be generated by each pair of students include: • <i>I solve it one way, you solve it another</i> • <i>Divide and conquer: you do one and I do another</i> • <i>I have a piece of information, you have a piece of information</i>
WHAT IS SIMILAR, WHAT IS DIFFERENT	Students first identify what is similar and what is different about the approaches. This can also be an initial discussion about what worked well in one approach compared to another and what might make a particular approach more complete or easy to understand.
MATHEMATICAL FOCUS	Students focus on specific mathematical relationships, operations, quantities, and values. Using Talk Moves effectively supports students in making mathematical comparisons and connections. For example: • <i>Who can restate _____'s reasoning in a different way?</i> • <i>Did anyone solve the problem the same way but would explain it differently?</i> • <i>Did anyone solve the problem in a different way?</i> • <i>Does anyone want to add on to _____'s strategy?</i> • <i>Do you agree or disagree? Why?</i>

(continued)

From the Classroom

SET-UP	Mr. B: <i>Henry used 12 blocks to create a building. What might his building look like?</i> [Students work individually with blocks to count out 12 blocks and create their own buildings]
WHAT IS SIMILAR, WHAT IS DIFFERENT	Mr. B: <i>I see we are all finished creating buildings. Look at what the other buildings at your table look like. Did anyone build it just like you did? How many different buildings do you see?</i> [Mr. B circulates while students look at each other's constructions.]
MATHEMATICAL FOCUS	Mr. B: <i>Let's talk about what you are noticing. Angel, how did you build with your blocks?</i> Angel: <i>I built mine with four blocks put together in a square on the bottom. Then I put four more right on top of those, and my last four right on top.</i> Mr. B: <i>Show me a thumbs up if you built yours just like Angel did?</i> [Pauses and looks at student responses] <i>Angel, how can we describe what you built in a number sentence?</i> Angel: <i>Ummm, I think I would write $4 + 4 + 4 = 12$.</i> [Mr. B writes the number sentence on a class chart alongside Angel's name] Mr. B: <i>That makes sense to me, based on how you described your building. Who built something different?</i> Konika: <i>I also started with four blocks on the bottom but mine were all in a row. Then I put four more on the next layer. But then I decided to make it really tall so I stacked up my last four blocks like a chimney.</i> Mr. B: <i>Interesting. So Konika and Angel each used 12 blocks but their buildings do not look the same! Konika, how would you represent your building with a number sentence?</i> Konika: <i>$4 + 4 + 1 + 1 + 1 + 1 = 12$.</i> [Mr. B writes the number sentence on a class chart alongside Konika's name.] Mr. B: <i>We've heard two different ways of building so far. At your table groups, record a number sentence for each of the different ways that you built with your blocks. Be ready to share your equations.</i> [Mr. B continues the whole-class conversation about the buildings using Talk Moves to emphasize the similarities and differences between the different student approaches and different equations.]

Integrating Language Routines Into Instruction

Critique, Correct, and Clarify

Students can start making sense of academic content and negotiate meaning in a language before they understand a language completely.

Grades K–2

Language Routine: Critique, Correct, and Clarify

The purpose of this routine is to optimize output by giving students a piece of mathematical writing that is not their own to analyze, reflect on, and develop. The intent is to use an incorrect, incomplete, or ambiguous written argument or explanation that students improve upon by correcting errors and clarifying meaning, thereby advancing their own mathematical thinking and communication.

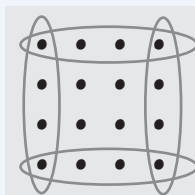
Routine	
PRESENT	Present a partial/broken argument, explanation, or solution method. The teacher can play the role of the student who produced the response and ask for help in fixing it. • <i>Given response could include a common error</i> • <i>Given response should include an ambiguous term or phrase, or an informal way of expressing a mathematical idea</i>
PROMPT	Prompt students to identify the error(s) or ambiguity, analyze the response in light of their own understanding of the problem, and work both individually and in pairs to propose an improved response.
SHARE	Pairs share out their drafts of the improved response.
REFINE	Students refine their own draft response.

(continued)

From the Classroom

PRESENT

Ms. L: *I asked students in another class to tell me how many dots they see in this group. This student is asking for our help. He knows he made a mistake but isn't quite sure what he needs to do to fix it. He said he saw 20 dots. He saw 4 on the top, 4 on the bottom, 4 on the left and 4 on the right. That gave him a total of 16, and then he added the last 4 in the middle and got 20.*



I counted 20 dots. 4 on the top, bottom, left, and right, and 4 in the middle.

PROMPT

Ms. L: *Look at this work for a minute and think to yourself about what you notice. What would you tell him? I'll give you a minute on your own to think.*

[Ms. L Pauses for a full minute while students analyze the student work]

Turn to your elbow partners and talk this through. What are your thoughts? How can we help this student with his work?

[Ms. L circulates as students discuss. She allows 2-3 minutes for partners to discuss before pausing their discussions]

On a piece of paper, you and your partner will show this student how to count the dots correctly. Include pictures, numbers, and words – anything that you think will help this student understand his mistake.

SHARE

Ms. L: [after allowing students 5 minutes to record their thoughts]

You are going to join with another pair, making a group of four. Each pair will take turns sharing with the others what they would tell this student about his error. I'll signal when it is time for the next pair to start sharing.

[While students work in their groups, Ms. L circulates, listening to student discussions and noting similarities and differences between student approaches]

REFINE

Ms. L: *Let's take a few minutes to gather all our thoughts and decide what makes sense to tell this student about his work. Get back together with your original partner and refine your work to include any of the ideas you heard from others that you think are important. You can add to or change what you have. We want to support this student with words, with pictures, with numbers, anything we possibly can to help make sense of the problem. You have 5 minutes to complete your work.*

Integrating Language Routines Into Instruction

Stronger and Clearer Each Time

Mathematical understandings and language competence develop interdependently. When students discuss mathematical ideas with one another, they **strengthen** and **clarify** their academic thoughts.

Grades K–2

Language Routine: Stronger and Clearer Each Time

This routine is well-suited for circumstances that call for students to construct a mathematical argument or defend an idea. Each time students talk with partners, they build from and borrow the ideas and language of previous partners.

Routine							
PRESENT	Teacher poses a problem/question to students						
PREPARE	Students Pre-Write - Students study the problem individually, writing down any questions or ideas/reasoning about how to solve the problem, using complete sentences if possible. - Scaffolding: Provide sentence frames or a skeletal paragraph framework to support students with the language structures, while leaving room for their independent mathematical reasoning.						
	Think Time - Provide a minute for students to think about what they will say to their first partner, considering what they are currently doing (or did) to solve the problem. - Students cannot look at what they wrote during their partner conversations.						
PARTNER	STRUCTURED PAIRING: <table> <tr> <th colspan="2">PARTNER ROTATIONS</th></tr> <tr> <th>Students</th><th>Teacher</th></tr> <tr> <td> - Listener asks clarifying questions, especially related to justifying (Why did you do that?). - Partners switch roles. Each person shares and each person listens, asking clarifying questions. - Rotate to additional partners, strengthening and clarifying their ideas each time </td><td> - Circulates and listens during student discussions - Prompts students at each turn to emphasize strength (focus on math concepts and skills) or clarity (how to describe the math to others) - Removes scaffolds with each successive pairing to build student independence </td></tr> </table>	PARTNER ROTATIONS		Students	Teacher	- Listener asks clarifying questions, especially related to justifying (Why did you do that?). - Partners switch roles. Each person shares and each person listens, asking clarifying questions. - Rotate to additional partners, strengthening and clarifying their ideas each time	- Circulates and listens during student discussions - Prompts students at each turn to emphasize strength (focus on math concepts and skills) or clarity (how to describe the math to others) - Removes scaffolds with each successive pairing to build student independence
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PROCESS	Post-Write Students return to seats and write down their final explanations using sentences or drawings supported with sentences.						
	Compare Students analyze their pre-writes and post-writes, noticing how their ideas were strengthened and/or clarified during partner discussions.						

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From the Classroom	
PRESENT	Ms. G: <i>A student in another class told me that 302 is smaller than 283 because 283 has 8 groups of ten and 302 has no groups of ten. Do you agree or disagree? Think about this on your own for a minute and write your thoughts.</i>
PREPARE	Students Pre-Write <i>Alejandro, do you agree or disagree and why? [Ms. G writes all student statements on the chart]</i> Alejandro: <i>I agree because 8 tens is more than no tens.</i> Mimi: <i>I agree, too, because 3 is bigger than 2. You can see there's a three at the end of 283 and a 2 at the end of 302.</i> Raaqim: <i>I disagree because three hundred and something is bigger than two hundred and something.</i> Think Time Ms. G: <i>In a moment you will meet with a partner to discuss whether you agree or disagree. First, think about what I wrote on our chart, and think about what you will say to your partner.</i>
PARTNER	Structured Pairing Ms. G: <i>To start you will partner up. Each of you takes a turn explaining your ideas like a mathematician. Partners, ask questions to clarify. Be clear in your explanations. The purpose of your discussions is to borrow ideas from your partner to make your argument stronger and clearer.</i> In Pairs Ms. G: <i>Find your first partner and start your discussion.</i> [Ms. G circulates and listens while students discuss. After one minute she signals students to switch listener/speaker roles] Rotate Partners Ms. G: <i>Rotate to a new partner and repeat the sharing and listening. Use ideas you heard to make your arguments stronger and clearer.</i> [Ms. G circulates again while students discuss and listens for common justifications. After one minute she signals students to switch listener/speaker roles. She has students switch one more time for a total of three partner discussions]
PROCESS	Post-Write Ms. G: <i>Let's take things you heard from your partners and strengthen and clarify our original thoughts about 302 and 283.</i> [Ms. G edits the class chart with feedback from students] Compare Ms. G: <i>Notice how much stronger and clearer our argument is after our partner discussions.</i>

Integrating Language Routines Into Instruction

Three Reads

Language is a tool that not only allows students to communicate their math understanding to others, but also to organize their own experience, ideas, and learning for themselves.

Grades K–2

Language Routine: Three Reads

This routine supports reading comprehension, sense-making, and meta-awareness of mathematical language. It also supports negotiating information in a text with a partner in mathematical conversation. Students are supported in reading a situation/problem three times—each time with a particular focus.

Routine	
First Read	Students read or listen to the problem (without a question stem) with the goal of comprehending the text .
Second Read	Students read or listen to the situation with the goal of comprehending the mathematics .
Third Read	Students read the situation and brainstorm possible mathematical questions pertaining to the context of the problem.

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From the Classroom

First Read	Mr. A: <i>Listen carefully. Listen for is what is going on in this problem.</i> <i>Molly had some fruit. Her brother Amir ate 3 pieces of her fruit. There were 4 pieces left.</i> <i>Turn and talk to each other and tell each other what the problem is about. Each pair needs to have at least one idea to share.</i> [Students turn and talk together. Mr. A circulates during discussions and listens to students.] Mr. A: <i>Let's start with Yesenia. What did you and your partner discuss?</i> Yesenia: <i>We think this problem is about fruit.</i> Mr. A: <i>Who else thinks this problem is about fruit? Who can add to what Yesenia said?</i> Ramiro: <i>There's a girl and her brother. And her brother ate some of her fruit.</i>
Second Read	Mr. A: <i>Alright, I'm going to read the problem again. This time listen for important information about the numbers in the problem.</i> [Mr. A reads the problem aloud.] <i>Turn and talk with your partner about the information you have about the numbers.</i> [Students turn and talk together. Mr. A circulates and listens to student discussions] Mr. A: <i>What numbers are important?</i> Sophia: <i>The 3 and the 4 matter.</i> Mr. A: <i>Why does the 3 matter? Juan?</i> Juan: <i>The 3 tells us how many pieces of fruit Amir ate.</i> Mr. A: <i>And what does the 4 tell us?</i> Juan: <i>The 4 tells us how many pieces of fruit are left. Molly still has 4 pieces of fruit.</i>
Third Read	Mr. A: <i>This time when I read the problem, think about what possible questions we could ask.</i> [Mr. A reads the problem aloud.] <i>What questions can we ask? Turn and talk with your partner and be ready to share at least one question.</i> [Students turn and talk together. Mr. A circulates during discussions and listens to student discussions] Mr. A: <i>I listened while you were talking, and I heard a couple different questions. I heard, "Who got more fruit, Molly or Amir?" and I heard, "How much did Molly have to start with?" Let's think about these two different questions and how we can find out the answers.</i> [Mr. A encourages students to draw pictures that represents the quantities and their relationships in the problem, and to use their pictures to answer the two questions.]