

# 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 3–5

### 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                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <b>SET-UP</b>                             | <p>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:</p> <ul style="list-style-type: none"><li>• <i>I solve it one way, you solve it another</i></li><li>• <i>Divide and conquer: you do one and I do another</i></li><li>• <i>I have a piece of information, you have a piece of information</i></li></ul>                                                                                     |
| <b>WHAT IS SIMILAR, WHAT IS DIFFERENT</b> | <p>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.</p>                                                                                                                                                                                                                                                                                                                                      |
| <b>MATHEMATICAL FOCUS</b>                 | <p>Students focus on specific mathematical relationships, operations, quantities, and values. Using Talk Moves effectively supports students in making mathematical comparisons and connections. For example:</p> <ul style="list-style-type: none"><li>• <i>Who can restate _____'s reasoning in a different way?</i></li><li>• <i>Did anyone solve the problem the same way but would explain it differently?</i></li><li>• <i>Did anyone solve the problem in a different way?</i></li><li>• <i>Does anyone want to add on to _____'s strategy?</i></li><li>• <i>Do you agree or disagree? Why?</i></li></ul> |

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| From the Classroom                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <b>SET-UP</b>                             | <p><b>Mr. B:</b> <i>You have 5 granola bars to share among 3 friends. How would you divide them up? Record your thoughts on your own paper, and be ready to share.</i></p> <p>[Mr. B circulates while students write their thoughts. He encourages students to draw pictures to illustrate their thinking and to write sentences that explain their pictures.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>WHAT IS SIMILAR, WHAT IS DIFFERENT</b> | <p><b>Mr. B:</b> <i>Next you will share your different strategies in groups of three or four. Each person will share how they approached the problem, and as a small group, you will discuss the similarities and differences between your approaches. Think about what worked well in one approach compared to another and what might make a particular approach more complete or easy to understand.</i></p> <p>[Mr. B circulates during group discussions and listens to students.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>MATHEMATICAL FOCUS</b>                 | <p><b>Mr. B:</b> <i>Let's talk about what you are noticing. Angel, how did you divide your granola bars?</i></p> <p><b>Angel:</b> <i>Well, I drew 5 granola bars to start. Then I realized that there were 3 people, so I just scratched out 3 of them because those whole bars each went to 1 person. That left me 2 bars to divide between 3 people. I split each of the 2 bars into 3 pieces. Each person got <math>\frac{1}{3}</math> of each of the 2 bars, plus the 1 whole bar from the beginning.</i></p> <p><b>Mr. B:</b> <i>What was the different way that your partner solved it?</i></p> <p><b>Angel:</b> <i>Konika divided each of her 5 bars into thirds, and then each person got <math>\frac{1}{3}</math> of the 5 bars.</i></p> <p><b>Mr. B:</b> <i>So, did you find the same answer? Is <math>\frac{5}{3}</math> the same as <math>1\frac{2}{3}</math>? Talk with your partner for a minute, and be prepared to share.</i></p> <p>[Mr. B circulates during group discussions and listens to students.]</p> <p><i>Alise, please share one of the ideas that came up during your discussion.</i></p> <p><b>Alise:</b> <i>We talked about how <math>\frac{3}{3}</math> makes up the whole bar, so if you took Konika's <math>\frac{5}{3}</math> and used <math>\frac{3}{3}</math> of it to make one whole bar, she would have two of her thirds left. That is how you would have the same thing Angel had, which was <math>1\frac{2}{3}</math>.</i></p> <p><b>Mr. B:</b> <i>Does anyone want to add on to Alise's explanation?</i></p> <p>[Mr. B continues the whole-class conversation about both Problems A and B using Talk Moves to emphasize the mathematical relationships among the different student approaches.]</p> |

# 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 3–5

### 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        |                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <b>PRESENT</b> | 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. <ul style="list-style-type: none"><li>• <i>Given response could include a common error</i></li><li>• <i>Given response should include an ambiguous term or phrase, or an informal way of expressing a mathematical idea</i></li></ul> |
| <b>PROMPT</b>  | 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.                                                                                                                                                                                                        |
| <b>SHARE</b>   | Pairs share out their drafts of the improved response.                                                                                                                                                                                                                                                                                                                                                          |
| <b>REFINE</b>  | Students refine their own draft response.                                                                                                                                                                                                                                                                                                                                                                       |

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## From the Classroom

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| <b>PRESENT</b> | <p><b>Ms. L:</b> <i>Let's look at this student's work. This is from a student in another class, and he is asking for our help. He knows he made a mistake but isn't quite sure what he needs to do fix it.</i></p> <div style="text-align: center; margin: 10px 0;"> <math display="block">\frac{2}{3} + \frac{4}{5} = \frac{6}{8}</math> <p>I added the numerators and got 6.<br/>I added the denominators and got 8.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>PROMPT</b>  | <p><b>Ms. L:</b> <i>Look at this work for a minute, and make notes, just thinking to yourself, about what you notice. What would you tell him? I'll give you a minute on your own to start.</i></p> <p>[Ms. L pauses for a full minute while students analyze the student work.]</p> <p><i>Turn to your elbow partners, and talk this through. What are your thoughts? How can we help this student with his work?</i></p> <p>[Ms. L circulates as students discuss, listening to their conversations and noting any common misconceptions or common approaches among the small groups. She allows 3-4 minutes for partners to discuss before pausing their discussions.]</p> <p><i>I'm hearing such detailed and helpful conversations. Great job focusing on the math. On a piece of paper, write down your thoughts for this student. Include the math and any explanation with words or drawings that you think will help this student understand his mistake and learn how to solve this problem.</i></p> |
| <b>SHARE</b>   | <p><b>Ms. L:</b> [after allowing students 5 minutes to record their thoughts]</p> <p><i>Pause your work for a moment. You are going to join with two other pairs, making groups of six. Each pair will take turns sharing with the others about what they would tell this student about his calculation error. Each pair has 2 minutes to explain to the others, and then I'll signal when it is time for the next group to start sharing. How long does each group have to share?</i></p> <p><b>Whole Class:</b> 2 minutes</p> <p>[Students work in their groups. Ms. L circulates, listening to student discussions and noting similarities and differences between student approaches.]</p>                                                                                                                                                                                                                                                                                                                 |
| <b>REFINE</b>  | <p><b>Ms. L:</b> <i>I heard so many thoughtful and detailed responses about this error. 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, or anything we possibly can to help make sense of the problem. You have 5 minutes to complete your work.</i></p> <p>[Ms. L circulates as students are working, prompting students to add diagrams, written explanations, or other representations to deepen their explanations.]</p>                                                                                                                                                                                                                                          |

# 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 3–5

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

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| From the Classroom |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <b>PRESENT</b>     | <p><b>Ms. G:</b> <i>Look up here [directing students to look at the board where she has written: <b>For any square, the area and perimeter are the same</b>]. Do you agree or disagree? Study this individually, writing down any questions, ideas, or reasoning that you have about it. Try to use complete sentences.</i></p>                                                                                                                                                                                                                                                                                                                     |
| <b>PREPARE</b>     | <p><b>Students Pre-Write</b></p> <p>[Ms. G pauses for a full minute while students write their thoughts.]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                    | <p><b>Think Time</b></p> <p><b>Ms. G:</b> <i>In a moment, you will partner up to discuss if you agree or disagree and why. You won't take your papers with you, so pause now and study your notes.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>PARTNER</b>     | <p><b>Structured Pairing</b></p> <p><b>Ms. G:</b> <i>To start, you will partner up. When you talk with your partner, explain your ideas like a mathematician, and partners ask questions to clarify. It is important to be clear in your explanations. The purpose is to borrow ideas from your partner to make your argument stronger and clearer.</i></p>                                                                                                                                                                                                                                                                                         |
|                    | <p><b>In Pairs</b></p> <p><b>Ms. G:</b> <i>Find your first partner, and start your discussion.</i></p> <p>[Ms. G circulates while students discuss and listen for common justifications. After one minute, she signals for students to switch listener/speaker roles.]</p>                                                                                                                                                                                                                                                                                                                                                                          |
|                    | <p><b>Rotate Partners</b></p> <p><b>Ms. G:</b> <i>Rotate to a new partner, and repeat the sharing and listening. Incorporate ideas you heard as you make your arguments stronger and clearer.</i></p> <p>[Ms. G circulates again while students discuss and listen for common justifications. She has students switch one more time for a total of three partner discussions.]</p>                                                                                                                                                                                                                                                                  |
| <b>PROCESS</b>     | <p><b>Post-Write</b></p> <p><b>Ms. G:</b> <i>Head back to your seats. You have 2 minutes to revise your original argument. Take things you heard from your partners, and strengthen and clarify your original thoughts.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | <p><b>Compare</b></p> <p><b>Ms. G:</b> <i>Now that you've refined your arguments, look at what you first wrote and your final draft. What do you notice?</i></p> <p><b>Raaqim:</b> <i>In my first draft, I said that it was not true because I tried squares with side lengths of 2 and 6. When I was talking with my second partner, she said it was true because she tested out a square that has a side length of 4. I decided to change my final draft to say that it is not always true.</i></p> <p>[Ms. G continues to facilitate the class discussion. Students share how their arguments are improved after their partner discussions.]</p> |

# 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 3–5

### 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 <b>comprehending the text</b> .           |
| Second Read | Students read or listen to the situation with the goal of <b>comprehending the mathematics</b> .                            |
| Third Read  | Students read the situation and <b>brainstorm possible mathematical questions</b> pertaining to the context of the problem. |

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## From the Classroom

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| <b>First Read</b>  | <p><b>Mr. A:</b> <i>Listen carefully. Listen for is what is going on in this problem.</i></p> <p><i>Molly has soccer practice on Monday, Wednesday, and Friday evenings from 6:45–8:15.</i></p> <p><i>Turn and talk to each other, and tell each other what the problem is about. I expect each pair to have at least one sentence to share.</i></p> <p>[Students turn and talk together. Mr. A circulates during discussions and listens to students.]</p> <p><b>Mr. A:</b> <i>Let's start with Yesenia. What did you and your partner discuss?</i></p> <p><b>Yesenia:</b> <i>We think this problem is about soccer.</i></p> <p><b>Mr. A:</b> <i>Who else thinks this problem is about soccer? [pauses and all students enthusiastically raise hands] Who can add to what Yesenia said?</i></p> <p><b>Ramiro:</b> <i>It's about soccer practice that happens three days a week.</i></p>                                                                                                                                                                                                         |
| <b>Second Read</b> | <p><b>Mr. A:</b> <i>Alright, I'm going to read the problem again. This time, listen for important information that will help us in answering some questions about this problem.</i></p> <p><i>Molly has soccer practice on Monday, Wednesday, and Friday evenings from 6:45–8:15.</i></p> <p><i>Turn and talk with your partner again, thinking about the information you have about the numbers.</i></p> <p>[Students turn and talk together. Mr. A circulates during discussions and listens to students.]</p> <p><b>Mr. A:</b> <i>Who can start us off? What numbers are important?</i></p> <p><b>Sophia:</b> <i>We don't see this number, but we think it is important that she practices three days a week.</i></p> <p><b>Mr. A:</b> <i>Alright, what else?</i></p> <p><b>Juan:</b> <i>We talked about the times: 6:45 and 8:15. Those are important too, I think.</i></p>                                                                                                                                                                                                                  |
| <b>Third Read</b>  | <p><b>Mr. A:</b> <i>This time when I read the problem, think about what possible questions we could ask.</i></p> <p><i>Molly has soccer practice on Monday, Wednesday, and Friday evenings from 6:45–8:15.</i></p> <p><i>What questions can we ask? Turn and talk with your partner, and be ready to share at least one question in 2 minutes.</i></p> <p>[Students turn and talk together. Mr. A circulates during discussions and listens to students.]</p> <p><b>Mr. A:</b> <i>I listened while you were talking, and I heard a couple different questions. I heard, "How long does she practice each day?" and I heard, "How long does she practice in a week?" Let's think about these two different questions and how we can find the answers</i></p> <p>[Mr. A encourages students to create a model that represents the times in the problem and to use their models to answer the two questions. When students have completed their representations, he encourages them to compare and contrast different ways of thinking. How are these models the same? How are they different?]</p> |