



Let's Talk About Math!

Unit B
Unit C





This guide provides a framework for engaging students in discussions focused on problem solving through metacognition, analyzing errors and mistakes, and synthesizing their existing knowledge to deepen their mathematical understanding. This guide also provides support for teachers to:

- Ask questions that cause students to introspectively focus



Use strategies to build student confidence and capacity with discourse.

- Pose questions and have students talk with a neighbor before sharing.
- Have students pass the question after answering it to another student to add onto their response or provide a new one.
- Have students retell what they heard someone else say.
- Have students begin their response by responding to something that was already said.
 - I agree with ____ because...
 - I disagree with ____ because...

Provide students with sentence starters that give them entry points into class discussions.

- I would like to add to what ____ said...
- What I heard ____ say was...
- This makes me think of...
- I like what ____ shared because...
- A question I have about this is...
- Can you clarify what you meant when you said...
- I find this idea interesting because...
- I would like to hear more about...

Hand Signals: K-2 students, students developing academic language, classrooms with multilingual learners

- Use thumbs up (agree), thumbs down (disagree), thumbs sideways (unsure).
- Use fingers to vote to show the strategy they want to try, the solution they think is correct, their level of certainty about a topic, etc.
- Students stand up (e.g., agree), turn around (e.g., I have different idea), sit down (e.g., disagree).

Pauses: Quiet students, classrooms with over-talkers

- Students write down their thoughts before sharing.
- Pause at various points of the discussion and have students write one-sentence summaries of what they're learning.
 - After each pause, students add to their summary.
 - At the end pair students to share and revise their summaries before sharing with the class.

Introduce–Talk–Connect Discourse Framework

Teacher support for engaging in student-led discussions.



Focus questions on what holds significance in the problem or conversation, how it relates to what they know, and how students are making meaning of it.

Sample questions:

- What do you notice?
- What do you wonder?
- How does this relate to something else you know?
- What does this mean to you?
- When have you solved problems like this before?
- What problem are you solving?



Focus questions on evaluating reasoning, comparing approaches and points of view, and learning from mistakes.



Focus questions on supporting communication, generalizing understanding, connecting to larger mathematical ideas, supporting language development, and applying knowledge to unfamiliar scenarios.

Sample questions:

- How do you plan to apply what you learned? How does this help you?
- How did the discussion cause you to revise your answer/thinking?
- What is another way you can solve the problem?
- What did you already know that helped with the problem/discussion?
- How are these ideas/strategies related?
- How does what you have learned connect to other things you know?
- What is an example and a non-example?
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Discourse Strategies

Strategies that can be used during instruction to get students talking.
Focus on student-to-student conversation with the teacher acting as a facilitator.



1. Think Time

- The teacher poses a question and gives students time to think about it individually.
- Students get with a partner.
- One person listens as the other shares their thoughts for 2 minutes.
- After 2 minutes they switch roles. Once they have both shared, they again switch roles and repeat the process and respond to what the other has said.
- Each student gets 1 minute to respond. After both partners share, the teacher has some students share their thoughts with the class to further the discussion.



2. Partner Conversation



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- In groups, have students discuss a question that was posed or their reflection of the lesson.
- Students work in a group to write five sentences that summarize their thoughts on a question posed by the teacher, the discussion of a topic during instruction, or a description of what was learned in the lesson.
- After each group creates their summary, the whole group will share and discuss.

...: Decrease the number of sentences. Ex: 1 or 3 Sentence Summary.

Discourse Strategies (continued)



- Have students write down their thoughts of a given topic/problem/question. (They are dumping out their brains)
- Encourage them to write questions if they have them.
- The purpose is to get students to think about the thoughts they have related to a particular topic/task/problem or question.
- Once students have dumped their brains, have them share their thoughts with a partner or small group.
- This will allow the students to hear other perspectives and gain additional information to help them respond to the topic, solve the

Discourse Strategies (continued)



- Write three statements on the board about a math concept.
 - Two of those statements should be true and one should be false.
 - Have students engage in discussions trying to determine which statement is false.
 - Encourage students to provide examples as their evidence.
 - Challenge students to convince their classmates of their point of view.
- ...: Provide two examples and one non-example.



- Pose a question to the class that has multiple answers (e.g., How would you summarize today's lesson? How would you describe (vocabulary word)? What is an example or non-example? How would you solve this problem?)



- Pose a problem to the class. Have students make sense of the problem and plan how they would solve it. (They are not to solve the problem).
- Have students write their claim on a piece of paper (which would be their strategy for solving the problem), their evidence (how do they know this strategy will provide the correct solution), and their reasoning (why is this the best way to solve the problem).
- Have one student state their claim, evidence, and reasoning. Engage in a class discussion. How does this claim compare to their claim? How does the reasoning compare? Do students agree or disagree?
- Allow time for students to share different claims before solving the problem.

When doing this for the first time you may want to provide the first claim or use a "fake student" to get started. Have students write their claim and comparing their reasoning to that of their classmates.

Tips for Creating a Discourse Culture



A Starburst is when discourse in the classroom follows a teacher to student back to teacher format. To avoid this, use a three before me protocol during discussions.

- Once the teacher poses the question and it is answered by the first student, two other students will have to add to the discussion before it can go back to the teacher.
- Encourage students to use sentence starters like "I agree/disagree..." or "I want to add to what was said..."

Art of Discussion

: Think Out Loud! poster, Student Discussion bookmark, interesting picture or rich math problem (should be a review concept so the focus can be on learning to engage in discourse).

Think Out Loud!

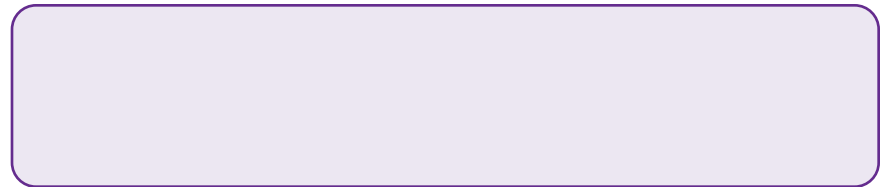
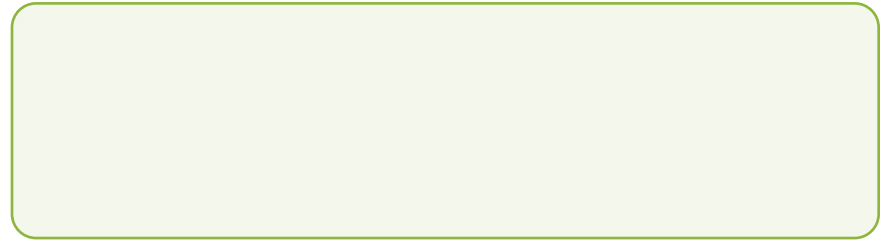
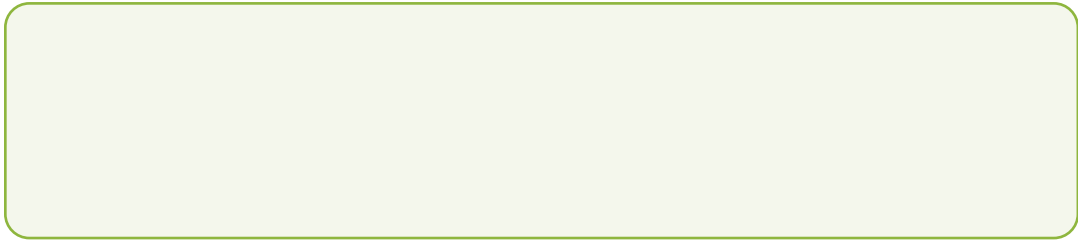
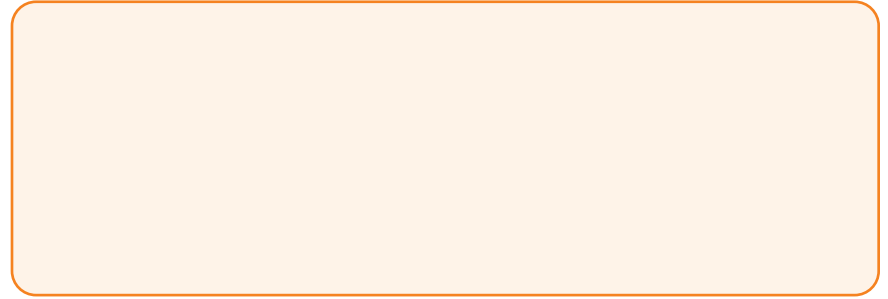
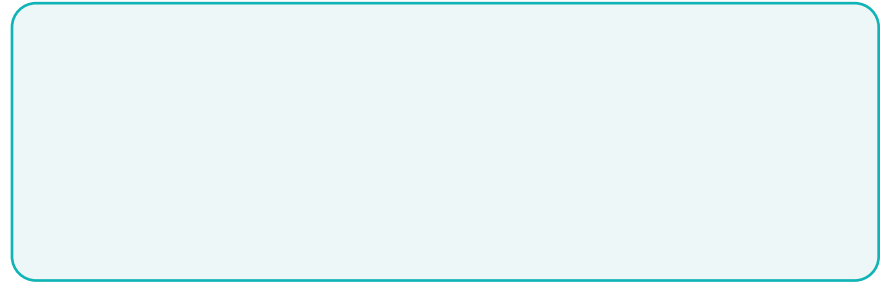
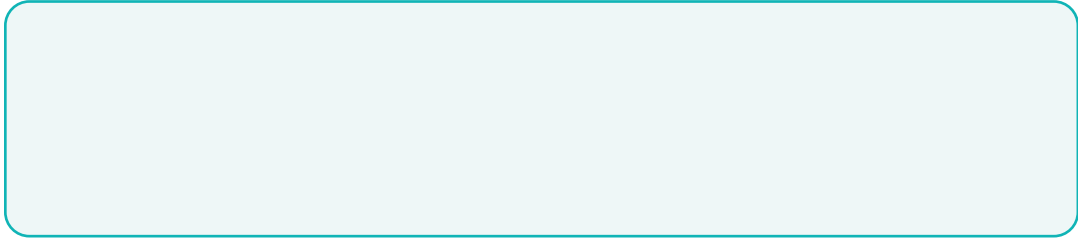


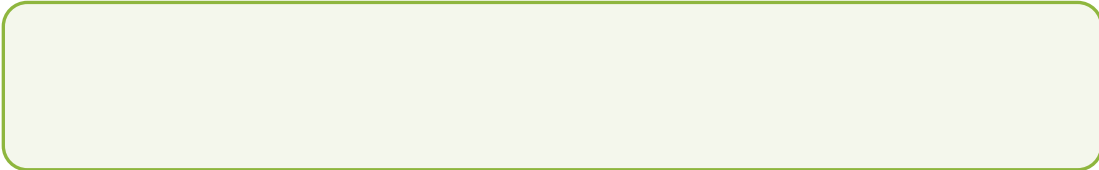
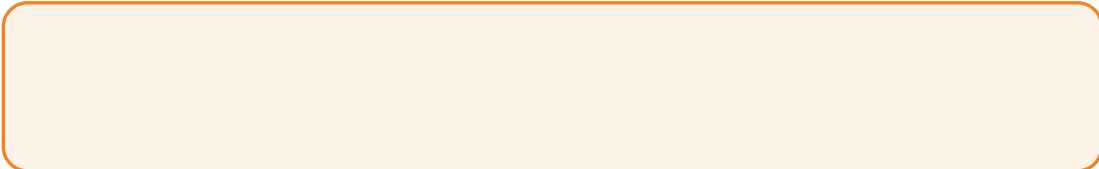
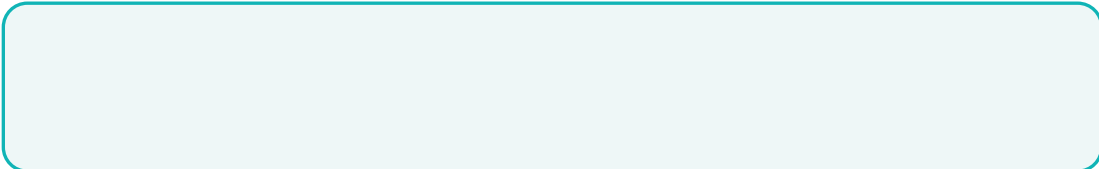
- Provide each student with a bookmark. Ensure the poster Think Out Loud! is located where it is clearly visible to the students.
- Pose the problem or show the image. Tell students "think about what you already know." Model asking the questions from the poster under the related category.
- Have students write their answer to the question using the sentence starter from their bookmark under that category.
- Pose the question again and have students respond. Some students that are not comfortable may read their responses. Encourage them to listen to their classmates answers and use their responses to add to or provide a different perspective.
- Repeat using the other categories.
- The goal is to get students comfortable joining the discussion and making it more like a conversation.
- Eventually students should feel comfortable enough asking the questions on the poster of their classmates to help clarify their thinking.



Discourse is a formative assessment practice embedded in instruction that informs both students and teachers. Discourse makes student thinking visible and provides the opportunity for students to analyze, evaluate, and synthesize their ideas and the ideas of others. Support the use of discourse as a formative assessment.

- Have students grapple out loud as they work through their thoughts and understandings. They may say something like, "At first I thought ___ but now I think ___ because..."
- Encourage students to actively listen as their classmates are sharing and allow them the opportunity to revise their thinking.
- Use strategies such as "What do you choose?" to see what students initially know and how those ideas become shaped through discussion.
- Use a Socratic Seminar to discuss a rich problem in mathematics class.
- Encourage students to use the Think Out Loud! questions to help clarify their thinking and that of their classmates.





Student Discussion

1. Think

- I know...

2. Reflect

- My idea is...

3. Analyze

- I learned...

4. Stretch

- Something else I know about this is...

5. Challenge

- I agree with _____ because...
- I disagree with _____ because...