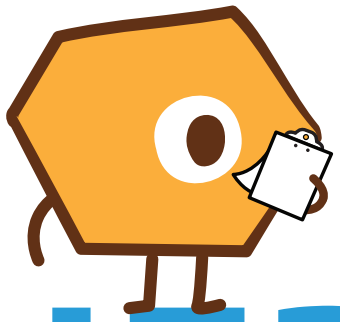
ST Math
Summer Immersion



TEACHER GUIDE WITH LESSON PLANS

ST Math Summer Immersion

Grade 4

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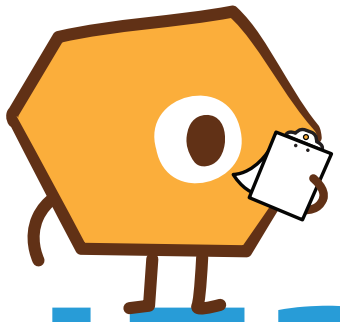

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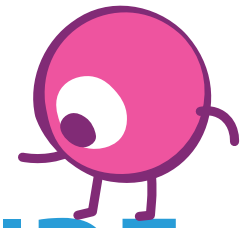


TEACHER GUIDE

What Is ST Math Summer Immersion?

About ST Math Summer Immersion

ST Math Summer Immersion is an intensive program that combines ST Math with a math curriculum that creates a rich mathematical environment.

The content addresses common areas in which students struggle while providing opportunities for building their content knowledge, reasoning skills, and growth mindset. Grades K-2 focus on operations and algebraic thinking, and Grades 3-5 focus on fractions.

Check out this video to learn more about **ST Math Summer Immersion Overview**.

ST Math Summer Immersion has been designed to accommodate a 4-day or a 5-day summer school schedule.

Instructional Design Overview

The curriculum for each grade level is an extension of the grade level students just completed. For example, the Kindergarten lessons are designed for students who have just completed Kindergarten. The 25 lessons in each grade will extend students' learning from the previous school year and prepare them for the next grade level. This flexible curriculum is designed to be implemented in 60- to 120-minute blocks over four to six weeks.

The lesson plans are divided into three main sections: **Puzzle Talks**, **Problem Solving,** and **Instructional Stations**. Puzzle Talks are a whole class time of facilitation and discussion using the Problem Solving Process. The Problem Solving section allows students to work on the problems of the day. The Instructional Stations divide the classroom into smaller groups to work on different activities at each station.

Student Portfolio

The Student Portfolio is a compilation of academic work and other forms of educational evidence assembled for the purpose of the learning process. ST Math Summer Immersion helps students build strong schema around mathematics and develop perseverance, confidence, and agency as they engage in the lessons and activities.

One way we do this is through the **Problem Solving Journal**. It serves as an artifact to track, evaluate, synthesize, and communicate student thinking around the mathematics they are learning. The Problem Solving Journal is designed for students to reflect upon their learning

through My Thinking Path, Problem of the Day, Exit Tickets, and ST Math Puzzle Reflections.

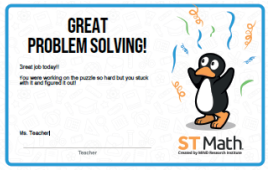
Assessments and Quizzes

ST Math Summer Immersion has assessments that can be used optionally. During the program's first and last module, a pre/post assessment can be administered. There are also pre/post quizzes that could be used on the first and last days of each module. The purpose of these assessments is to monitor the progress of your students and help you make instructional decisions based on their results. Your team should decide whether or not you will administer these assessments and how you will use the results.

Celebrating Students' Growth and Development

Throughout ST Math Summer Immersion, give students encouraging notes. Celebrating students' successes helps motivate learners to achieve more while continuing to develop a growth mindset. As students engage in ST Math, they are not only building mathematical knowledge but developing self-regulatory skills that are essential to success.

Celebrating students
ST Math Summer Immersion concludes its program with the **Learning Showcase and Celebration** on the last day. In the lesson plan, you will find more information and instructions about it. Students will prepare and present their reflection posters and their math game.



Give students an encouraging note like the one above. We have some already designed. See our refillable **celebration notes**.

For more information on celebrating students, visit our **Focus On: Celebrating** page.

We have also created a framework you can use to prepare for the Learning Showcase and Celebration. We recommend teachers extend an invitation to families, community members, district leaders, teachers, peers, and school board members to celebrate and hear from students about what they learned. Use our **Learning Showcase and Celebration Editable Invitation**.

Creating a Reflection Poster
The reflection poster is a culmination of the thinking, learning, and growth that students experienced during the program. The students should review their Problem Solving Journal to help them make the reflection poster. Read more about the poster in the **Reflection Poster Guide**.

Designing a Math Game
In 4-Day Summer Immersion, there is an optional mini-math game design activity that teachers can do with students. This activity involves having students redesign a game they know (e.g., any card game, Candy Land, Uno, etc.) and add mathematical components to the game.

In the 5-Day ST Math Summer Immersion, students will be designing a more elaborate math game. They will engage in the Engineering Design Process, which is adapted from *Engineering is Elementary*® from the Museum of Science in Boston to create their game.

What Makes ST Math Summer Immersion Unique?

The Science Behind the Learning

Building Schemas
Schemas are neural networks, our brain's way of organizing our thoughts and experiences. The way those networks get created and connected ends up defining your concept or understanding of the topic. And when we talk about having a "deep conceptual understanding in math," we're talking about building schemas of mathematical concepts that give students the ability to solve problems they haven't seen before.

The puzzles, activities, problem solving, and discussions in the ST Math Summer Immersion program support students in revising, extending, and building new schemas around mathematics concepts.

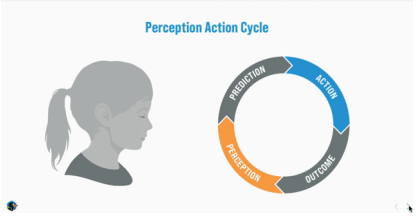
Check out this video to learn more about **schema**.

Blogs on Schema:

- ***Schemas Are Key to Deep Conceptual Understanding***
- ***Mathematical Coherence with ST Math***

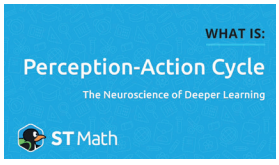
Perception-Action Cycle (PAC)

Brain research tells us students learn by doing. They need to be allowed to engage in meaningful content, make predictions, test those predictions, receive immediate and formative feedback as a result of their testing, and analyze that information to refine their thinking around the content.



The Cycle of Learning
This cycle of learning is known as the **Perception-Action Cycle (PAC)** and is the foundation of our award-winning ST Math program.

The Perception-Action Cycle is this continuous flow of information and action between the brain and the world around it. On and on it goes: sense, predict, act, adjust. Sense, predict, act, adjust. This PAC is embedded in our game-based learning design at MIND. ST Math puzzles take students through this cycle over and over, giving them a safe place to fail, providing new information through immediate and formative feedback, and inviting them to try again until they find the solution.



Watch and learn more about the **Perception-Action Cycle**.

Blogs on PAC:

- ***What the Perception-Action Cycle Teaches Us About How the Brain Learns***
- ***Success and Failure How Growth Minds Can Change Education***

Academic Discourse

Effective Facilitation Strategies

Facilitation plays a pivotal role in creating a classroom rich with academic discourse. Effective facilitation promotes, deepens, and supports students' thinking as they grapple with concepts and build understanding. Students understand that they are accountable for their thinking, not just for writing correct answers. As teachers continue to engage students in focusing on what and how they are thinking, students will build confidence, increase their communication skills, and deepen their understanding of concepts.

Blogs on Facilitation:

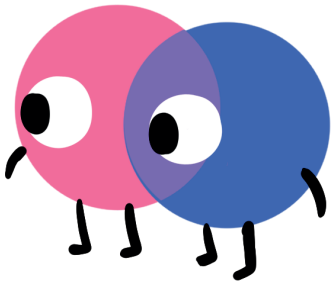
- ***How ST Math's Problem Solving Process Develops Social-Emotional Learning Skills***
- ***Using the Art of Facilitation to Become a Better Math Teacher***

Problem Solving Process

ST Math Summer Immersion uses the Problem Solving Process designed to support teachers as facilitators and students as authors of their ideas and sense-makers of mathematics. It is aligned with the perception-action cycle and helps students develop skills that can be used outside of ST Math.

What Is an Asset-Based Approach?

ST Math Summer Immersion uses an asset-based approach to instruction through diversity, equity, and inclusion. An asset-based approach focuses on the student's strengths and talents instead of their deficits, which is crucial to bringing equity in education. It supports students in seeing how they think about and engage in math. It is essential that every student, teacher, administrator, family, and community see themselves in math.



For too many students, math has been a hurdle to overcome. They are either identified or self-identified as people who can or can't do math. This identification follows students throughout their journey and impacts their learning experiences. One of the goals of ST Math Summer Immersion is to help students build a positive math identity and instill confidence, joy, and wonder in their mathematics ability. It was designed to equip students with the agency to be a knower, a doer, and a sense-maker of math.

The curriculum supports students in developing the understanding that they are capable and confident problem solvers. The lessons provide opportunities for student voices to be heard. Through the sharing of strategies, thoughts, and perspectives, students are positioned to see each other as mathematical resources and build on each other's ideas.

The teacher's role in ST Math Summer Immersion is to (1) facilitate student thinking, (2) position students as authors of their learning, and (3) support students in developing essential skills. Through this focus, teachers center student thinking instead of teaching the puzzle. In turn, students learn that they can construct their knowledge. They also learn that mistakes are not only okay but are expected and are part of the learning process. Having an asset-based approach helps students develop perseverance, resilience, a growth mindset, and self-motivation. These are strengths that students can carry into the school year.

What are Puzzle Talks?

Facilitating in Action

Puzzle Talks
The use of ST Math puzzles to lead a whole group or small group short conversation is what we call Puzzle Talks. Similar to number talks or math talks, the goal is to get students to communicate and deepen their understanding of mathematics.

Puzzle Talks are a whole class time of facilitation and discussion that combines the ST Math Puzzles with the Problem Solving Process. They leverage the power of the visual models inherent in ST Math and use facilitation questions to promote classroom discourse and enhance the learning experience. As teachers deliver Puzzle Talks, they are supporting students in developing mathematical habits of mind, problem solving skills, and deepening their understanding of math concepts.

If you would like more information on Puzzle Talks and how to do them remotely, visit **Focus On: Puzzle Talks** on our ST Math Academy site.

The facilitation of Puzzle Talks has been intentionally designed to develop students' identity and agency as mathematics thinkers. Puzzle Talks are a way to get students thinking about and solving ST Math puzzles as a group and are a key component of ST Math Summer Immersion.

Puzzle Talks focus on supporting student strategies and thinking about concepts presented in ST Math puzzles. The goal is **NOT** to teach the puzzle, but rather to uncover, discuss, and stretch the thinking of the students. The lessons in ST Math Summer Immersion are built around Puzzle Talks. In the lesson plan overview, you will find the ST Math puzzles associated with the Puzzle Talks in the module.

Puzzle Talks promote rich discussions around math concepts and strategies. It is possible to extend a Puzzle Talk over several days as you discuss, compare, evaluate strategies, and make connections. It is also one of the most flexible areas in the program, which allows you to reduce or increase the amount of time to allow students to go through the Problem Solving Process. In

combination with the **Problem Solving Facilitation Bookmark**, we have included some engagement strategies that can be helpful during Puzzle Talks.

Game in a Minute Videos located in the ST Math Summer Immersion site has been designed to give teachers an overview of the ST Math puzzles that will be used during the Puzzle Talks. These under-a-minute videos also have a quick brief explanation of the puzzle's objective and some facilitating questions at the end.

Engagement Strategies with Puzzle Talks

Partner Talk

Have students discuss with a partner. After each partner shares their thoughts, they can compare their ideas. Challenge students to try to convince their partner to adopt their idea. This gives them time to summarize, reflect, evaluate, justify, and revise their thinking.

Voting

Have students share strategies and ideas and vote on which ones they would like to try. Have students share why they think the strategy they voted for is best. This allows them to rate, justify their rating, and discuss the outcome.

Strategy Compare

Have students share their strategies with a partner or small group. After sharing strategies, students can make comparisons, ask clarifying questions, and determine which strategy is best for the situation and why. This allows them to extend their thinking and evaluate others' strategies.

Popcorn Share

The teacher poses a question and calls on a student to share. That student answers and then picks another student to pass it to. They continue popcorning around answering questions, adding thoughts, and responding to their classmates. This provides an opportunity to connect and extend student thinking.

Think Pair Share

The Teacher asks questions and provides individual thinking time for students. Students share their thoughts with a partner. Engage the students in a whole group sharing. This allows them to share perspectives and ideas.

Say Something Write Something

Pause during the discussion and suddenly say, "*Say Something or Write Something!*" Have students summarize learning, ask a question, make a comment, or share a new idea/strategy verbally or in writing. This provides a quick check on student understanding.

What Are Problem Solving Strategy Discussions?

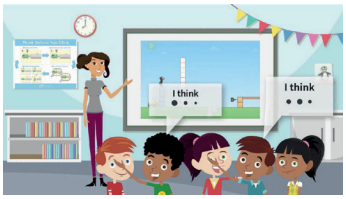
Extending Student Discourse

Facilitation focused on the Problem Solving Process allows for students and teachers to co-lead the learning. Students develop agency and accountability because they understand that their thinking is important. It is what will lead them to a deeper understanding. Facilitation is thinking-driven, not answer-driven.

Focus discussion on

- Strategy sharing and exploration
- Visual to symbolic connections (including word problems)
- Making connections between and among concepts
- Vocabulary connections

Use engagement strategies to promote student-to-student discourse to create an atmosphere that fosters rich math conversations.

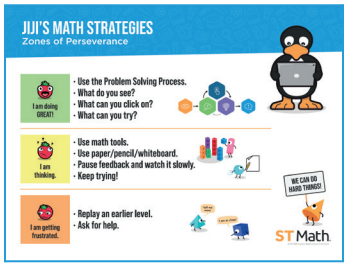


Problem Solving Resources

- **Problem Solving Strategy Discussions**
- **Problem Solving Facilitation Bookmark**

Cultivating a Culture of Perseverance

One of the essential skills ST Math Immersion focuses on is helping students develop perseverance and build the confidence that they can problem solve the most challenging tasks. As students engage in ST Math, they may encounter puzzles that they struggle to solve.



If a student gets stuck, they can start by using the Problem Solving Process on the student bookmark. This helps give them the language they need to reflect and communicate their thinking. Another resource to help students who are struggling is **JiJi's Math Strategies Poster**. It focuses on building perseverance and agency. Students are encouraged to recognize what point of struggle they are experiencing. It also provides strategies to support them. This keeps students engaged in a productive struggle.

In addition, there are **How Are You Doing Cards** that can be used in class to help you keep tabs on how students are doing as they go through the curriculum and activities. Having students use these cards and place a clip or clothespin to indicate how they are feeling alerts the teacher as to when their struggle is becoming unproductive.

Student Engagement

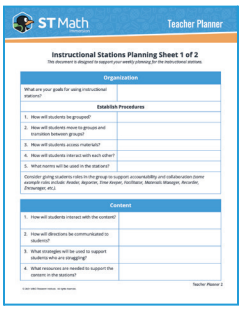
Engaging students in discussions around problem solving activities is a great way to explore connections, expand perspectives, and have students check and challenge each other. Problem solving activities provide a great opportunity to facilitate classroom discussions around student work. When you do a Problem of the Day, it is important to plan your goals and outcomes for the discussion before posing the problem to students.

Planning for the Discussion	Monitoring During Problem Solving	Promoting Classroom Discussion Using Student Work
Before students begin working on the problem solving activity, think about what your students might do to solve the problem and what mathematics you would want to point out and discuss.	As students are working during Problem Solving time, walk around and ask students questions to facilitate their thinking and select students' work to share as a whole class. See the **Problem Solving Facilitation Bookmark** for sample questions.	Order the work you selected to share from least sophisticated to most sophisticated. Include some work that has misconceptions and/or errors in reasoning. Ask students questions that engage them in discussions around both correct and incorrect reasoning. It is important for the teacher to remain in the role of facilitator and ask students questions to help them construct knowledge.

What Are Instructional Stations?

About Instructional Stations

The **Instructional Stations** are a key element in ST Math Summer Immersion. They provide a great model to engage students to learn collaboratively, to build student agency and accountability, and to provide opportunities for personalized intervention. There are three instructional stations: small group instruction, table games, and ST Math puzzles. Familiarize yourself with the instructional stations by reviewing the first module's lesson plan overview section. It is very important that you set expectations for each instructional station.



Instructional Station Planner

The Problem Solving Journal will be used during the instructional stations as a place for students to share their learning. Students will complete Exit Tickets after playing table games and puzzle reflections after playing ST Math puzzles.

Set expectations for the instructional stations by using the optional **Instructional Station Planner** found in the **Teacher Planner**. Learn more about the breakdown of the instructional stations, assigning student roles, facilitating questions, and best practices on our **Instructional Station Overview**.

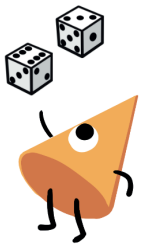
Small Group Station

The Small Group Station is an opportunity to focus on meeting students' needs. This station is teacher-led and focuses on engaging students in math discourse to promote understanding. Share a problem with students that is similar to the Problem of the Day. Allow the students time to solve that problem. As they solve the problem, have them talk about the process of finding the solution. Students should discuss their strategies and defend their points of view for different solutions. There is a **Small Group Intervention Planner** in the teacher planner you may want to use to help organize your groups; however, there are instructions and ideas for your small group station in the lesson plan to make it easy.

ST Math Puzzles Station

The ST Math Puzzles Station is where students will each individually play ST Math Puzzles in their small groups. You have the option to assign them the entire ST Math Summer Immersion objective, have them continue their grade-level journey from the previous school year, or assign them specific puzzles. Students can set their own minutes and puzzle goals using the **Accomplishment Log** and record what they did that day.

Table Games Station

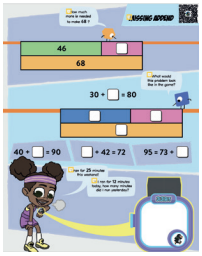


The Table Games Station features games during which students explore math concepts, engage in strategic thinking, apply their knowledge, challenge each other, and have fun with mathematics. All of the games in this station focus on number sense. They are also easily replicated for play at home. The game materials are located in the lesson resources for each module. There is time built into the last day of each module for you to teach your students how to play the game.

Focused Instructional Time

Focused Instructional Time is built in on Day 5 of every module. Use this time to personalize instruction for students. Identify areas to intervene based on student performance, divide the students into four groups, and assign them to the instructional station that will be most beneficial to meet their needs. Use the **Small Group Intervention Planner** to identify students who need more time.

ST Math Activity Pages



ST Math Activity Pages are an optional student activity booklet that can be found on the ST Math Summer Immersion website. It is based on an ST Math Puzzle and was designed to be fun and engaging for students. Teacher directions are written in the lesson plans, and it's recommended to be done as a whole class, but they can be done individually.

Use **Problem Solving Strategies** to stimulate discussion amongst your students. Apply the Problem Solving Process, and have students make connections to the games. Review the **ST Math Activity Introduction** to help you get started.

Instructional Station Rotations

Students should be divided into groups of three to four students to rotate through the different stations. Beginning in Module 2, students will visit two instructional stations per day for about 20 minutes at each station on Days 1–4. Day 1 and Day 2 instructional stations are the same, as are Day 3 and Day 4 stations. This allows students to visit all four stations within the two-day time frame.

On Day 5, if applicable, students will attend one instructional station during Focused Instructional Time at the discretion of the teacher. This is an opportunity for the student to have additional instructional time with the teacher or at a specific instructional station.

Schedule Sample (Days 1-4)

Time	Activity	Group Configuration
5-10 min.	My Thinking Path	Individual/Whole Group
20-25 min.	Puzzle Talk	Whole Group
20-25 min.	Problem Solving	Individual/Whole Group
40 min.	Instructional Stations	Small Group

	Instructional Stations Rotations							
	Day 1		Day 2		Day 3		Day 4	
Station	Rotation 1	Rotation 2	Rotation 1	Rotation 2	Rotation 1	Rotation 2	Rotation 1	Rotation 2
Small Group Instruction	Group A	Group B	Group C	Group D	Group A	Group B	Group C	Group D
ST Math 1:1	Group B	Group A	Group D	Group C	Group B	Group A	Group D	Group C
Table Games	Group C	Group D	Group A	Group B	Group C	Group D	Group A	Group B
ST Math 1:1	Group D	Group C	Group B	Group A	Group D	Group C	Group B	Group A

Schedule Sample (Day 5) - This day is skipped for 4-day implementations

Time	Activity	Group Configuration
60-70 mins	Game Design Challenge	Whole Group
20-30 min.	Focused Instructional Time	Small Group/Whole Group

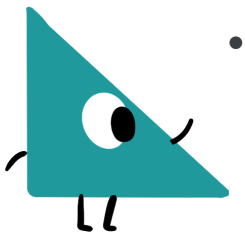
Focused Instructional Time	
During this instructional station time, students do not rotate. They can either be assigned to a station or allowed to choose which one to go to.	
Small Group Instruction	Teacher Intervention Group
ST Math Puzzles	Teacher choice or Student choice
Table Games	Teacher choice or Student choice

How Do We Monitor Students' Learning?

We have designed monitoring tools to help track the growth of student learning during ST Math Summer Immersion. In the Problem Solving Journal, you will find My Thinking Path, ST Math Puzzle Reflection, and Exit Tickets. These graphic organizers encourage students to think about their learning and schema. The Problems of the Day can also be used to monitor students' learning by reviewing their answers. In addition, assessments can be used as a measure of student learning. There are Pre/Post Quizzes for each module. The quizzes are optional but can be used to monitor student learning.

My Thinking Path

What are things I already know about this topic?		
Goal/Purpose	**Support Student Thinking Prompts**	**Look for**
Students show they are beginning to unpack this new idea. They are engaging with the topic and trying to find connections to it. If they can find an access point to the topic, they will have more success understanding it.	• Could what we did yesterday help you with this topic? • Does this make you think of a game or activity you've done? • Are there math tools you think you could use to help you with this topic? • Where have you seen something like this outside of school? • What words/parts of this topic do you know and which are ones you don't? • Can you draw a picture of what this makes you think of?	• Recall of previous day(s) lessons • Mathematical operations they may use • "It looks like when we did ___." • Real-world connections • Highlighting words that sound familiar • "I think it has to do with ____, but I'm not sure." • Drawings of situations it could be used in or related to math strategies • Examples using the topic



What are some questions I have about this topic?

Goal/Purpose	Support Student Thinking Prompts	Look for
Students identify things they have questions about, allowing them to address any confusion that comes up as they work through the topic. This also prepares students to be able to answer their own questions as they learn more about the topic.	• Are there words here you have never heard? • Do you know when you would use this? • What about this topic seems confusing?	• "Does it have to do with [previous topic]?" • "What does _____ mean?" • "Could this help me when I need to _____?" • Questions about how/when to use it

How are the puzzles connected to what I already know?

Goal/Purpose	Support Student Thinking Prompts	Look for
Students are practicing transferring concepts to new situations. They are accessing their schema to figure out ways to use previous skills in a new context.	• Does this make you think of a game or activity you've done? • Have you seen the images in these puzzles before? • What math operations have you used before?	• Mathematical operations they may use • "It looks like when we did ___." • Real-world connections • Other ST Math puzzles • Math games they have played • Math problems from previous lessons

What new things did I learn in playing the puzzles? Did the puzzles make me think of anything differently?

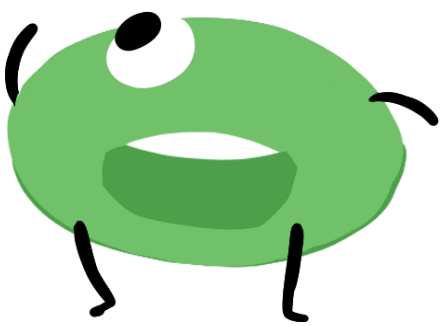
Goal/Purpose	Support Student Thinking Prompts	Look for
Encourage students to think metacognitively as they are solving ST Math puzzles. Since they know they will be asked about what they learned, they will be thinking about it and aware of it as they play.	• What was different in this puzzle from other ones you have played? • Did you have to think about something in a new way from the other puzzles? • What did you try that didn't work? What did you do instead? • If you had to help someone else solve this puzzle, what might you tell them?	• Operations used in the lesson • Terms for operations (joining, separating, taking away, fraction words) • Example problems • Tips they would give to help someone solve • Situations/context the math could be used • Organization/soft skills

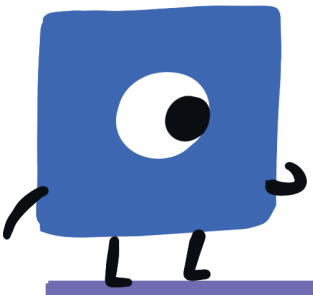
What challenges am I having/questions I still have about this topic?		
Goal/Purpose	**Support Student Thinking Prompts**	**Look for**
Build the idea that our learning doesn't end and there is always more to know. It is also important for students to be okay with having lingering questions and become comfortable with not fully understanding something. This is what pushes us to grow.	• What parts of the game still seemed hard on the last level? • What questions do you think you need more practice with? • What are you curious about? • What do you want to know that the game/teacher didn't show you today? • Did you get a question correct and you don't know why? • Do you think there are other ways to solve these types of problems? • Did your strategy today feel efficient? Do you want to try something new?	• Examples of problems they got stuck on/solved incorrectly • "Where can I use this in the real world?" • "Why was I correct when I did ____?" • "I want someone to explain this part to me again: ____." • A picture of a tricky part of the puzzle • "What would I do if I was given this situation: ____?" • "Could I also use a different strategy?" • "How could I make this problem easier to solve?"

ST Math Puzzle Reflection

The ST Math Puzzle Reflection allows students to have a 1:1 experience with the ST Math puzzles. It captures their ST Math quantitative data and qualitative data. It asks students to show what they learned while playing the ST Math puzzles. It is up to the teacher to decide the content they want students to engage in during ST Math Summer Immersion.

	Goal/Purpose	Support Student Thinking Prompts	Look for
Top Data Points	Students will be able to associate these numbers with their progress. This way they can hold themselves accountable as the numbers grow/decrease.	• What do [levels/percent/minutes/puzzles] tell us? • Why do you think we should write these numbers down each day? • How has it changed from the last module? • What do you want to change in the next module?	• Correct input of data • Understanding the difference between each piece of data • Recognizing this shows us how we are 'growing our brains' each day
Open-Ended Questions	Reinforce student learning. Having them put new ideas into their own words or pictures will help the new understanding 'stick.' Students can also refer back to this when stuck on a problem in the future or to remind them of their growth and build their confidence.	• Tell me about the problem we did together on the carpet. • What did you tell JiJi to do in the ST math puzzle? • What did you have to do to try and win the ST Math puzzle you played at your station? • When would you use the math we did today? • What other kinds of problems could it help with? • What did you do today that made solving math easier? • What part of today's lesson made you feel proud? • What part of the lesson was hard at first?	• Operations used in the lesson • Terms for operations such as joining, separating, taking away, or fraction words • Example problems • Situations/context in which the math could be used • Organization/soft skills

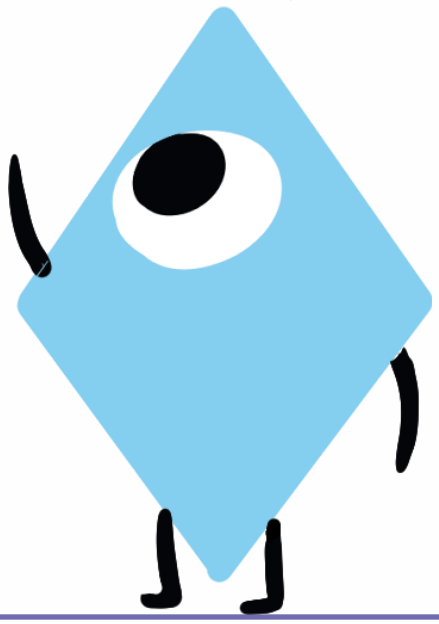




Exit Tickets

Exit Tickets allow students to represent their learning in a different, more novel way (note to a friend, freeform brain dump, as a discovery, etc.). Many of these are the same look-fors and prompts as the My Thinking Path and ST Math Puzzle Reflection.

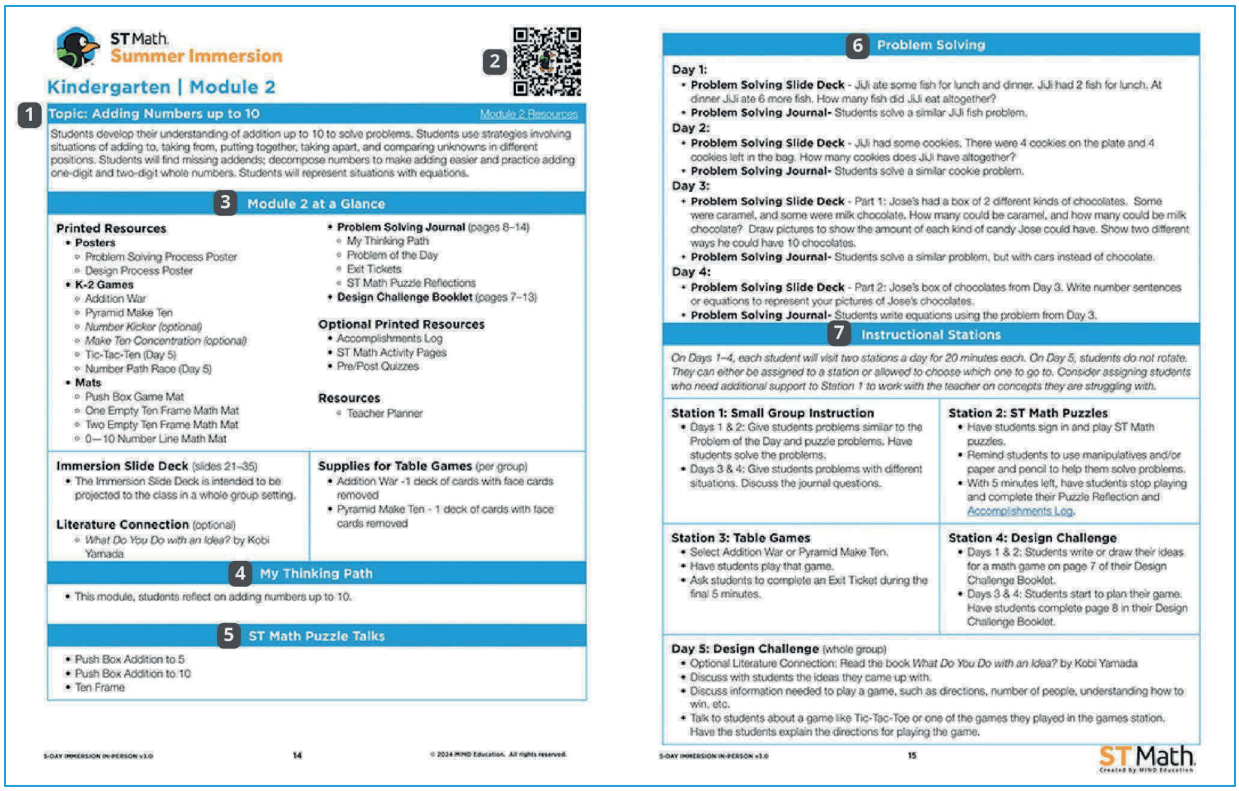
Prompts	Look for
• Tell me about the problem we did together on the carpet. • What did you tell JiJi to do in the ST math puzzle? • What did you have to do to try and win the game you played at the table games station? • When would you use the math we did today? • What other kinds of problems could it help with? • What did you do today that made solving math easier? • What part of today's lesson made you feel proud? • What part of the lesson was hard at first? • What was different in this puzzle from other ones you have played? • Did you have to think about something in a new way from the other puzzles? • What did you try that didn't work? What did you do instead? • If you had to help someone else solve this puzzle, what might you tell them?	• Operations used in the lesson • Terms for operations, such as joining, separating, and taking away fraction words • Example problems • Tips they would give to help someone solve • Situations/contexts in the math could be used • Organization/soft skills • Examples of problems they got stuck on/solved incorrectly • "Why was I correct when I did ____?" • A picture of a tricky part of the puzzle • "Could I also use a different strategy?" • "How could I make this problem easier to solve?"



How Are the Lesson Plans Sectioned?

Module at a Glance

Module at a Glance, which can be found in the lesson plan in blue, gives you an overview of what you'll encounter. Here is a breakdown of what you will see.



ST Math
Summer Immersion

Kindergarten | Module 2

2

1 Topic: Adding Numbers up to 10 — Module 2 Resources

Students develop their understanding of addition up to 10 to solve problems. Students use strategies involving situations of adding to, taking from, putting together, taking apart, and comparing unknowns in different positions. Students will find missing addends; decompose numbers to make adding easier and practice adding one-digit and two-digit whole numbers. Students will represent situations with equations.

3 Module 2 at a Glance

Printed Resources
- **Posters**
  - Problem Solving Process Poster
  - Design Process Poster
- **K-2 Games**
  - Addition War
  - Pyramid Make Ten
  - *Number Kicker (optional)*
  - *Make Ten Concentration (optional)*
  - Tic-Tac-Ten (Day 5)
  - Number Path Race (Day 5)
- **Mats**
  - Push Box Game Mat
  - One Empty Ten Frame Math Mat
  - Two Empty Ten Frame Math Mat
  - 0—10 Number Line Math Mat
- **Problem Solving Journal** (pages 8–14)
  - My Thinking Path
  - Problem of the Day
  - Exit Tickets
  - ST Math Puzzle Reflections
- **Design Challenge Booklet** (pages 7–13)

Optional Printed Resources
- Accomplishments Log
- ST Math Activity Pages
- Pre/Post Quizzes

Resources
- Teacher Planner

Immersion Slide Deck (slides 21–35)
- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Literature Connection (optional)
- *What Do You Do with an Idea?* by Kobi Yamada

Supplies for Table Games (per group)
- Addition War -1 deck of cards with face cards removed
- Pyramid Make Ten - 1 deck of cards with face cards removed

4 My Thinking Path
- This module, students reflect on adding numbers up to 10.

5 ST Math Puzzle Talks
- Push Box Addition to 5
- Push Box Addition to 10
- Ten Frame

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6 Problem Solving

Day 1:
- **Problem Solving Slide Deck** - JiJi ate some fish for lunch and dinner. JiJi had 2 fish for lunch. At dinner JiJi ate 6 more fish. How many fish did JiJi eat altogether?
- **Problem Solving Journal-** Students solve a similar JiJi fish problem.

Day 2:
- **Problem Solving Slide Deck** - JiJi had some cookies. There were 4 cookies on the plate and 4 cookies left in the bag. How many cookies does JiJi have altogether?
- **Problem Solving Journal-** Students solve a similar cookie problem.

Day 3:
- **Problem Solving Slide Deck** - Part 1: Jose's had a box of 2 different kinds of chocolates. Some were caramel, and some were milk chocolate. How many could be caramel, and how many could be milk chocolate? Draw pictures to show the amount of each kind of candy Jose could have. Show two different ways he could have 10 chocolates.
- **Problem Solving Journal-** Students solve a similar problem, but with cars instead of chocolate.

Day 4:
- **Problem Solving Slide Deck** - Part 2: Jose's box of chocolates from Day 3. Write number sentences or equations to represent your pictures of Jose's chocolates.
- **Problem Solving Journal-** Students write equations using the problem from Day 3.

7 Instructional Stations

On Days 1–4, each student will visit two stations a day for 20 minutes each. On Day 5, students do not rotate. They can either be assigned to a station or allowed to choose which one to go to. Consider assigning students who need additional support to Station 1 to work with the teacher on concepts they are struggling with.

Station 1: Small Group Instruction
- Days 1 & 2: Give students problems similar to the Problem of the Day and puzzle problems. Have students solve the problems.
- Days 3 & 4: Give students problems with different situations. Discuss the journal questions.

Station 2: ST Math Puzzles
- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games
- Select Addition War or Pyramid Make Ten.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge
- Days 1 & 2: Students write or draw their ideas for a math game on page 7 of their Design Challenge Booklet.
- Days 3 & 4: Students start to plan their game. Have students complete page 8 in their Design Challenge Booklet.

Day 5: Design Challenge (whole group)
- Optional Literature Connection: Read the book *What Do You Do with an Idea?* by Kobi Yamada
- Discuss with students the ideas they came up with.
- Discuss information needed to play a game, such as directions, number of people, understanding how to win, etc.
- Talk to students about a game like Tic-Tac-Toe or one of the games they played in the games station. Have the students explain the directions for playing the game.

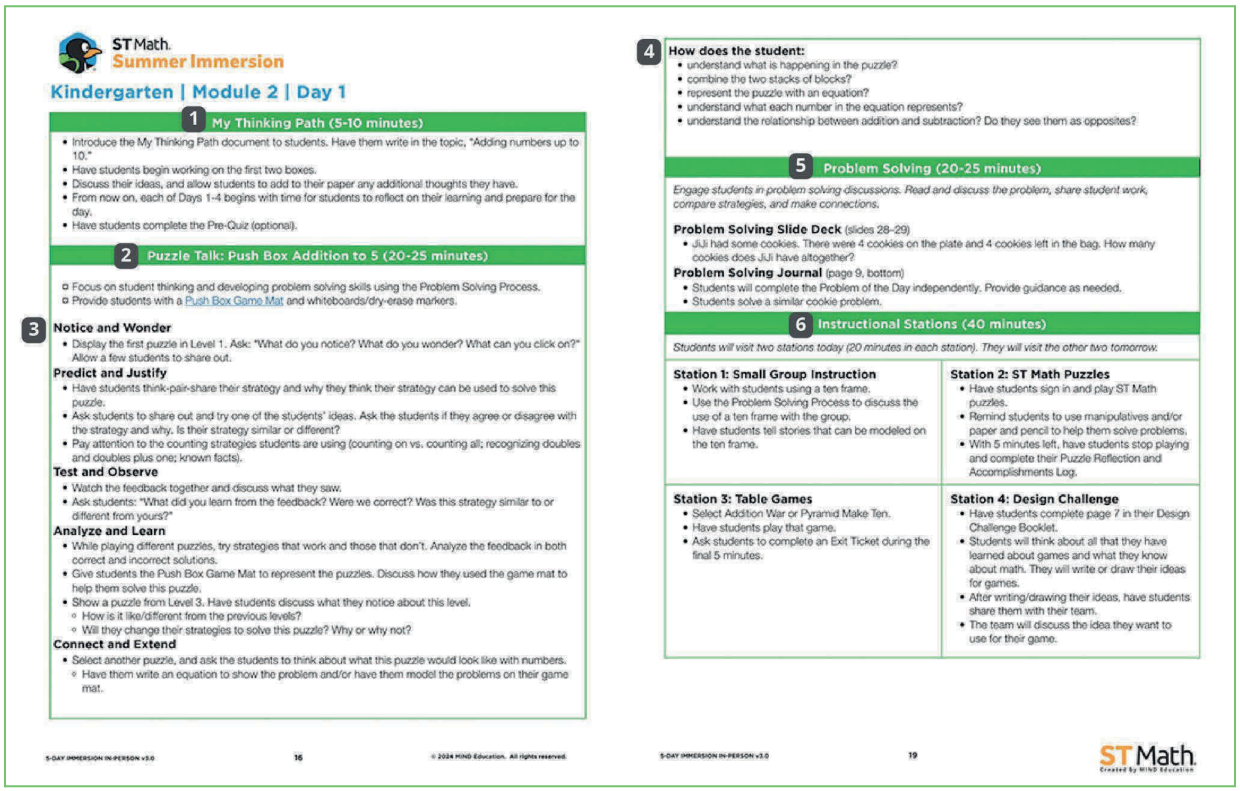
5-DAY IMMERSION IN-PERSON v1.0 15 ST Math

SECTIONS

1. **Topic** - highlights the math focus for that module and the content students will be exploring.
2. **QR Code & Hyperlink** - links to that particular module's resources.
3. **Module at a Glance** - lists documents that need to be printed, slides from the slide deck that will be projected, and any manipulatives necessary for the module.
4. **My Thinking Path** - tracks the student's thinking around the module's topic in a graphic. organizer found in the Problem Solving Journal.
5. **ST Math Puzzle Talks** - specifies the puzzles used during Puzzle Talks (use a QR code/link to locate these).
6. **Problem Solving** - features the Problem of the Day included in the Problem Solving Journal and on the Problem Solving Slide Deck. These are used to explore connections and have students check and challenge each other.
7. **Instructional Stations** - organizes students into small groups to work on various activities at a particular designated rotating station.

Daily Lessons

Daily Lessons, which can be found in the lesson plan in green, give you specific lesson plans for the day. Here is a breakdown of what you will see on most days. The last day of the module is slightly different.



ST Math
Summer Immersion

Kindergarten | Module 2 | Day 1

1 My Thinking Path (5-10 minutes)

- Introduce the My Thinking Path document to students. Have them write in the topic, "Adding numbers up to 10."
- Have students begin working on the first two boxes.
- Discuss their ideas, and allow students to add to their paper any additional thoughts they have.
- From now on, each of Days 1-4 begins with time for students to reflect on their learning and prepare for the day.
- Have students complete the Pre-Quiz (optional).

2 Puzzle Talk: Push Box Addition to 5 (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with a Push Box Game Mat and whiteboards/dry-erase markers.

3 Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What can you click on?" Allow a few students to share out.

Predict and Justify

- Have students think-pair-share their strategy and why they think their strategy can be used to solve this puzzle.
- Ask students to share out and try one of the students' ideas. Ask the students if they agree or disagree with the strategy and why. Is their strategy similar or different?
- Pay attention to the counting strategies students are using (counting on vs. counting all; recognizing doubles and doubles plus one; known facts).

Test and Observe

- Watch the feedback together and discuss what they saw.
- Ask students: "What did you learn from the feedback? Were we correct? Was this strategy similar to or different from yours?"

Analyze and Learn

- While playing different puzzles, try strategies that work and those that don't. Analyze the feedback in both correct and incorrect solutions.
- Give students the Push Box Game Mat to represent the puzzles. Discuss how they used the game mat to help them solve this puzzle.
- Show a puzzle from Level 3. Have students discuss what they notice about this level.
  - How is it like/different from the previous levels?
  - Will they change their strategies to solve this puzzle? Why or why not?

Connect and Extend

- Select another puzzle, and ask the students to think about what this puzzle would look like with numbers.
  - Have them write an equation to show the problem and/or have them model the problems on their game mat.

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4 How does the student:

- understand what is happening in the puzzle?
- combine the two stacks of blocks?
- represent the puzzle with an equation?
- understand what each number in the equation represents?
- understand the relationship between addition and subtraction? Do they see them as opposites?

5 Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem Solving Slide Deck (slides 28-29)

- JiJi had some cookies. There were 4 cookies on the plate and 4 cookies left in the bag. How many cookies does JiJi have altogether?

Problem Solving Journal (page 9, bottom)

- Students will complete the Problem of the Day independently. Provide guidance as needed.
- Students solve a similar cookie problem.

6 Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). They will visit the other two tomorrow.

Station 1: Small Group Instruction

- Work with students using a ten frame.
- Use the Problem Solving Process to discuss the use of a ten frame with the group.
- Have students tell stories that can be modeled on the ten frame.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishments Log.

Station 3: Table Games

- Select Addition War or Pyramid Make Ten.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Have students complete page 7 in their Design Challenge Booklet.
- Students will think about all that they have learned about games and what they know about math. They will write or draw their ideas for games.
- After writing/drawing their ideas, have students share them with their team.
- The team will discuss the idea they want to use for their game.

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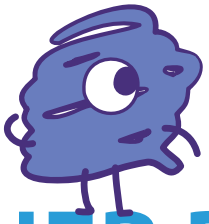
SECTIONS

1. **My Thinking Path** - provides direction on how to get students thinking about the topic of the module.
2. **Puzzle Talks** - brings ST Math which engages students to practice mathematical discourse and problem solving.
3. **Problem Solving Process** - integrates the Problem Solving Process to engage students in mathematical discourse and to develop problem solving skills.
4. **Check for Understanding** - determines the level of understanding of the day's lesson using questions.
5. **Problem Solving** - features the Problem of the Day included in the Problem Solving Journal and on the Problem Solving Slide Deck. These are used to explore connections and have students check and challenge each other.
6. **Instructional Stations** - provides details on the activities students will be working on in small groups at a particular designated rotating station.

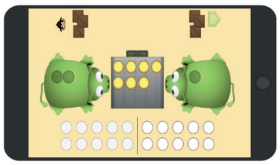


TEACHER PLANNER

Checklist: Module 1

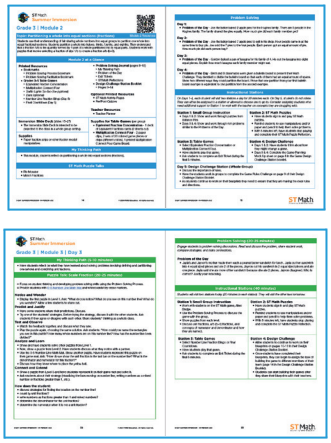
The focus of Module 1 is to get students acclimated to the structure of the program as well as to establish expectations, routines, and procedures.

ST Math Student Experience



- ☐ Ensure all students have access to ST Math®.
- ☐ Review Lesson 1:
  - Plan how you will present ST Math.
  - Review the **Foundations of ST Math - Interactive Webinar** in ST Math Academy to successfully get your students onto the ST Math Program.

ST Math Summer Immersion Curriculum



- ☐ Review the **Embedded Professional Learning**.
- ☐ Module 1 focus:
  - Familiarize students with ST Math.
  - Teach through the Problem Solving Process.
  - Engage in strategies that promote student thinking.
  - Establish and teach procedures for the instructional stations.
  - Set the expectations for problem solving and student work.
  - Introduce the Design Challenge, and review with the students the steps in the **Design Challenge Station Guide** (*for 5-Day Summer Immersion*).
  - Set the expectations for the student portfolio.
  - Use the Pre-Assessment to establish a baseline of students' knowledge.

In the Lesson Plan:

- ☐ Review sections Module at a Glance in blue and Daily Lessons in green.
- ☐ Plan and prepare for the Puzzle Talk, Problem Solving, and Instructional Stations using the document Instructional Station Planning Sheet in this planner.
- ☐ Plan strategies to help students self-facilitate during their ST Math time.

Instructional Stations Planning Sheet 1 of 2

This document is designed to support your lesson planning for the instructional stations.

Organization	
What are your goals for using instructional stations?	
Establish Procedures	
How will students be grouped?	
How will groups transition between the instructional stations?	
How will students access materials?	
How will students interact with each other?	
What norms will be used in the instructional stations?	
Consider giving students roles in the group to support accountability and collaboration. See **Instructional Station Overview**.	

Content	
How will students interact with the content?	
How will directions be communicated to students?	
What strategies will be used to support students who are struggling?	
What resources are needed to support the content in the instructional stations?	

Instructional Stations Planning Sheet 2 of 2

This document is designed to support your lesson planning for the instructional stations.

Monitor/Evaluate	
How will you know what students are learning? ***Example**: Use quizzes or assessments, My Thinking Path, Exit Tickets, ST Math Puzzle Reflection, etc.*	
How will student progress be tracked, monitored, and celebrated?	
How will students know if they are successful?	

Teacher Actions	
What is your role in the instructional stations?	
How will you evaluate the instructional station rotation model you created?	
What will you do once you determine what is/isn't working?	
How often will you make adjustments to maximize success?	

Checklist: All Remaining Modules

This document is designed to support your lesson planning for ST Math Summer Immersion.

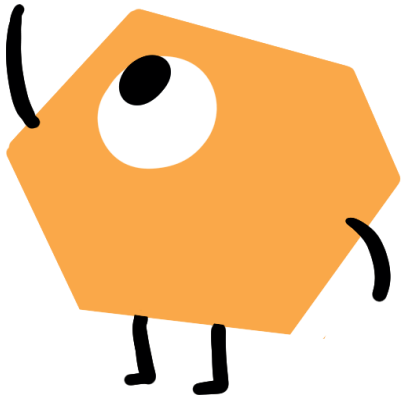
Module's Checklist

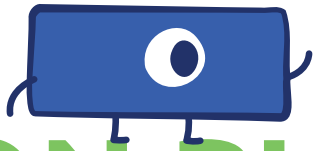
Student Support

- ☐ Review students' work.
- ☐ Identify students who may benefit from more intensive instruction during the Small Group Instruction Station or during Focused Instructional Time (in 5-Day Summer Immersion) by using the Small Group Intervention Planner.

Lesson Preparation

- ☐ **Review the Module at a Glance in blue and Daily Lessons in green.**
  - ☐ Identify the topic for the module.
  - ☐ Review printed resources needed for the module.
  - ☐ Establish goals and celebrate students in this module.
- ☐ **Problem Solving Discussions Review**
  - ☐ Anticipate student responses to promote academic discourse.
  - ☐ Determine strategies to highlight in the discussion.
  - ☐ Review the answer keys.
- ☐ **Puzzle Talks Review**
  - ☐ View the Game in a Minute videos.
  - ☐ Gather math tools.
- ☐ **Instructional Stations Review**
  - ☐ Review and organize instructional station activities.
  - ☐ Determine procedures for instructional stations.
  - ☐ Determine how to group students for instructional stations.
  - ☐ Determine strategies to use to monitor student success.s
  - ☐ Review and prepare for the Table Games.
- ☐ **Math Tools**
  - ☐ Centimeter cubes (K-5)
  - ☐ Connecting cubes (K-5)
  - ☐ Two-color counters or chips (K-2)
  - ☐ Fraction model manipulatives (3-5)
  - ☐ Whiteboards and dry-erase markers for students
  - ☐ Chart paper
  - ☐ Markers





LESSON PLAN

ST Math
Summer Immersion

Grade 4 | Module 1

Click or scan for resources

Topic: Acclimate Students to ST Math Immersion

Module 1 Resources

This module's focus: Getting your students started on ST Math and acclimated to the structure of the ST Math Immersion program. Whether or not your students have been using ST Math, it is important to introduce it. During this module, students will discuss strategies and learn how to overcome hurdles. Students will also begin to engage with the components of the program. Most importantly, during this module students will actively engage in thinking about their thinking and the strategies they use to solve problems and overcome challenges, while getting excited about exploring mathematics.

Module 1 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **Grades 3-5 Table Games**
  - Traffic Lights Tic-Tac-Toe
  - Dara
  - Equivalent Fraction Concentration (Day 4)
  - Multiplication Connect Four (Day 4)
- **Problem Solving Journal** (pages 4–9)
  - My Thinking Path
  - Problem of the Day (POD)
  - Exit Tickets
  - ST Math Puzzle Reflections

Optional Printed Resources

- Accomplishment Log
- ST Math Activity Pages
- Pre-Assessment
- Pre/Post Quizzes

Teacher Resources

- ST Math Activity Pages - Teacher Introduction
- Teacher Planner
- Teacher Guide

Immersion Slide Deck (slides 2–14)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies for Table Games (per group)

- **Traffic Lights Tic-Tac-Toe** - Tic-Tac-Toe game board; red, yellow, and green color tiles (9 of each color)
- **Dara** - Dara game board, 2 sets of 12 small game pieces of different colors

Other Supplies for Students

- Paper fraction strips or other fraction model manipulatives

My Thinking Pat

- This daily opportunity for reflecting will be introduced on Day 3 of this module. Students will reflect on solving problems involving comparing fractions.

ST Math Puzzle Talks

- Big Seed
- Scale Fractions
- Fraction Bricks

Problem Solving

Day 1:

- **Problem of the Day** - Create a "Getting to Know Our Class" chart. Ask the students questions to gather data about the class and record the information on a chart. For example:
  - How many of the students are girls? What fraction of the class are girls? How many of the students are boys? What fraction of the class are boys? How can we write an equation to show the total of the fraction of girls in the class plus the fraction of boys in the class?
  - Write another question about the class which can be solved by adding fractions of the class, e.g. - the fraction of the class wearing glasses plus the fraction of the class not wearing glasses. Add these and the equations to the class chart. Discuss that the total always equals a fraction equivalent to 1 whole.

Day 2:

- **Problem of the Day** -Remind students about yesterday's Problem of the Day. How can we describe the class mathematically? Generate a list of three to five things students want to know about each other. For example: Favorite ice cream flavor, favorite color, number of siblings, number of pets, favorite subject in school, birth month, favorite sport, etc.

Day 3:

- **Problem of the Day** - Create a model of a scale fraction with fourths. Use Cuisenaire rods, connecting cubes, or paper strips to create your bar model. Build a number line using your bar model. Include whole numbers, halves, fourths, and eighths up to 3.

Day 4:

- **Problem of the Day** - Kyle and Juan each had the same size chocolate bar. Kyle cut his into 6 equal size pieces and gave 2 pieces to Carla. Juan cut his bar into 3 equal size pieces and gave 1 piece to Carla. Compare how much chocolate bar each friend has.

Preparing for Instructional Stations

This module is focused on teaching students about the structure of the stations, how to transition between stations, expectations of a station, and responsibilities in a station. It is very important to spend Days 1-3 really teaching the procedures of the stations. Use the Teacher Planner as a resource for planning Instructional Stations, also see the Instructional Stations Overview for tips and best practices.

Day 1: Table Game Play (whole group)

- Discuss why we play games.
- Introduce and play the game Traffic Lights Tic-Tac-Toe.

ST Math Puzzles (small group)

ST Math Pre-Assessment and/or Pre-Quiz

- Students can play when they complete the Pre-Assessment and/or Pre-Quiz

Day 2: Table Game Play (whole group)

- Introduce and play Dara.
- Discuss why we play games like Traffic Lights Tic-Tac-Toe and Dara.
- Have students identify the math and/or strategy in the games.

ST Math Puzzles (small group)

- Have students sign in and play ST Math.

Day 3: Instructional Stations Routines

- Establish class routines.

Table Game Play (small group)

- Play Traffic Lights Tic-Tac-Toe and Dara

ST Math Puzzles (small group)

- Have students sign in and play ST Math.

Day 4: Instructional Stations

- No Small Group Problem Solving

Table Game Play (small group)

- Play Traffic Lights Tic-Tac-Toe and Dara

ST Math Puzzles (small group)

- Have students sign in and play ST Math.

ST Math
Summer Immersion

Grade 4 | Module 1 | Day 1

ST Math Immersion Focus (10 minutes)

Introduce ST Math Immersion and its components, and answer any questions the students may have to better prepare them for a successful experience. Introduce the components of the program including the Problem Solving Journal (which includes My Thinking Path, Problem of the Day (POD), Exit Tickets, and Puzzle Reflections), Puzzle Talks, and Instructional Stations (which includes Small Group Instruction, ST Math Puzzles, and Table Games). There are optional Activity Pages that can also be introduced. Explain how you will be completing the Pre-Assessment and/or Pre-Quiz if you decide to use them.

ST Math Focus (15 minutes)

Reminder About or Introduction to ST Math

Your students likely have been playing ST Math. For some of them, this may be their first experience with ST Math. On this first day it is important to reintroduce ST Math while sharing important tips and reminders as students play ST Math. (See Slide Deck, slides 3-5.)

If your students have used ST Math, you will not need to do a formal introduction to the program. Instead focus on engaging them in discussions where they can share tips, encouragement, and success stories with ST Math.

- Brainstorm what students like about ST Math. What tips do they have to share? What do they do when they get stuck?
- Have students share their favorite games and why they like them.
- Discuss goal setting with students. Have students set a puzzles and minutes goal for each day they play ST Math games.
- Provide students with an Accomplishment Log (Data Tracker), and walk them through how to use it.
- Let the students know if they will be doing the Journey, Assignments, or both. Remind them that you are able to see the minutes and puzzles they have completed.
- Ask: When you do an ST Math puzzle, how does the animation help? Give an example.
  - This is a group discussion. Help students understand that the animation in the puzzle shows them if they are right or wrong. The information provided by this feedback (animation) can be used to adjust their thinking about how to solve the puzzle. As you discuss, allow all students to contribute to answering this question. Create a chart of their responses. Make sure you put their name or initials by their response so that you can compare it at the end of the program to what they learned.

For students who are new to ST Math:

- Choose one of the following ways to introduce ST Math to your students.
  - Show students the Guided Intro and/ or Intro Video [English] [Spanish]
  - Play the Slinky game with your students. During gameplay explain that ST Math is a program that teaches math in a very different way.
    - Encourage students to look at the visuals on the screen and determine what they think they should do.
    - Point out the things that are clickable and the clues that are given on the screen. (Click on the sky, and the parts of the screen shimmer to show where to click.)
    - Make sure students understand that they have to complete all the puzzles in a level before moving on.
    - Remind students that if they get a puzzle wrong, they can click anywhere on the screen to replay the animation or to track movement on the screen to learn from their informative feedback.

Problem Solving (20 minutes)

Problem of the Day

- Create a "Getting to Know Our Class" chart. Ask the students questions to gather data about the class, and record the information on a whiteboard or chart. (You will use this information throughout the module so it is important that it is in a form you can refer back to.)
  - Some questions to ask to gather data might include: How many students are in this class? How many are girls? Boys? How many students have brown eyes? Blue eyes? Green eyes? How many students in the class have black hair? Brown hair? Blonde hair? Red hair? How many have pets? Siblings? Favorite subject? Favorite flavor ice cream? Favorite color?
  - This is a great opportunity to practice counting, making tally marks, and comparing numbers (more/less, bigger/smaller, one more, two more, one less, two less, etc.)

Preparing for Instructional Stations (45 minutes)

Table Game Play & Discussion (25 minutes, whole group)

- Ask students to think about their favorite game to play. Engage them in a discussion about why that game is their favorite.
- Share with them that people of all ages enjoy playing games. Ask them to think about why people play games. Record their responses on chart paper.
- Tell students they are going to play a game. Introduce students to the game Traffic Lights Tic-Tac-Toe.
- Have them play the game with a partner.
- Discuss as a whole group. Ask students to share what they liked about the game. Ask questions about the math they used in the game, and record answers on chart paper. (How did the math work in the game? What was the purpose?)

ST Math Puzzles (20 minutes, small groups)

Students in small groups will each individually play ST Math Puzzles. You have the option to assign them the entire Immersion objective, have them continue their grade level journey from the previous school year, or assign them specific puzzles. If you do not have enough computers for each student to play ST Math, you can have some students working on ST Math, some continuing to play Number Line Bingo, and if applicable, others in a small group with the teacher completing the Pre-Assessment and/or Pre-Quiz.

- OR -

OPTIONAL - ST Math Immersion Grade 4 Pre-Assessment and/or Pre-Quiz

Administer the Pre-Assessment and/or Pre-Quiz to students. Those who finish early can play ST Math. This time can also be used to give the Pre-Assessment and/or Pre-Quiz to all students in a whole group setting. Another option would be to administer the assessment to small groups over the course of this first module.

ST Math
Summer Immersion

Grade 4 | Module 1 | Day 2

ST Math Focus (5-10 minutes)

Today you are going to teach students the Problem Solving Process. This process focuses on student thinking and developing problem solving skills. It follows the Perception-Action Cycle and can be used beyond ST Math to support students in problem solving. As you engage students in the Puzzle Talk, spend time highlighting strategies, pointing out the feedback, and asking students facilitation questions to promote their thinking. Show them the Problem Solving Bookmark, and encourage them to refer to it as they play ST Math on their own.

Puzzle Talk: Big Seed (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Tell students you are going to teach them questions they can ask themselves to help think through the puzzles.
- Show the first puzzle and encourage students to complete this sentence: “I notice _____” (without suggesting a solution). Have several students share what they notice.
- Tell students that they can click the sky to make the clickable elements shimmer.
- Once students call out all the components they see on the screen, ask students what they wonder. "What question is this puzzle asking?”

Predict and Justify

- Encourage students to complete this sentence: “My prediction is _____ because_____.”
  - Have different students share their predictions and why they think theirs are the best.
  - Ask students to name or describe their strategy they will use to test their prediction.
    - For example, students may predict that they have to fill the empty blocks. In this case, they would name the strategy of flipping. “My strategy is to flip the shape to fill in the blocks.”

Test and Observe

- Try a few student strategies, both correct and incorrect. Watch the feedback, and discuss what they observed in the animation.

Analyze and Learn

- Facilitate students in analysis of the feedback, understanding what worked and didn’t work. By examining their thinking, students either reinforce their strategies or examine their errors, which provides an opportunity for them to learn from their mistakes.
  - How does this compare to what you thought would happen?
  - What did you learn?
  - How will you use what you learned?
- Be sure to use the playback features to pause, rewind, and fast forward the animation and discuss what they are learning from the feedback. Use the annotation tools to highlight the learning.
- Encourage students to complete this sentence: “Something I learned from the feedback is _____.”
- Continue to facilitate student thinking as you work through additional puzzles.

Connect and Extend

- Share solutions, and discuss how puzzles are different as the levels progress. Encourage a variety of strategies/solutions, and remember to facilitate, not teach, how to solve the puzzles.
- Ask the students if what they learned about how the puzzle behaves in previous levels can be applied here.
- When playing Level 3, ask the students if there is more than one answer to the puzzle. Explore different solutions and discuss what they thought would happen vs. what did happen.
- Before moving on, ask students to describe what is occurring in the puzzles. What are they learning? Do they notice any relationships or patterns? Chart the math concepts/words/skills that students discuss.
- Depending on how students are doing with the puzzles, you may want to skip to Level 5.
- Have students work in breakout groups to complete a puzzle from Level 5. How did what they learned in

Problem Solving (20-25 minutes)

Problem of the Day

- Remind students about yesterday's Problem of the Day. How can we describe the class mathematically? Generate a list of three to five things students want to know about each other. For example:
  - Favorite ice cream flavor, favorite color, number of siblings, number of pets, favorite subject in school, birth month, favorite sport, etc.

Preparing for Instructional Stations (35 minutes)

Table Game Play & Discussion (20 minutes, whole group)

- Discuss the game that the students played yesterday: Traffic Lights Tic-Tac-Toe. Review what they liked/didn't like about the game. Ask questions, such as how did they figure out who won. Did they have a strategy that helped them win?
- Let students know that they are going to play a different game today.
  - Introduce students to Dara.
  - Have them play the game with a partner.
- Discuss as a whole group. Ask students to share what they liked/didn't like about the game. Ask questions about the math they used in the game and record answers on chart paper.
  - How did the math work in the game?
  - What was the purpose of the math?
- Show them the game chart from yesterday. Have them think about Traffic Lights Tic-Tac-Toe and Dara. Discuss their answers to the questions:
  - Which game did they like better? Why?
  - How was mathematics involved in each of these games?

ST Math Puzzles (15 minutes, small group)

Students in small groups will each individually play ST Math Puzzles. You have the option to assign them the entire Immersion objective, have them continue their Grade Level Journey from the previous school year, or assign them specific puzzles. If you do not have enough computers for each student to play ST Math, you can have some students working on ST Math, some continuing to play Dara, and if applicable, others in a small group with the teacher completing the Pre-Assessment and/or Pre-Quiz.

ST Math
Summer Immersion

Grade 4 | Module 1 | Day 3

My Thinking Path (5-10 minutes)

Students will begin solving problems involving comparing fractions and ordering them on a number line.

My Thinking Path Discussion

- Introduce the My Thinking Path page to students. Have them write in the topic: “Solve problems involving comparing fractions.”
- Have students complete page 4 in ther journal.
- Discuss their ideas and allow students to add any additional thoughts they have to their paper.
- From today on, begin each of Days 1-4 with time for students to reflect on their learning and prepare for the day.

Puzzle Talk: Scale Fractions (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 2. Ask: “What do you notice? What do you wonder?” Allow a few students to share out.

Predict and Justify

- Ask students to make a prediction of how to solve the puzzle, and after some think time, have them do a think-pair-share with a partner.
- Have students share out, and try one of the students’ ideas. Ask why they chose that strategy.

Test and Observe

- Solve the puzzle, and have students describe what happened. You may choose to replay the animation and pause before JiJi crosses.

Analyze and Learn

- Ask students some questions, such as: How is the visual model we saw on the top of the screen related to the number line? What did we learn and how does that help us with the rest of the puzzles?
- Show the next puzzle, and repeat the Problem Solving Process.

Connect and Extend

- Ask students: “How could we represent this model as a fraction? A mixed number?” Have students write their answers on their whiteboards or a piece of paper.
- Share students’ answers, and discuss.
- Try one of the students' strategies. Watch and discuss the feedback. Were they correct? If so, what did they learn? If not, what will they change?
- Repeat with a few more puzzles in Level 2 and Level 4, and ask questions about the relationship between the denominator and the partitions for the number line.

How does the student:

- explain the fractions they see in the visual model? (Do they understand the 1 = 3/3, which is the same as 1/3 + 1/3 + 1/3?)
- understand how fractions are represented on a number line (e.g., fractions between 0 and 1, 1 and 2)?
- represent the model on the number line? (Can they convert the whole number to unit fractions?)
- explain the relationship between the visual model representation and the number line representation?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Create a fraction model partitioned into fourths. Use Cuisenaire rods, connecting cubes, or paper strips to create your model. Build a number line using your bar model. Include whole numbers halves, fourths, and eighths up to 3.

Preparing for Instructional Stations (40 minutes)

Students will visit two stations today (15 minutes per station). See Instructional Stations Overview.

Instructional Station Routines (10 minutes)

- It is important to establish routines for station rotation that allow students to seamlessly move from one station to another with little disruption. Beginning with module 2, there are 3 stations. For today, have students rotate only between the stations below while you monitor the students. Allow for 15 minutes at each station. Consider these tips as you set up stations with your class.
  - Communicate clear expectations to students.
  - Provide clear directions, and ensure that students have all the materials they need.
  - Make sure math tools are accessible to students.
  - Set a timer to help students pace themselves.
  - Provide strategies for students who need help during Instructional Station time.
  - Be sure to consider movement in high traffic areas during transition time.
  - Consider giving students' roles in the group to support accountability and collaboration.

Station 1: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 2: Table Games

- Select Traffic Lights Tic-Tac-Toe or Dara. Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 1 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving comparing fractions. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Fraction Bricks (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with fraction strips and whiteboards/dry-erase markers.

Notice and Wonder

- Give students fraction strips, and display a puzzle in Level 1. Ask: “What do you notice? What do you wonder?” Give students think time before sharing out whole group.

Predict and Justify

- Have students use fraction strips to figure out how they might solve this puzzle.
- Have students share out. Select one of the students’ ideas to discuss. Ask students: “Why do you think the answer is ___?” Discuss other strategies as a class.

Test and Observe

- Solve the puzzle using one of the strategies, and have students describe what happened in the feedback.

Analyze and Learn

- Ask students (giving think time): ”What do we know about equivalent fractions and how does that help us with the rest of the puzzles? Is there another fraction that is equal to this fraction? Can you figure out which fraction will fill this hole, too?”
- Have students determine an equivalent fraction. Try a student’s solution. Ask students to record the solution on their whiteboards by writing the fractions using the equal sign to show their equivalence. Discuss as a whole group the strategies students are using for locating a fraction on the number line.
- Discuss how they partition the number line and then locate the fraction. As you work on the puzzles, discuss and chart strategies students use to compare and order fractions. Keep this chart going throughout the module.
- If the puzzle has more equivalent fractions, have students determine the missing fractions and record the comparisons as a number sentence.
- Repeat with other puzzles in Level 1 and the first puzzle in Level 2, asking students to discuss and write what fraction they think will fill the hole.

Connect and Extend

- Using a fraction from a current puzzle, have students draw a number line and place the given fraction on the number line. Then ask students to place all of the equivalent fractions on the number line, too. Discuss why equivalent fractions are at the same spot on the number line.
- Sticking with the same puzzle, or a new one in Level 2, ask students to write and draw on a number line a fraction that is less than the current fraction and explain their work to a partner. All of the denominators in Level 2 are eighths, so continue to add equivalent fractions to the number line as students solve puzzles.
- Display the next puzzle in Level 2.
- Ask students to then write a fraction that is greater than the fraction shown, and share their fraction with a partner. Encourage them to prove that each fraction is greater than the fraction shown in the puzzle. Have students share out some of their solutions whole group.

- Show puzzles in Level 3 (all fifths and tenths). Ask questions such as:
  - What do you notice about the numerators and denominators in the fractions that fill the hole?
  - If the fraction in the sky has the denominator of 5, will there always be a fraction with the denominator of 10? Explain. If the fraction in the sky has the denominator of 10, will there always be a fraction with the denominator of 5? Explain.

How does the student:

- write equations to show equivalence of fractions?
- discuss the size of the fractions (denominator) and the number of unit fractions (numerator) of that size to compare equivalent fractions?
- partition a number line to place fractions? add fractions to a number line?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3 with 20 minutes for each rotation.
Qrsbc lrq ugjj tgqgr QR K_rf /8/ _lb R_`jc E_kcq,

*No Small Group Instruction to allow the teacher to reinforce expectations and support students while they do the ST Math 1:1 and Table Game stations.

Whole Group Table Games (15-20 minutes)

During this time you will introduce Equivalent Fraction Concentration and Multiplication Connect Four. Students will play these Table Games in the next module in Station 3.

- Introduce one of the games.
- After explaining the game, and playing it with the whole group, give students time to play it on their own.
- After playing the game, have them discuss:
  - What math did they learn or use?
  - What strategies did they try to win the game?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Kyle and Juan each had the same size chocolate bar. Kyle cut his into 6 equal size pieces and gave 2 pieces to Carla. Juan cut his bar into 3 equal size pieces and gave 1 piece to Carla. Compare how much chocolate bar each friend has.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz. (optional)
- Have students review their ST Math Puzzle Reflection, Exit Tickets, and Problem Solving work.
- Engage students in discussions about what they have learned in this module, what they have questions about, and what they would like to learn more about.

ST Math
Summer Immersion

Grade 4 | Module 1 | Day 5

Design Challenge: Whole Group (40 minutes)

Favorite Game Discussion

- Ask students to think about their favorite game to play.
- Engage them in a discussion about favorite games, why we play games, and what they like about games.

Introduce & Play Traffic Lights Tic-Tac-Toe & Dara

- Traffic Lights Tic-Tac-Toe:
  - Introduce students to the game Traffic Lights Tic-Tac-Toe.
  - Watch the game video.
  - Have them play the game with a partner.
  - Have students complete Design Challenge Booklet Page 34 about Traffic Lights Tic-Tac-Toe
- Dara:
  - Introduce students to the game Dara.
  - Watch the game video.
  - Have them play the game with a partner.
  - Have students complete Design Challenge Booklet Page 34 about Dara.

Game Comparison

- Have students complete Page 35 in the Design Challenge Booklet individually.
- Discuss as a whole group.
  - Ask students to share what they liked about each game. Record answers on chart paper.
  - Which game did they like better? Why? How did the rules make the players use skill and/or strategy? Give examples.
  - Ask questions about the math they used in the game and record answers on chart paper.
    - How did the math work in the game?
    - What was the purpose?
    - What are ways other than computation that a game can include mathematics (such as, logical reasoning, critical thinking, problem solving, developing strategies, thinking ahead, etc.)?

Design Process Introduction

- Let the students know that they will be creating their own math games during Immersion. To help them with that, they will be working through the Design Process.
- Introduce the Design Process using the Design Process Poster, (See pages 32–33 of the Design Challenge Booklet.)
- **Step 1: ASK** involves understanding the job or task that needs to be done or the product that needs to be created.
  - Engage students in a discussion to ensure they understand they are going to work in a small group to create a math game that will be presented on the last day of Immersion.

- **Step 2: INVESTIGATE**
  - Ask the students to explain how they might investigate something. What would they do first, next, and last?
  - Part of investigating is starting with what we know. Help the students start to unpack what they know about games.
    - What is a game versus an activity?
    - What is the value in playing math games?
    - What are some games they like? Why?
    - What are some games they do not like? Why?
    - What are some things students may want to consider in creating their games?
    - Ask the students to think about how games can be used to help students learn math.
    - What are some things they might do in a math game? (Chart their ideas on chart paper.)

TIP: This process is about facilitating thinking among the students. Charting their thoughts, ideas, and brainstorming is a great way to keep students engaged in thinking processes. They can analyze their thoughts, revisit them, expand them, and make refinements based on what they are learning. The charts are a great way of making their thinking visible. It may be beneficial to hang the charts in the room so they are an easy reference for students.

Game Design Project Introduction

- Explain to students that During Summer Immersion they will design their own math game in a small group. Their job is to create a game that will help students with math.
- **Step 3: Imagine Discussion & Model**
  - Have students think about what they know about math. What are things that are important for students to know in their grade? (Brainstorm a list on chart paper)
  - Pick out a concept from the list. Model for students by completing a Math Concept Web together.
  - Ask: "What are some things that are important for students to know about this concept?"
    - What is hard about this math concept?
    - How could a game teach those concepts?
    - Is this concept like anything else that we have learned?
    - Ask them to think of what type of game would be best to teach this concept and why?
- Next students will work in small groups to choose a concept and begin designing a game.

Grade 4 | Module 1 | Day 5 (continued)

Game Design Small Groups (20 minutes)

Small Group Game Design

Divide the class into small groups of 2-4 students to design their math game. Groups will work together during each Game Design Day to work on their game.

Brainstorming

- Today they will work on Step 3: Imagine and brainstorm ideas about their game together.
- Preview Design Challenge Booklet Page 36 as a group:
  - Think about all the games you've explored up until now. What information will you take from your knowledge of these games to help you brainstorm your own game ideas?
  - What style of game are you interested in?
  - What math concept(s) will you incorporate into your game? Why?
  - How might you combine some of your game styles and math ideas to help people who struggle with the math concept(s)?
- Students should work with their group to complete Design Challenge Booklet Page 36.

Deciding on a Math Concept (Page 37)

- Have students get in their groups and review the list of math concepts that you created as a class.
- Groups will then decide on the math concept they will use.
- Remind them that they need to be able to explain why they chose this concept.
- Have students as a group complete Design Challenge Booklet page 37.
  - As a team, think back to the characteristics of a good math game.
  - How will your game incorporate these characteristics?
  - In what ways will game players explore the math concepts in the game?
  - What are the key math components that your game needs in order for it to be helpful for the players?

Game Planning Mock Up (Page 38)

- When students are finished with Page 37 they can present their math concept to the teacher or class for feedback and then work on Page 38 in the Design Challenge Booklet - "Game Planning Mock Up".
- Students can continue to work on the game mock up next week.

Focused Instructional Time (20 minutes)

- After students complete the Small Group Design task, the remaining time is used for “Focused Instructional Time."
- The teacher can assign the activity or allow student choice:
  - **Individual or small group** - Teacher pulls small groups or individual students to work on a specific skill they struggled with during the week or support students on an ST Math puzzle they are stuck on.
  - **Table Games** - Students can choose a Table Game to play with a partner or small group.
  - **ST Math 1:1** - Students can continue to play ST Math.

Optional: ST Math Activity Page: Fraction Bricks

- **Play the game**
  - Project the game.
  - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: Fraction Bricks**
  - Distribute the Activity Page.
  - Ask students what they notice about the content on the page. What do they wonder? Where do they want to start on the page?
  - Give them time to complete the page.
  - Discuss the page and have students share their thinking.
  - Take the time to compare strategies, and have students share their work.
  - Make connections to the game.

ST Math
Summer Immersion

Grade 4 | Module 2

Topic: Comparing fractions and understanding equivalence

Module 2 Resources

Students will compare fractions and understand equivalence. Students create fractions using paper strips. They use the strips and the number line they created to compare fractions and find equivalent fractions. Students solve problems involving comparing and ordering fractions.

Module 2 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **Grades 3-5 Table Games**
  - Equivalent Fraction Concentration
  - Multiplication Connect Four
  - *Traffic Lights Tic-Tac-Toe (optional)*
  - *Dara (optional)*
  - Number Line Fraction Bingo (Day 4)
  - Final Countdown (Day 4)
- **Game Mats**
  - Estimate Fractions Game Mat
  - 0-5 Number Line Math Mat
- **Problem Solving Journal** (pages 10–15)
  - My Thinking Path
  - Problem of the Day
  - Exit Tickets
  - ST Math Reflections

Optional Printed Resources

- Accomplishment Log
- ST Math Activity Pages
- Pre/Post Quizzes

Teacher Resources

- Teacher Planner

Immersion Slide Deck (slides 15–27)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies

- Paper fraction strips or other fraction model manipulatives

Supplies for Table Games (per group)

- **Equivalent Fraction Concentration** - 1 deck of Equivalent Fractions cards (2 sheets cut)
- **Multiplication Connect Four** - Two paper clips, 2 sets of 20 colored game pieces or chips (different colors), 1 printed Multiplication Connect Four Game Board

My Thinking Path

- In this module, students will reflect on comparing fractions and understanding equivalence.

ST Math Puzzle Talks

- Common Denominator with Fractions
- Estimate Fractions on a Number Line
- Fraction Order Fill

Problem Solving

Day 1:

- **Problem of the Day** - Jana and Deklan each brought the same size pan of brownies for the class party.
  - Jana cut her brownie into 4 equal size pieces.
  - Deklan cut his brownie into 3 equal size pieces.
  - They needed to give 24 students the same size piece.
  - How could they do this with their two pans of brownies?

Day 2:

- **Problem of the Day** - Howard and Imani were in charge of dividing the clay for their table in art class. Each table had 4 students. Howard divided the clay into 4 equal size pieces. Imani divided the clay into 8 equal size pieces. Both tables fair shared all of their clay. Compare and contrast the clay students at each table received.

Day 3:

- **Problem of the Day** - Draw a number line. Place the following fractions: 3/6, 7/8, 11/12, 8/6, 1/8, 3/4, 25/12, 6/3, 6/12, 6/5, 3/5, and 14/8 on the number line. Select three of the fractions you placed on the number line and explain how you determined where to place these fractions. Challenge yourself.

Day 4:

- **Problem of the Day** - Isabella baked a pan of lasagna for her family of 4. She cut the lasagna into 8 equal pieces. Explain how much lasagna each family member might eat. Write equations/inequalities to compare how much each family member ate. Find at least three different ways the family could share the lasagna.

Instructional Stations

On Days 1–4, each student will visit two stations per day following the schedule in the Instructional Stations Overview*.*

Station 1: Small Group Instruction

- Engage students in a math conversation around more problems that involve different fraction models.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Equivalent Fraction Concentration or Multiplication Connect Four.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 2 | Day 1

My Thinking Path (5-10 minutes)

- Remind students of the My Thinking Path page in their journal. Have them write in the topic: “Comparing fractions and understanding equivalence."
- Have students work on the My Thinking Path page in their journals.
- Discuss their ideas, and allow students to add any additional thoughts they have to their paper.
- From today on, begin each of Days 1-4 with time for students to reflect on their learning and prepare for the day.
- Have students complete the Pre-Quiz (optional).

Puzzle Talk: Common Denominator with Fractions (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder?” Allow a few students to share out.

Predict and Justify

- Have students think-pair-share their strategies, and then take a few responses, making sure you are encouraging students to agree/disagree with each other.
- Try one of the students’ ideas, and perhaps some that don’t work.
- Watch the feedback together and discuss the feedback you saw.

Test and Observe

- Ask students to think about the feedback they watched and how it compared to their prediction.

Analyze and Learn

- Replay the puzzle. Make the same selection, and pause the puzzle.
- Have students name the two fractions represented by the two bars. Ask students: “How did you determine which cutter to select? Are the two fractions equivalent? What do they have in common? How do the two fractions compare? Prove that the denominator is the same and one of the bars represents one whole."
- Repeat with several puzzles from Levels 1 and 2.
- Display the first puzzle in Level 3. Ask: "How is this puzzle different from the puzzles we just solved? What can we do to solve this puzzle with the cutters we have?"
- Have students record the names for each fraction before they begin to solve the puzzle.
- Have students use their fraction tools to help them solve the puzzle and share their thinking with a partner. As a whole group, discuss different strategies that students used (e.g., Did they try to match up the two bars visually? Did they know something about the fractions already? Did they find a common denominator?).
- Try a student’s solution, and watch the feedback. Pause the puzzle before the pieces fall down to the ground. Ask students to name the new fractions that have been made and record them on their whiteboards.

Connect and Extend

- Work together to write equations and inequalities to compare the two fractions before and after they are cut. Ask students if the total size of the fraction bar changed (e.g., 1/2 and 1/4 became 2/4 and 1/4) or the names of the fractions changed.
- Repeat with additional puzzles in Level 3.

How does the student:

- write equations and inequalities to compare fractions?
- discuss what happens to the numerator and denominator of the fractions when they are cut?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Jana and Deklan each brought the same size pan of brownies for the class party.
  - Jana cut her brownie into 4 equal size pieces.
  - Deklan cut his brownie into 3 equal size pieces.
  - They needed to give 24 students the same size piece.
  - How could they do this with their two pans of brownies?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Create fractions from paper strips of the same length.
  - Use different colors for different fractions.
  - Use your fraction strips to compare fractions: 1/2, 3/4, 6/8, 2/8, 3/2, and 9/4. You may work with a partner to have enough unit fractions to create some of these fractions.
  - Place each of these fractions on the number line you created in the last module.
- Discuss why students may or may not be able to place the strips along the line to plot the fractions.
- Select fractions similar to the fraction cards for students to place on a number line.
- Have students use different strategies from the chart to help them place the fractions and compare them to other fractions. OR
- Show puzzles from Fraction Order Fill. Have students use fraction strips, Cuisenaire rods or connecting cubes to compare fractions. Discuss ways to compare and order fractions. Chart any new strategies.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Equivalent Fraction Concentration or Multiplication Connect Four.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 2 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems comparing fractions and understanding equivalence.

Puzzle Talk: Common Denominator with Fractions (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 4. Ask: “What do you notice that is similar/different from the puzzles we solved yesterday?” Allow a few students to share out.

Predict and Justify

- Have students share the cutting tool they think they should use and why. Try one of the students’ ideas.
- Ask students if there is more than one answer.

Test and Observe

- Turn on auto pause. As you play the feedback, stop the action as the partitions are being cut, and have students think about and describe what is happening.

Analyze and Learn

- Discuss the number created when the two fractions are added together.
- Have students name the two fractions represented by the two bars. Ask students: “How did you determine which cutter to select? Are the two fractions equivalent? What do they have in common? How do the two fractions compare?”
- Ask students: "What happens to the two fractions when they are cut by the number of partitions in the other fraction?"
- Prove that the denominator is the same and one of the bars represents one whole.
- Repeat with several puzzles from Levels 1 and 2.

Connect and Extend

- Show puzzles from Level 5.
- Discuss how this level compares to Level 4.
- Think about and discuss possible solutions.
- Discuss how to name the fractions after they are cut.
- Write an equation to compare the fractions before and after they are cut.
- Show puzzles from Level 6.
- Continue to discuss the fractions before and after they are cut and naming fractions.
- Discuss why they select the cutters they select each time.
- Write equations to represent the fractions that are being added.

How does the student:

- write equations and inequalities to compare fractions?
- discuss what happens to the numerator and denominator of the fractions when they are cut?
- compare original unit fractions to the fraction after it is cut?
- write an equation to compare fractions before and after they are cut?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Howard and Imani were given the same size tub of clay for their table in Art class. Each table had 4 students. Howard divided his clay into 4 equal size pieces. Imani divided her clay into 8 equal size pieces. Both tables fair shared all of their clay. Compare and contrast the clay students at each table received.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview*.*

Station 1: Small Group Instruction

- Create fractions from paper strips of the same length.
  - Use different colors for different fractions.
  - Use your fraction strips to compare the fractions: 1/2, 3/4, 6/8, 2/8, 3/2, and 9/4. You may work with a partner to have enough unit fractions to create some of these fractions.
  - Place each of these fractions on the number line you created in the last module.
- Discuss why students may or may not be able to place the strips along the line to plot the fractions.
- Select fractions similar to the fraction cards for students to place on a number line.
- Have students use different strategies from the chart to help them place the fractions and compare them to other fractions. OR
- Show puzzles from Fraction Order Fill. Have students use fraction strips, Cuisenaire rods or connecting cubes to compare fractions. Discuss ways to compare and order fractions. Chart any new strategies.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Equivalent Fraction Concentration or Multiplication Connect Four.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 2 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving comparing fractions and understanding equivalence.

Puzzle Talk: Estimate Fractions on a Number Line (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.¤ Provide students with a copy of Estimate Fractions Game Mat, 0–5 Number Line Math Mat, whiteboards/dry-erase markers.

Notice and Wonder

- Give students the Estimate Fractions Game Mat.
- Display the first puzzle in Level 2. Ask: “What do you notice? What do you wonder?” Allow a few students to share out.

Predict and Justify

- Have students model the puzzle and their solution on their game mat. Ask students to predict and explain where the rocket should go based on the given fraction, first sharing with a partner and then sharing whole group.

Test and Observe

- Select a student to show where the rocket will go. Watch the feedback.
- Ask students to explain what they learned from the feedback. Replay the puzzle, select the same answer, and click the screen once to pause. Ask students what the arrow means (e.g., for 3/5 the number line is divided into fifths. JiJi makes 3 jumps the size of 1/5 each on the number line).

Analyze and Learn

- Show the next puzzle. Have students use their game mat to show their prediction of where the rocket should land. Have students share their predictions with a neighbor.
- Discuss as a whole group the strategies students are using for locating a fraction on the number line. Discuss how they partition the number line and then locate the fraction.
- Have students mark the location of the fraction on the 0-5 Number Line Math Mat.
- Select some students to share their strategy. Solve the puzzle. Repeat with more Level 2 puzzles, as needed.

Connect and Extend

- Display the first puzzle in Level 4. Ask students: “How do these puzzles compare to the puzzles in Level 2?” Have students turn and talk to a neighbor about how the puzzles are different, and mark the location of the fraction on the 0-5 number line.
- Discuss strategies for locating the fraction on the number line and how students are identifying which two whole numbers the fraction is located between.
- Ask: "Is there another name for this fraction?" Focus your discussion on equivalent fractions, mixed numbers, and benchmarks on the number line.
- Repeat with the remaining puzzles in Level 4.

How does the student:

- use benchmarks to locate fractions (e.g., I know 1/2 is here, and this is between 1/2 and 1)?
- decide which whole numbers to locate a fraction between?
- explain fraction equivalence?
- use the number line to add/subtract and determine the location of fractions?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Draw a number line. Place the following fractions: 3/6, 7/8, 11/12, 8/6, 1/8, 3/4, 25/12, 6/3, 6/12, 6/5, 3/5, and 14/8 on the number line. Select three of the fractions you placed on the number line and explain how you determined where to place these fractions. Challenge yourself.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Create fractions from paper strips of the same length.
  - Use different colors for different fractions.
  - Use your fraction strips to compare the fractions: 1/2, 3/4, 6/8, 2/8, 3/2, and 9/4. You may work with a partner to have enough unit fractions to create some of these fractions.
  - Place each of these fractions on the number line you created in the last module.
- Discuss why students may or may not be able to place the strips along the line to plot the fractions.
- Select fractions similar to the fraction cards for students to place on a number line.
- Have students use different strategies from the chart to help them place the fractions and compare them to other fractions. OR
- Show puzzles from Fraction Order Fill. Have students use fraction strips, Cuisenaire rods, or connecting cubes to compare fractions. Discuss ways to compare and order fractions. Chart any new strategies.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Equivalent Fraction Concentration or Multiplication Connect Four.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 2 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving comparing fractions and understanding equivalence. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Fraction Order Fill (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Show a puzzle from Level 1. Ask students: “What do you notice about the three fractions shown? How are they the same? How are they different?”

Predict and Justify

- Have students predict how to solve the puzzle and share their prediction with a neighbor. Ask: "Did your predictions match? What strategies did you use?"

Test and Observe

- Have students share out predictions. Try one of the students’ ideas. Ask students to reflect on how the feedback compares to their predictions.

Analyze and Learn

- Discuss the role of the numerator and denominator. Say to students: “If all of these fractions have the same denominator, how can we use the numerator to compare them?”
- Show the next puzzle. Have students think, pair, share with a partner and record the order of the fractions from least to greatest on their whiteboards. Try a student’s solution and watch the feedback.
- Pause the puzzle before JiJi crosses the screen. Say to students: “How could we represent our solution to this puzzle using a number sentence?” Model how to write a number sentence using <, > and/or = (e.g., 1/2 >1/7>1/8).
- Repeat with additional puzzles in Level 1.
- Display the first puzzle in Level 2.
- Ask students: “What do you notice about the three fractions shown? How are they the same? How are they different?” Discuss the role of the numerator and denominator. Say to students: “If all of these fractions have the same numerator, how can we use the denominator to compare them?”
- Repeat with additional puzzles in Level 2.
- Display the first puzzle in Level 3. Ask students what they notice about the fractions in the puzzle. Ask students: “How can you compare fractions with different denominators?”
- Have students use what they have learned to order the fractions. Discuss students’ strategies (e.g., Did they change the 1 to a fraction? Represent the fraction with a denominator of 1? Did they make a model to find a common denominator?).
- Repeat with additional puzzles in Level 3.

How does the student:

- discuss the role of the numerator to compare fractions and order them from least to greatest?
- discuss the role of the denominator to compare fractions and order them from least to greatest?
- represent the solution by writing a number sentence?
- compare fractions with unlike denominators?
- explain their strategy for finding a common denominator?
- represent 1 as a fraction?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Table Games (15-20 minutes)

During this time you will introduce Number Line Fraction Bingo and Final Countdown. Students will play these games in the next module in Station 3.

- Introduce one of the Table Games.
- After explaining the game and playing it with the whole group, give students time to play it on their own.
- After they play the game, have them discuss:
  - What math did they learn or use?
  - What strategies did they try to win the game?
- Repeat with the second game.

Problem Solving - Optional, if time

Problem of the Day

- Isabella baked a pan of lasagna for her family of 4. She cut the lasagna into 8 equal pieces. Explain how much lasagna each family member might eat. Write equations/inequalities to compare how much each family member ate. Find at least three different ways the family could share the lasagna.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz. (optional)
- Have students review their ST Math Puzzle Reflection, Exit Tickets, and Problem Solving work.
- Engage students in discussions about what they have learned in this module, what they have questions about, and what they would like to learn more about.

Grade 4 | Module 2 | Day 5

Design Challenge: Whole Group (40 minutes)

Change the Game

- Have students select one of the games they played in the last module and replay it.
- After playing the game, have students discuss how they would change the game.
- Students make the changes and then try playing the game with their changes.
- **Facilitate a group discussion:** Have groups share how they changed the game.
  - How did the changes in the rules affect game play?
  - Did they like them? Did they not like them?
  - Did it make it easier or harder?

Share Game Mock Ups

- Have each Design Group share their Game Mock Up from Page 38 in the Design Challenge Booklet: Game Name, Description, and why they chose the game.
- If groups aren't finished with this page they can share the ideas they have so far or wait to share later.

Importance of Rules

- **Discussion:** Why are rules important?
  - Ask students to describe things that we have rules for and why rules are important.
  - How do rules impact gameplay?
  - What if we didn't have rules?
- **Design Challenge Booklet: Rules Challenge (Page 39)**
  - Discuss the game Tic-Tac-Toe. Remind students that Traffic Lights Tic-Tac-Toe is a modified version of Tic-Tac-Toe.
    - What are the rules of the game?
    - Play a game or two of Tic-Tac-Toe as a whole class to make sure that students understand how it is played. Students could also play a game with a partner.
- **Write the Rules:**
    - Page 39: Have the students draw a Tic-Tac-Toe grid and write the rules in their booklets.
    - Remind students it is important to write rules that are clear and easy for the players to understand.
    - Share: Have several students share the rules they wrote out and talk about which are the most clear and easy to understand.
- **Change the Rules:**
    - Working in teams of two, have the students change one rule for Tic-Tac-Toe, write the new rule, and play the game using that rule.
    - Write the new rule on Design Challenge Booklet Page 39, Box 2.
    - Share out rules and discuss how gameplay was affected by their new rule.
    - Write the reflection on the new rules in Design Challenge Booklet Page 39, Boxes 3-4.
    - Reiterate the importance of having clear rules.

Game Design Small Groups (20 minutes)

Step 4: Plan - Game Blueprints

Inform the students that writing rules is only part of what they need to plan for their game. Next they will work on the Blueprints for their game.

- **Define "Blueprint":** Ask students if they know what a "Blueprint" is. Discuss. (You could pull up pictures of blueprints for a building.)
- **Design Challenge Booklet Pages 40-43: Game Blueprint**
  - Review pages 40-43 in the Design Challenge Booklet with the students.
  - Explain that blueprints allow them to plan out each part of their game so that it is easier to build. Today they will be working on their blueprints, creating a sketch of their game, and writing their rules.
  - **Thinking about Jobs:** Share with students that next week they will begin assigning jobs to team members to build their game. As they make their blueprint, they can start to think about who will have the job of making the game board, who will make the game cards or game pieces, who will write out all the rules that the group decides on, etc. It is important that everyone in the group helps build the game.
  - **Small Group Design Time:** After reviewing the booklet with the students, give them time to begin their blueprints.

Focused Instructional Time (20 minutes)

- After students complete the Small Group Design task, the remaining time is used for "Focused Instructional Time." There is also an optional ST Math Activity Page that could be done in small or whole group.
- The teacher can assign the activity or allow student choice:
  - **Individual or small group** - Teacher pulls small groups or individual students to work on a specific skill they struggled with during the week or support students on an ST Math puzzle they are stuck on.
  - **Table Games** - Students can choose a Table Game to play with a partner or small group.
  - **ST Math 1:1** - Students can continue to play ST Math.

Optional: ST Math Activity Page: Estimate Fractions on a Number Line

- **Play the game**
  - Project the game.
  - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: Estimate Fractions on a Number Line**
  - Distribute the Activity Page.
  - Ask students what they notice about the content on the page. What do they wonder? Where do they want to start on the page?
  - Give them time to complete the page.
  - Discuss the page and have students share their thinking.
  - Take the time to compare strategies, and have students share their work.
  - Make connections to the game.

ST Math
Summer Immersion

Grade 4 | Module 3

Topic: Adding and subtracting fractions and mixed numbers

Module 3 Resources

Students work with area models and number line models to add and subtract fractions and mixed numbers. Students use a number line to represent addition and subtraction of fractions as jumps to the right or left. They relate this to addition and subtraction of whole numbers. Students solve rich problems involving addition and subtraction of fractions.

Module 3 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **Grades 3-5 Table Games**
  - Number Line Fraction Bingo
  - Final Countdown
  - *Traffic Lights Tic-Tac-Toe (optional)*
  - *Dara (optional)*
  - *Equivalent Fraction Concentration (optional)*
  - *Multiplication Connect Four (optional)*
  - Race to 2 (Day 4)
  - Five for Twenty-Five (Day 4)
- **Game Mats**
  - Pie Monster Game Mat
- **Problem Solving Journal** (pages 16–21)
  - My Thinking Path
  - Problem of the Day
  - Exit Tickets
  - ST Math Reflections

Optional Printed Resources

- Accomplishment Log
- ST Math Activity Pages
- Pre/Post Quizzes

Teacher Resources

- Teacher Planner

Immersion Slide Deck (slides 28–40)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies for Table Games (per group)

- **Number Line Fraction Bingo** - 1 set of fraction cards, number line for each player, 4 centimeter cubes for each player
- **Final Countdown** - deck of cards, 3 game pieces per player to be used as Multiplication Chips

My Thinking Path

- Daily reflection time for students on adding and subtracting fractions and mixed numbers.

ST Math Puzzle Talks

- Alien Bridge
- Scale Fraction Addition and Subtraction
- JiJi Cycle Select Basket
- Pie Monster

Problem Solving

Day 1:

- **Problem of the Day** - Keyton wanted to make 2 gallons of punch to take to the school picnic. He found a recipe that called for 3/4 gallon of fruit punch, 2 quarts of orange juice, 3 quarts of lime soda, and 1/2 gallon of water. If Keyton makes this recipe, will he have as much punch as he wants? Justify your solution.

Day 2:

- **Problem of the Day** - Fill in the blank with the correct symbol (i.e., >, <, =) for this equation/inequality: 3/6 + 4/6 _____ 2/3 + 2/3. Explain how you determined the symbol to use. Then use a number line to compare these two addition expressions.

Day 3:

- **Problem of the Day** - Joan and Brett were decorating picture frames for a class store project. They needed 3 1/4 feet of ribbon to decorate all their frames. Joan had 2 1/2 feet of ribbon but used 3/4 of a foot of her ribbon for another project. Brett had 2 3/4 feet of ribbon but used 5/4 of a foot of his ribbon for another project. Do they have enough ribbon for their project? Justify your solution.

Day 4:

- **Problem of the Day** - Iris and her brother needed 2 1/2 bags of popcorn kernels to make enough popcorn to sell at the school bake sale. Iris had 1 1/4 bags and her brother had 1 3/8 bags. Do they have enough bags of popcorn kernels? Explain how you know.

Instructional Stations

On Days 1–4, each student will visit two stations per day following the schedule in the Instructional Stations Overview.

Station 1: Small Group Instruction

- Have students decompose fractions into sums of fractions.
  - Discuss how decomposing fractions can help them add and subtract fractions. 8/8, 5/4, 7/2, 6/10
- Work with students in small groups discussing the *Enough Ribbon* problem (POD Day 3).

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Number Line Fraction Bingo or Final Countdown.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 3 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic, “Adding and subtracting fractions and mixed numbers.”
- Have students work on the My Thinking Path page in their journals.
- Discuss their ideas, and allow students to add any additional thoughts they have to their paper.
- Have students complete the Pre-Quiz (optional).

Puzzle Talk: Alien Bridge (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What is the name of each fraction in the alien ship?" Allow a few students to share out.
- Move the cursor along the bottom of the puzzle, and ask: "What is happening as we move the cursor? What does the denominator tell us? The numerator? How do you know which denominator to choose?"

Predict and Justify

- Have students make a prediction about how they will solve the puzzle. Student should think-pair-share their prediction.
- Allow some students to share whole group and discuss.

Test and Observe

- Try one of the student’s solution strategies. Before trying the strategy, discuss it with the other students (agree/disagree; what do they think will happen?).

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction. What did the feedback tell them? How many total equal pieces do we have? Do we have more or less pieces than we started with? Why or why not?
- Show the next puzzle. Say to students: “Name the two fractions you see in the alien ships on your whiteboard. What do you think happens when we add these two fractions together?"
- Try one of the students' solution strategies. Pause the animation and discuss.

Connect and Extend:

- Say to students: “The denominator is the cutting number. It tells us how many equal pieces our whole has been cut into. How many equal pieces has each of the circles been cut into? What should our denominator be?" Write the correct denominator.
- Display the whole addition equation, and read the equation out loud. (e.g., one third plus one third is two thirds). Ask students: “Why did the numerator change but the denominator did not? How is adding fractions like adding whole numbers? If we add 2 + 2 or 2/3 + 2/3, how are those the same and different?"
- Review the meaning of the numerator and denominator in the solution. Remind students that the numerator is the counting number and the denominator is the cutting number.
- Repeat with the remaining puzzles in Level 1.

How does the student:

- name the fractions in the alien ship?
- explain the role of the numerator and denominator?
- discuss different strategies for solving the puzzles?
- discuss counting by unit fractions and the similarity to adding whole numbers?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Keyton wanted to make 2 gallons of punch to take to the school picnic. He found a recipe that called for 3/4 gallon of fruit punch, 2 quarts of orange juice, 3 quarts of lime soda, and 1/2 gallon of water. If Keyton makes this recipe, will he have as much punch as he wants? Justify your solution.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Have students decompose fractions into sums of fractions.
- Discuss how decomposing fractions can help them add and subtract fractions such as: 8/8, 5/4, 7/2, 6/10.
- Work with students in small groups discussing the *Enough Ribbon* problem (POD Day 3)
- First give them a chance to redo their work. (Do not erase or cross out original work. Just draw a line and start the new work.)
- Discuss any misconceptions students exhibited in their work.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Number Line Fraction Bingo or Final Countdown.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 3 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving adding and subtracting fractions and mixed numbers.

Puzzle Talk: Scale Fraction Addition and Subtraction (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder?" Allow a few students to share out.

Predict and Justify

- Have some students share their predictions.

Test and Observe

- Try a student's solution and watch the feedback. Talk with students about what happened as they solved the puzzle.
- Ask students to think about how what they saw happen compares to their prediction.

Analyze and Learn

- Replay the puzzle with the same solution. Pause the animation. Ask students to explain what is happening with the bars and the number line.
- Display the next puzzle. Ask students to write an equation to represent the bars at the top and then solve the puzzle. How does the model (bars) relate to the number line? What are some things you need to understand about unit fractions to be able to solve this puzzle? How did you know where to place the dot on the number line?
- Have students share their answers and strategies. Ask students if whether whole numbers or fractions need to be answered first. Either answer is fine, if the student can justify it. Solve the puzzle. How does the model (bars) relate to the number line? What are some things you need to understand about unit fractions to be able to solve this puzzle?
- Continue with some puzzles from Level 2.
- Discuss how this puzzle is similar/different from the previous level. Try to show a few incorrect solutions, and discuss why.

Connect and Extend

- Display the first puzzle in Level 3. Ask: "How is this puzzle different from the ones we just solved? How can you use what you know from the other puzzles to help you solve this one?" Have students think, ink (write their solution), pair, share.
- Share students' solutions. Discuss their strategies for subtracting fractions.
- Ask students to write an equation to represent what is happening with the bars. Repeat with the remaining puzzles in Level 3, pushing them to evaluate how adding and subtracting whole numbers compare to adding and subtracting fractions.

How does the student:

- explain the fractions they see in the visual model? (Can they see wholes and parts in the model? On the number line?)
- understand the relationship between mixed numbers and fractions greater than 1? (Do they understand that 1 ¼ would be ¼ + ¼ + ¼ + ¼ + ¼?)
- represent addition and subtraction on the number line?
- explain the relationship between the visual model representation and the number line representation?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Fill in the blank with the correct symbol (i.e., >, <, =) for this equation/inequality: 3/6 + 4/6 _____ 2/3 + 2/3. Explain how you determined the symbol to use. Then use a number line to compare these two addition expressions.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview*.*

Station 1: Small Group Instruction

- Have students decompose fractions into sums of fractions.
- Discuss how decomposing fractions can help them add and subtract fractions such as: 8/8, 5/4, 7/2, 6/10.
- Work with students in small groups discussing the *Enough Ribbon* problem (POD Day 3)
- First give them a chance to redo their work. (Do not erase or cross out original work. Just draw a line, and start the new work.)
- Discuss any misconceptions students exhibited in their work.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Number Line Fraction Bingo or Final Countdown.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 3 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving adding and subtracting fractions and mixed numbers.

Puzzle Talk: JiJi Cycle Select Basket (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder?” Have students discuss first with a partner and then as a whole group.

Predict and Justify

- Discuss solution strategies. Have students discuss in pairs and then whole group solutions they want to try. Ask students to visualize what they think will happen. Have some students share their predictions.

Test and Observe

- Try a student’s solution, and watch the feedback. Talk with students about what happened as they solved the puzzle.

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction.
- Replay the puzzle with the same solution. Pause the animation. Ask students to explain what is happening with the cycle and the number line.
- Display the next puzzle. Ask students to write an equation to represent the wheels. How did you know where to place the basket on the number line?
- Have students share their answers and strategies. Ask students if whole numbers or fractions need to be answered first. Either answer is fine, if the student can justify it. Solve the puzzle. How does the model (wheels) relate to the number line? What are some things you need to understand about unit fractions to be able to solve this puzzle?
- Continue with some puzzles from Level 2.
- Discuss how this puzzle is similar/different from the previous level. Try to show a few incorrect solutions and discuss why.

Connect and Extend

- Display the first puzzle in Level 3. Ask: "How is this puzzle different from the ones we just solved? How can you use what you know from the other puzzles to help you solve this one? Have students think, ink (write their solution), pair, share."
- Share students’ solutions. Discuss their strategies for subtracting fractions.
- Ask students to write an equation to represent what is happening with the bars. Repeat with the remaining puzzles in Level 3, pushing them to evaluate how adding and subtracting whole numbers compare to adding and subtracting fractions.

How does the student:

- name the fractions shown in the puzzle?
- determine whether the puzzle is an addition or subtraction situation?
- show the action of adding and subtracting fractions as jumps on a number line?
- write equations to represent the puzzle?
- write fractions greater than one as fractions and mixed numbers?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Joan and Brett were decorating picture frames for a class store project. They needed 3 ¼ feet of ribbon to decorate all their frames. Joan had 2 ½ feet of ribbon but used ¾ of a foot of her ribbon for another project. Brett had 2 ¾ feet of ribbon but used 5/4 of a foot of his ribbon for another project. Do they have enough ribbon for their project? Justify your solution.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Have students decompose fractions into sums of fractions.
- Discuss how decomposing fractions can help them add and subtract fractions such as 8/8, 5/4, 7/2, 6/10.
- Work with students in small groups discussing the *Enough Ribbon* problem (POD Day 3)
- First give them a chance to redo their work. (Do not erase or cross out original work. Just draw a line, and start the new work.)
- Discuss any misconceptions students exhibited in their work.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Number Line Fraction Bingo or Final Countdown.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 3 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving adding and subtracting fractions and mixed numbers. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Pie Monster (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.¤ Provide students with a copy of Pie Monster Game Mat and whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder?"

Predict and Justify

- Ask students, "What do you think you need to do to solve this puzzle?" Have them model the puzzle and their solution on their game mat.
- Allow a few students to share out how many pies the Pie Monster needs.
- Have students think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work. What do they think will happen if they don't choose the right amount of pies?

Test and Observe

- Select one of the students' strategies. Ask the students to think about if they agree or disagree with the strategy and why.
- You may also ask students turn to their neighbor and make a story about the Pie Monster for the current puzzle.

Analyze and Learn

- Play the feedback. Ask if it was it what they were expecting. If not, ask if this affects their strategy to try again.
- Solve additional puzzles from Level 1. Be sure to analyze the feedback in both correct and incorrect solutions.
- Show a puzzle from Level 2. Have students discuss what they notice with a partner.

Connect and Extend

- Select a puzzle or two from Level 3 for students to represent on their Pie Monster Game Mat. Discuss the fractions in it, and ask: "Is this an addition or subtraction situation? How do you know? Can you represent this puzzle with an equation?"
- Show a puzzle from Level 4, and how it compares to Level 3. Discuss the fractions for each and have students represent the puzzles with equations. What fraction of pies is on the conveyor belt (i.e., 0/3 or 0/4)? What equation can they write?

How does the student:

- explain the fractions they see in the visual model?
- name the fractions shown in the puzzle?
- determine whether the puzzle is an addition or subtraction situation?
- understand the relationship between mixed numbers and fractions greater than 1? (Do they understand that 1 ¼ is ¼ + ¼ + ¼ + ¼ + ¼?)

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Table Games (15-20 minutes)

During this time you will introduce Race to 2 and Five for Twenty-Five. Students will play these games in the next module in Station 3.

- Introduce one of the games.
- After explaining the game and playing it with the whole group, give students time to play it on their own.
- After they play the game, have them discuss:
  - What math did they learn or use?
  - What strategies did they try to win the game?
  - Repeat with the second game.

Problem Solving - Optional, if time

Problem of the Day

- Iris and her brother needed 2 1/2 bags of popcorn kernels to make enough popcorn to sell at the school bake sale. Iris had 1 1/4 bags, and her brother had 1 3/8 bags. Do they have enough bags of popcorn kernels? Explain how you know.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz (optional).
- Have students review their ST Math Puzzle Reflection, Exit Tickets, and Problem Solving work.
- Engage students in discussions about what they have learned in this module, what they have questions about, and what they would like to learn more about.

ST Math
Summer Immersion

Grade 4 | Module 3 | Day 5

Design Challenge: Whole Group (~ 20 minutes)

*Note that most of the time today will be spent working on creating games.

Introduction:

- Review the Design Process Poster and identify what step you are on in the process.
- Last week we finished Step 4: Plan and this week we will focus on Step 5: Create.

Share Blueprints & Sketches:

- Give each group a few minutes to review their Game Design from Pages 40-43 in the booklet. They should identify one person to share about their game with the group.
- Each group should share an update about their game and let the class ask questions and give feedback.

Step 5: Create - Brainstorm Jobs

- As a class brainstorm a list of jobs they could have on their team.
- The rest of the time today will be spent working on Step 5: Creating their game.
  - Note: If students haven't finished their blueprints they should do that first.
- Groups should work together to fill out Game Design Booklet Page 44 and decide on the job role and team members.
  - Students can start building their games after they share their blueprints and job assignments with their teacher.

Game Design Small Groups (~ 40 minutes)

Once students have had their blueprints and job assignments (Pages 40-44) approved by the teacher they can spend the rest of the Game Design time building their games.

*If students don't finish creating their games today you may want to consider allowing them to work on them throughout the following week.

Focused Instructional Time (20 minutes)

- After students complete the Small Group Design task, the remaining time is used for “Focused Instructional Time." There is also an optional ST Math Activity Page that could be done in small or whole group.
- The teacher can assign the activity or allow student choice:
  - **Individual or small group -** Teacher pulls small groups or individual students to work on a specific skill they struggled with during the week or support students on an ST Math puzzle they are stuck on.
  - **Table Games -** Students can choose a Table Game to play with a partner or small group.
  - **ST Math 1:1 -** Students can continue to play ST Math.

Optional: ST Math Activity Page: Scale Fractions

- **Play Scale Fractions:**
  - Project the game.
  - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: Scale Fractions**
  - Distribute the Activity Page.
  - Ask students what they notice about the content on the page. What do they wonder? Where do they want to start on the page?
  - Give them time to complete the page.
  - Discuss the page and have students share their thinking.
  - Take the time to compare strategies, and have students share their work.
  - Make connections to the game.

ST Math
Summer Immersion

Grade 4 | Module 4

Topic: Multiplying fractions by whole numbers

Module 4 Resources

Students work with puzzles involving multiplication of a fraction by a whole number using area models and number line models. Students extend their understanding of multiplication to multiply a whole number by a fraction. Students solve rich problems involving multiplying a whole number by a fraction.

Module 4 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **Grades 3-5 Table Game Directions**
  - Race to 2
  - Five for Twenty-Five
  - *Traffic Lights Tic-Tac-Toe (optional)*
  - *Dara (optional)*
  - *Equivalent Fraction Concentration (optional)*
  - *Multiplication Connect Four (optional)*
  - *Number Line Fraction Bingo (optional)*
  - *Final Countdown (optional)*
  - Sudoku Puzzles (Day 4)
- **Problem Solving Journal** (pages 22–27)
  - My Thinking Path
  - Problem of the Day
  - Exit Tickets
  - ST Math Reflection

Teacher Resources

- Teacher Planner

Optional Printed Resources

- Accomplishment Log
- ST Math Activity Pages
- Pre/Post Quizzes

Immersion Slide Deck (slides 41–53)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies for Table Games (per group)

- **Race to 2** -1 set of fraction cards, number line 0 to 2 for each player, 1 small game marker for each player
- **Five for Twenty-Five** - 1 deck of cards

My Thinking Path

- Daily reflection time for students on multiplying fractions by whole numbers.

ST Math Puzzle Talks

- Alien Bridge
- Fraction Multiplication on the Number Line
- Crank Pies Fraction Multiplication
- Alien Bridge Symbolic

Problem Solving

Day 1:

- **Problem of the Day -** Kevin poured 16 glasses of water from a jug. Each glass held 1/8 cup of water. How much water was in Kevin's jug?

Day 2:

- **Problem of the Day** - Demarius made cupcakes for his sister's birthday. He made 34 cupcakes. If Demarius used 1/8 cup of icing on each cupcake, how much icing did he use?

Day 3:

- **Problem of the Day** - Carlos drinks 2/3 cup of milk at every meal and snack. How much milk does Carlos drink in one day if he eats breakfast, lunch, dinner, and an afternoon snack?

Day 4:

- **Problem of the Day** - Bev is knitting a scarf for her mother. She knits 1/3 of a foot every day. How long will it take her to knit 2 feet of the scarf? Write a multiplication equation to show how long it will take her to make a scarf 4 feet long.

Instructional Stations

On Days 1–4, each student will visit two stations per day following the schedule in the Instructional Stations Overview.

Station 1: Small Group Instruction

- Engage students in a math conversation about math concepts using a rich problem.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 4 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic: “Multiplying fractions by whole numbers.”
- Have students work on the My Thinking Path page in their journals.
- Discuss their ideas, and allow students to add any additional thoughts they have to their paper.

Puzzle Talk: Alien Bridge (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What do you think you need to do to solve this puzzle? What is the name of each fraction in the alien ship?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work.
- Select one of the students’ strategies. Ask the students if they agree or disagree with the strategy.

Test and Observe

- Try a student’s solution, and watch the feedback. Ask students to describe what happened.

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction. What did they learn from the feedback about what the numerator and denominator represent? How does this affect their strategy?
- Show the next puzzle. Ask: "What is known in this puzzle? What is unknown? How is this problem similar to multiplying whole numbers? How is it different?"

Connect and Extend

- Try a student’s solution. Pause the puzzle before JiJi crosses the screen. Ask students: “How could we represent what is happening in this puzzle using an equation?” Display the student’s equations and prove whether or not they match the puzzle. Repeat with additional puzzles in Level 1.
- Display the first puzzle in Level 2. Discuss how this puzzle compares to the Level 1 puzzles. Ask:" How could we represent this puzzle in an equation? What is known? What is unknown? How do we write the solution as a fraction? Have students use a ? to represent the unknown, write an equation, and then solve for the unknown." Share students' equations and solutions.
- Ask: "Is the sum greater than, less than, or equal to 1? How do you know? Is the sum a whole number? How do you know?" Discuss students’ strategies. How do the strategies compare to the strategies they use to multiply whole numbers? Repeat with additional puzzles in Level 2.
- Show a puzzle from Level 3. Ask: "What math story can we tell with this visual?"
- If time permits, repeat this activity allowing students to create their own story, either individually or with a partner.
- Students can pose their stories for their classmates to solve visually and symbolically.

How does the student:

- name the fraction in the alien ship and the fraction that represents the sum?
- determine whether the sum is greater than, less than, or equal to 1?
- explain the strategy they used to solve the puzzle?
- identify the known and unknown in the puzzle?
- represent the puzzle using an equation?
- compare multiplying a whole number by a whole number to multiplying a whole number times a fraction?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Kevin poured 16 glasses of water from a jug. Each glass held 1/8 cup of water. How much water was in Kevin's jug?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps JiJi shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
  - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used 1/8 (1/2, 1/4, 3/8) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 4 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers.

Puzzle Talk: Fraction Multiplication on the Number Line (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work. Then have students share out whole group

Test and Observe

- Try a student's solution, and watch the feedback. Ask students to describe what happened and if they agree or disagree with the strategy.

Analyze and Learn

- Ask students to think about how what they saw happen compares to what they thought would happen. What did they learn from the feedback? How does this affect their strategy?
- Pull up the next puzzle, and ask: "What does the problem mean at the top of the puzzle? How is multiplying fractions similar to multiplying whole numbers? How do you think we solve this puzzle?" Have students think, pair, share their ideas.
- Try a student's solution and watch the feedback. Say to students: "This problem said there were ___ groups of ___. JiJi counted out ___ of those pieces along the number line. Write the number where JiJi landed on your whiteboard."
- Ask students: "How did you determine where to put the rocket platform? How did you count along the number line? How many of the equal pieces did it take to make 1? How do you know?"
- Have students share their strategies. Repeat with additional puzzles in Level 1.

Connect and Extend

- Display the first puzzle in Level 2. Ask students: "Can you think of a story problem that this equation could represent?" Have a student turn and talk to a neighbor, and after some time, have some students share out.
- Solve additional puzzles in Level 2.

How does the student:

- write the solution as a fraction and mixed number?
- understand the relationship between addition and multiplication?
- place a fraction on a number line?
- explain how many equal pieces are needed to make 1?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Demarius made cupcakes for his sister's birthday. He made 34 cupcakes. If Demarius used 1/8 cup of icing on each cupcake, how much icing did he use?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps JiJi shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
  - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used 1/8 (1/2, 1/4, 3/8) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 4 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers.

Puzzle Talk: Crank Pies Fraction Multiplication (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?” Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After some think time, do think-pair-share and then ask some students to share out their strategies whole group.

Test and Observe

- Select one of the students’ strategies and discuss if students agree or disagree with the strategy and why.

Analyze and Learn

- Try a student’s solution, and watch the feedback. Ask students to describe what happened and think about what they saw happen. What did they learn from the feedback? Will they change their strategy?
- Pull up the next puzzle. Ask: "What is happening in this equation? What do we know about multiplying whole numbers that can help us solve this problem?"
- Move the cursor over the fraction circles at the bottom, and ask students: “Which denominator should we choose? How do you know?” Share students’ thinking.
- Choose the correct denominator, and then ask: “How many shaded equal parts do we need in all? Why?” Connect the multiplication number sentence to a repeated addition number sentence and say to students, “If this problem says we have ___ groups of ___, how many total pieces do we need?”
- Move the cursor over the shaded pieces and count the pieces needed. Before clicking to solve the puzzle, ask students to record the solution as an equation on their whiteboards (e.g., 3 x 1/3 = 3/3 or 1/3 + 1/3 + 1/3 = 3/3).
- Repeat with additional puzzles in Level 1.
- Display the first puzzle in Level 2. Ask: "How is this puzzle different from the ones we just did?" Choose the denominator together and then move the cursor over the shaded pieces and count the pieces needed.
- Before clicking to solve the puzzle, ask: "What do you notice about the fraction that is our answer? What does it tell us if the numerator is bigger than the denominator?"

Connect and Extend

- Ask students to record the solution as an equation on their whiteboards (e.g., 2 x ¾ = 6/4). Ask students to record the solution as both a fraction and a mixed number. Have students write the solution as both a fraction and a mixed number. Have students explain why the fraction and mixed number are equal.
- Repeat with additional puzzles in Level 2.

How does the student:

- determine the number of partitions (denominator) needed in the pies?
- determine how many shaded equal pieces to select?
- write an equation to represent the puzzles?
- write the solution as a fraction and mixed number?
- understand the relationship between addition and multiplication?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Carlos drinks 2/3 cup of milk at every meal and snack. How much milk does Carlos drink in one day if he eats breakfast, lunch, dinner, and an afternoon snack?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes per station). See Instructional Stations Overview.

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Fraction Multiplication on the Number Line*.
- Use the Problem Solving Process to discuss the game with the group.
- Have students draw a number line and show the steps JiJi shows to represent the multiplication on the number line.
- Discuss what is happening with each move.
- Relate whole number times a fraction multiplication to repeated addition of fractions and to whole number multiplication.
- Work with students on problems similar to the Problem of the Day. Use alternative number selections in the problem.
  - Wanda made cupcakes for her sister's birthday. She made 14 (10, 20, 16) cupcakes. If Wanda used 1/8 (1/2, 1/4, 3/8) cup of icing on each cupcake, how much icing did she use?
- Have students show the jumps on a number line.
- Discuss the number of jumps and the size of each jump.
- What do each of these represent in the equation?

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Puzzle Reflection and Accomplishment Log.

Station 3: Table Games

- Select Race to 2 or Five for Twenty-Five.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

ST Math
Summer Immersion

Grade 4 | Module 4 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving multiplying fractions by whole numbers. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Alien Bridge Symbolic (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with fraction tools and whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: "What do you notice? What do you wonder?" Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work. Compare the circles in the sky to the circles selected at the bottom.

Test and Observe

- Try a student's solution, and watch the feedback. Ask students to describe what happened after choosing the denominator and the numerator. What is being multiplied?

Analyze and Learn

- Ask students to think about how what they saw happen compares to what they thought would happen. What did they learn from the feedback? How does this affect their strategy?
- Show a puzzle from Level 2, and ask how this is different from Level 1. What fraction can we write to represent the circle inside the ship?

Connect and Extend

- Open another Level 2 puzzle, and ask students to write an addition sentence that would show what happens with the animation. Can you write your answer as a fraction and a mixed number (e.g., 3 x 2/3 = 2/3 + 2/3 + 2/3 = 6/3 or 2 whole circles)?
- Then, display the first puzzle in Level 5. Ask students what is unknown in this puzzle compared to the other puzzles we have solved. Say to students, "The unknown in this puzzle is the group size, but we do know how many groups we have and the total number. Work with a neighbor to write a number sentence and find the missing whole number."
- Have students use their fraction tools to work together to solve the puzzle. Share student's strategies and solutions. Ask students: "How did you know what denominator to choose? Why does the denominator stay the same when we multiply?"
- You may repeat with the remaining puzzles in Level 5.

How does the student:

- determine the correct denominator?
- determine the correct numerator?
- find the total number of shaded pieces?
- represent the puzzle and solution with an equation?
- write a number as both a fraction and a mixed number?
- connect multiplication of fractions to multiplication of whole numbers?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Table Games (20 minutes)

During this time you will introduce JiJi Sudoku. Students will play these games in the next module in Station 2.

- Introduce JiJi Sudoku using the simple picture game boards.
- Allow students to work together to solve the picture puzzles.
- If there's time, explain that Sudoku is usually played with numbers and share one or two of the additional numeric Sudoku puzzles.

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Bev is knitting a scarf for her mother. She knits 1/3 of a foot every day. How long will it take her to knit 2 feet of the scarf? Write a multiplication equation to show how long it will take to make a scarf 4 feet long.
  - Compare the two arrays you drew. How are they alike? How are they different?

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz. (optional)
- Have students review their ST Math Puzzle Reflection, Exit Tickets, and Problem Solving work.
- Engage students in discussions about what they have learned in this module, what they have questions about, and what they would like to learn more about.

ST Math
Summer Immersion

Grade 4 | Module 4 | Day 5

Design Challenge: Whole Group (40 minutes)

*Note: If students have not finished creating their games you may want to give a set amount of time at the beginning to allow them to finish.

Materials: For this activity you will need to print copies of the Game Tester Report (English | Spanish). Each student will need 2-3 copies of the Game Tester Report.

Introduction:

- Today we are going to reflect on and analyze our games and then have classmates play our games and give feedback. We will also create an advertisement for our game.
- Discuss Feedback - why is it important in design? What can be tricky about feedback?
  - Prepare students that there may be some changes needed to their games and that might not feel great, but it's an important part of the design process.

Warm-up: Analyze your Game

- First we will reflect on and analyze our own game
  - Groups should complete Design Challenge Booklet Page 45.

Step 6: Test - Watching others play your prototype

For this step you will create new groups of 4-5 students with one or two students from different Game Design Groups. Students test playing the game of one of the group members while the Game Designers watch.

- **Explain:** Clearly lay out the activity to students and divide them up into "Game Testing Groups."
  - This is when students test the games, get feedback, and then see what else they need to do to improve their games.
  - Preview the "Game Tester Report" and discuss the examples of good and bad feedback at the top of the page.
- **Play:** Give students 10-15 minutes to play a game.
  - When students are done playing the game, ask them to rate the game using the Game Tester Report.
  - Rotate the games, so each group will get a new game. Have students play that game and then complete a feedback sheet.
  - Students can share their feedback with the Game Designer.
  - As students are playing games, monitor student gameplay and use facilitation questions to help support their thinking about games and about math.

*Students will continue this activity back in their Game Design Small Groups next.

Game Design Small Groups (20 minutes)

Reflect on Feedback

- **Review Feedback: Game Feedback Form (Page 46)**
  - Students should review the feedback collected from the Game Tester Reports.
  - Have students answer the Game Feedback Form on Design Challenge Booklet Page 46.
- **Make Adjustments: Reflecting on Improvement (Page 47)**
  - Fill out Design Challenge Booklet Page 47 together and decide what improvements they want to make.
  - Design Groups should revise their games and ask another classmate to play it again if needed.
- **Optional: Create an Advertisement**
  - If students complete their game improvements and have some extra time they can use Design Challenge Booklet Page 48 to plan how they will share their game and create an advertisement.
  - The advertisement should describe their game, the math students learn from it, and why people should play it.

* There is time built in during Module 5 to complete games if students do not finish.

Focused Instructional Time (20 minutes)

- After students complete the Small Group Design task, the remaining time is used for “Focused Instructional Time." There is also an optional ST Math Activity Page that could be done in small or whole group.
- The teacher can assign the activity or allow student choice:
  - **Individual or small group** - Teacher pulls small groups or individual students to work on a specific skill they struggled with during the week or support students on an ST Math puzzle they are stuck on.
  - **Table Games** - Students can choose a Table Game to play with a partner or small group.
  - **ST Math 1:1** - Students can continue to play ST Math.

Optional: ST Math Activity Page: Alien Bridge

- **Play the Game:**
  - Project the game.
  - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: Alien Bridge**
  - Distribute the Activity Page.
  - Ask students what they notice about the content on the page. What do they wonder? Where do they want to start on the page?
  - Give them time to complete the page.
  - Discuss the page and have students share their thinking.
  - Take the time to compare strategies, and have students share their work.
  - Make connections to the game.

ST Math
Summer Immersion

Grade 4 | Module 5

Topic: Write and compare decimal fractions

Module 5 Resources

Students use a number line and hundred grid to represent and compare fractions and decimals.

Module 5 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **Problem Solving Journal** (pages 28-30)
  - My Thinking Path
  - Problem of the Day
- **Mini-Math Game Design Booklet**
- **ST Math Immersion Debriefing Bookmark**
- **Learning Showcase & Celebration Invitation**

Optional Printed Resources

- Accomplishment Log
- ST Math Activity Pages
- Post-Assessment
- Pre/Post Quizzes

Teacher Resources

- Teacher Planner
- Reflection Poster Guide
- Mini-Math Game Design Guide
- Learning Showcase and Celebration Guide

Immersion Slide Deck (slides 76–91)

- The Immersion Slide Deck is intended to be projected to the class in a whole group setting.

Supplies needed for students

- 1 poster board or large sheet of construction paper per student.
- Various supplies to create Mini-Math Game.

My Thinking Path

- In this module, students reflect on the relationship between fractions and decimals.

ST Math Puzzle Talks

- Fractions and Decimals Grid and Number Line Trap

Problem Solving

Note: Students will only complete Problem Solving on Day 1 & Day 2 of this module.

Day 1:

- **Problem of the Day**- Barry had $4.00. He earned $2.75 a day for 5 days taking care of his neighbor's dog. How much money does he have now? Use a number line to show how much money Barry has now.

Day 2:

- **Problem of the Day**- Loretta keeps time for each lap she runs around a track. The first lap she ran in 1.83 minutes. The second lap she ran in 1.9 minutes. She ran for three laps. Her total time for the three laps was 4.48 minutes. How long was her third lap?

Instructional Stations

Students will only have Instructional Stations on Day 1 & 2 of this module and will only have 2 stations. Use this time to give the Post-Assessment and/or Quizzes. They should rotate through both stations each day.

Station 1: Small Group Instruction

- Administer the Post-Assessment and/or Quizzes.
- Students will review Problem Solving Journal.
- Begin discussion around Reflection Poster and Mini-Math Game Design.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.
- With 5 minutes left, have students stop playing and complete their Accomplishment Log.

Day 3 Thinking and Reflecting Time

Reflection Poster

- Students are going to create a poster that represents the learning they have gained. The poster should reflect how their thinking and understanding have grown. It should be an opportunity for students to show what they know.
- Work with students to review the thinking they have recorded in their Problem Solving Journal (My Thinking Path, Problem of the Day, Exit Tickets, and ST Math Puzzle Reflections) and discuss what they have learned during Immersion.

Option 1: If you did the Game Design Challenge

Students will complete their games and participate in Focused Instructional Time.

Option 2: If you did not do Game Design Challenge

Mini Game Design:

Students will create a game similar to the Table Games they have played throughout the program.

- Use the slide deck and Mini-Game Design Booklet to guide students through the process. They will begin with brainstorming games they are familiar with and end by working in small groups to create a game.

Day 4 & Final Day

The Learning Showcase and Celebration occurs on the final day of ST Math Immersion. It will serve as a time for students to showcase their learning. It will also serve as a debrief as students share their projects and respond to questions from those attending the event.

- Parents, board members and community partners can be invited to attend. This is a great opportunity for students to showcase their learning from the Immersion program.
  - Provide students time to make any final adjustments to their game and notes for the presentation of their games.
  - Have groups present their posters and introduce their games to the class.
  - Provide an opportunity for the students to play each other's games.
  - Provide each visitor with an Immersion Debriefing Bookmark of questions to ask the students.

ST Math
Summer Immersion

Grade 4 | Module 5 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic: “Write and compare decimal fractions.”
- Have students work on the My Thinking Path page in their journals.
- Discuss their ideas, and allow students to add any additional thoughts they have to their paper.
- Have students complete the Pre-Quiz (optional).

Puzzle Talk: Fractions and Decimals Grid (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.¤
Provide students with the copies of the Hundred Grids Math Mat and whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?” Allow a few students to share out.

Predict and Justify

- Have students make a prediction about how many blocks to select in the grid. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work.

Test and Observe

- Select one of the students’ strategies, and test. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy?

Analyze and Learn

- Ask students to think about how what they saw happen compares to what they thought would happen. What did they learn from the feedback? How does this affect their strategy? When you shade in the hundred grid, how do you know what number to put as the numerator/denominator of the fraction?
- For the next few puzzles in Level 1, have students discuss the solution and solution strategies. What represents one whole on the hundred grid? One-tenth? One-hundredth? How do you know?

Connect and Extend

- Compare the different forms for writing the numbers. What would the fraction and decimal form be if the entire grid was shaded? What is the equivalent for this number (e.g., 40/100) if the denominator is 10? How might you write 40/100 using tenths and hundredths?
- Have students write equations for the problem where their solution is written as a decimal or fraction.
- Display the first puzzle from Level 2. Discuss how these puzzles compare to puzzles in other levels.
- Have students use the Hundreds Grid Mat. Have students show their solutions on their mat.
- Have students show and discuss the equation for the puzzle. Examine the animation, and give students a chance to compare the numbers and the grid.
- Have students write expanded forms of the numbers and compare to the decimal and fraction forms.
- Repeat with the other puzzles in Level 2.

How does the student:

- understand that the fraction and decimal forms of writing the numbers are equivalent?
- compare the different forms for writing the numbers, including expanded form?
- understand what the whole is in the numbers?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Barry had $4.00. He earned $2.75 a day for 5 days taking care of his neighbor's dog. How much money does he have now? Use a number line to show how much money Barry has now.

Instructional Stations (40 minutes)

Students will visit both stations today (20 minutes per station). Instructional Stations will only take place on the first two days of this last module.

Station 1: Small Group Instruction

- Work with students going through their journals, My Thinking Path, Exit Tickets, PODs, Puzzle Reflection, etc., and discuss what they have learned during ST Math Immersion.
- Discuss major concepts and vocabulary they learned and used during ST Math Immersion.
- Have students add to their journal as you discuss things they have learned but may have not yet included in their journal.
- This will prepare the students to complete their Reflection Poster on Day 3.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.

OR

- Have students solve the Sudoku puzzles.

ST Math
Summer Immersion

Grade 4 | Module 5 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about writing and comparing decimal fractions. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Number Line Trap (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Give students centimeter cubes to use to represent their solutions.

Notice and Wonder

- Display the first puzzle in Level 1. Ask: “What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?” Allow a few students to share out.

Predict and Justify

- Have students make a prediction. After they have had some think time, have them think-pair-share about what they would like to try, what will happen when they try it, and why they think it will work.
- Have students share out their predictions and related strategy.

Test and Observe

- Select one of the students’ strategies. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy? Watch the feedback, and ask students to describe what happened.

Analyze and Learn

- Ask: "Does this compare to your prediction? Do we need to change our strategy? How? How many tenths are needed to make 1? How many hundredths are needed to make 1?"
- Pull up another puzzle. Ask: "What do you know about the fraction in the sky? What do you notice about the number line? Where do you think you would place this fraction on the number line?"
- Have students think-pair-share solutions, and record them on their whiteboards. Try a student’s solution and ask some guiding questions again. You may repeat with additional puzzles in Level 1.

Connect and Extend

- Display the first puzzle in Level 2 with a denominator of 100. Say to students: “What do you notice about the denominator of this fraction and the tick marks on the number line?”
- Ask students to talk with a neighbor about where to place the fraction if the number line is not partitioned into parts equal to the denominator.
- Share students’ thinking. Try a student’s solution and watch the feedback. Pause to discuss the number of bars between the tick marks for tenths and hundredths.
- You may also want to use the annotation tool to highlight the relationship of tenths and hundredths. Ask students: “What do we know about the relationship between tenths and hundredths? How do they compare? How many tenths does it take to make 1? How many hundredths? How many hundredths does it take to make 1/10?”
- Solve additional puzzles in Level 2.

How does the student:

- determine where to place a fraction on a number line?
- determine where to place a decimal on a number line?
- explain the relationship between tenths and hundredths?
- write decimal and fraction forms of a number?

Problem Solving (20-25 minutes)

Engage students in problem solving discussions. Read and discuss the problem, share student work, compare strategies, and make connections.

Problem of the Day

- Loretta keeps time for each lap she runs around a track. The first lap she ran in 1.83 minutes. The second lap she ran in 1.9 minutes. She ran for three laps. Her total time for the three laps was 4.48 minutes. How long was her third lap?

Instructional Stations (40 minutes)

Students will visit both stations today (20 minutes per station). Instructional Stations will only take place on the first two days of this last module.

Station 1: Small Group Instruction

- Hand out the Post-Assessment and/or Post-Quiz to students.
- Begin a discussion around the Mini-Math Game Design students will be doing on Day 3.
- If students finish early, they can sign in and play ST Math puzzles or any of the Table Games.

Station 2: ST Math Puzzles

- Have students sign in and play ST Math puzzles.
- Remind students to use manipulatives and/or paper and pencil to help them solve problems.

OR

- Have students solve the Sudoku puzzles.

ST Math
Summer Immersion

Grade 4 | Module 5 | Day 3

Reflection Poster (20 minutes)

Students are going to create a Reflection Poster that represents the learning they have gained. The poster should reflect how their thinking and understanding have grown. It should be an opportunity for students to show what they know.

- With the whole class, brainstorm a list of all the things they have learned this summer. Record their ideas on chart paper.
- Discuss major concepts and vocabulary they learned and used during Immersion.
- Work with students to review the thinking they have recorded in their journals (My Thinking Path, Exit Tickets, PODs, Puzzle Reflection) and discuss what they have learned during Immersion.
- Have students add to their journal as you discuss things they have learned but may have not yet included in their journal. This will prepare the students to complete their poster.
- Ask students to work with their group to see what they might want to include on their poster.
- Instruct groups to make their posters colorful, interesting, and informative so students in other classes will see what they have accomplished in the past few modules.
- Give students time to work on their posters.
- The posters will be displayed for the entire school and families to see on Day 4.

The Reflection Poster is best done as a small group project because that allows students to engage in higher order thinking skills (e.g., evaluating their learning and the ideas of others, synthesizing their thoughts and the thoughts of others, reaching consensus, and working together). It can however, be done as an individual project. Have students consider their learning and make a poster to share it with others.

Optional: Assessments (20 minutes)

Use this time to give the Post-Assessment and/or Weekly Post-Quiz.

Mini Game Design or Finish Design Challenge (50 minutes)

Did you do the Game Design Challenge?

Yes, Go to:	**No, Go to:**
Finalize Game Designs (Dark Blue Section)	Mini-Math Game Design (Purple Section)

Option 1: Finalize Game Designs (50 minutes)

Game Design Groups: Final Touches

- Students should complete the final touches on their games.
- If they finish they can play each other's games or choose from the Focused Instructional Time.

Focused Instructional Time

The teacher can assign the activity or allow student choice:

- **Individual or small group** - Teacher pulls small groups or individual students to work on a specific skill they struggled with during the week or support students on an ST Math puzzle they are stuck on.
- **Table Games** - Students can choose a Table Game to play with a partner or small group.
- **ST Math 1:1** - Students can continue to play ST Math.

Option 2: Mini-Math Game Design (50 minutes)

Design Process (20 minutes)

During this time, students will be creating their own game. See Mini-Math Game Design Guide.

- Display the slide deck and have them complete the Mini-Math Game Design Booklet to guide them through the process.
- Brainstorm a list of games they have played. Include both the Table Games in Immersion and any other board game they are familiar with. Record the list on a whiteboard or chart paper.
- Take the opportunity to discuss the games that students have learned to play. Compare and contrast the games and share opinions, strategies, and experiences. Discuss the impact any of the games have had on the games students are designing.
- When thinking about the game they would like to design, ask students what math concepts they will include.

Making the Game (30 minutes)

During this time, students will be making their game.

- As students are designing their game, they should decide on a game name, directions, and rules for their game.
- Students will work in small groups to create a game. Provide them with the supplies needed. The list below are samples of items that could be used.
    - Dice or number cubes
    - Construction paper
    - Scissors
    - Poster board
    - Manila folders
    - Index Cards
    - Egg cartons
    - Water bottles
    - Pizza circles
    - Paper towel rolls
    - Buttons
    - Other creative items
- Once students have a game created, they should test it out with their classmates and make any changes needed. They should complete page 3 in the Mini-Math Game Design Booklet.
- The students will be presenting their games at the Learning Showcase and Celebration on Day 4. They will be given the opportunity to play games with the guests.

Prepare for Learning Showcase and Celebration

- Discuss what students will need to do tomorrow during the Showcase. Include details about:
    - Organizing games and displays
    - Setting up posters
    - Expectations for the day

ST Math
Summer Immersion

Grade 4 | Module 5 | Day 4

*Final Day? If today is your final day of ST Math Summer Immersion, skip Day 4 and jump to the Final Day.

Focused Instructional Time (45-70 minutes)

- The teacher can assign the activity or allow student choice:
  - **Reflection Poster** - Students should make sure their reflection posters are complete.
  - **Game Design** - If students have not finished their games, this is the last opportunity.
  - **Table Games** - Students can choose a Table Game to play with a partner or small group.
  - **ST Math 1:1** - Students can continue to play ST Math.

Prepare for the Learning Showcase

Discuss what students will need to do tomorrow during the Showcase. Include details about:

- Organizing games and displays
- Setting up posters
- Expectations for the day
- Time to practice presentations
- Preparing answers to Immersion Debriefing Bookmark questions.

Grade 4 | Module 5 | Final Day

Learning Showcase and Celebration

Famlies, board members, and community partners can be invited to attend. This is a great opportunity for students to showcase their learning from the Immersion program.

- Provide students time to make any final adjustments to their game and notes for the presentation of their games.
- Have groups present their Reflection Posters and introduce their games to the class.
- Provide invited guests a copy of the Immersion Debriefing Bookmark. They should ask students those questions as they visit with each group.
- Provide an opportunity for the students to play each other's games.
- Reflection Poster Gallery Walk (See Learning Showcase and Celebration Information.)

Optional Activity Page

ST Math Activity Page

Students will have one final Activity Page left. Encourage students to keep practicing their math skills by continuing to play ST Math Puzzles at home and by completing this final Activity Page.

ST Math

PROBLEM SOLVING PROCESS

NOTICE & WONDER

Focus **students' thinking about the problem.**

- What do you notice?
- What do you wonder?
- What question is the problem asking?

PREDICT & JUSTIFY

Uncover **students' thinking around how they plan to address the problem.**

- What is your prediction?
- What strategy will you use to test it?
- What do you think will happen when you test your prediction and why?

TEST & OBSERVE

Encourage **students to observe and process the results of testing their hypothesis.**

- Test your hypothesis.
- Describe what happened.

ANALYZE & LEARN

Facilitate **students in analyzing the feedback/results.**

- How does this compare to what you thought would happen?
- What did you learn?
- How will you use what you learned?

CONNECT & EXTEND

Stretch **students' thinking.**

- How does what you learned support your understanding of [the concept]?
- What would happen if_____?
- How would you apply this concept to [this] situation?

ST Math

PROBLEM SOLVING PROCESS

NOTICE & WONDER

Focus students' thinking about the problem.

- What do you notice?
- What do you wonder?
- What question is the problem asking?

PREDICT & JUSTIFY

Uncover students' thinking around how they plan to address the problem.

- What is your prediction?
- What strategy will you use to test it?
- What do you think will happen when you test your prediction and why?

TEST & OBSERVE

Encourage students to observe and process the results of testing their hypothesis.

- Test your hypothesis.
- Describe what happened.

ANALYZE & LEARN

Facilitate students in analyzing the feedback/results.

- How does this compare to what you thought would happen?
- What did you learn?
- How will you use what you learned?

CONNECT & EXTEND

Stretch students' thinking.

- How does what you learned support your understanding of [the concept]?
- What would happen if_____?
- How would you apply this concept to [this] situation?

ST Math

PROBLEM SOLVING PROCESS

When your students struggle with...

Getting Started
- What do you need to do to solve this problem?
- What do you know about this problem and what do you need to know?
- What question is this problem asking you to solve?
- How might you begin?

Identifying and Testing Strategies
- What is your strategy? Why is that the best strategy?
- What will happen if you click on _____?

Persevering
- Is there anything you learned from those earlier levels that can help you now?
- Is this like _____ that you did earlier? How is it the same? How is it different?
- What have you tried? What happened?
- What did you try that did not work? Why did it not work?
- What do you already know about (concept/problem)?

Learning from Feedback
- What did you learn from the feedback?
- What do you need to do next?
- What did you see that showed you the answer was wrong?
- Explain why your answer was correct or incorrect.
- How did the earlier problems/levels work?

Extending and Connecting
- Please explain it in a different way.
- Is there another way to solve this puzzle?
- Can you represent this puzzle symbolically?
- Show me how this will work on the next problem.
- Why did you ____?

ST Math

PROBLEM SOLVING PROCESS

When your students struggle with...

Getting Started
- What do you need to do to solve this problem?
- What do you know about this problem and what do you need to know?
- What question is this problem asking you to solve?
- How might you begin?

Identifying and Testing Strategies
- What is your strategy? Why is that the best strategy?
- What will happen if you click on _____?

Persevering
- Is there anything you learned from those earlier levels that can help you now?
- Is this like _____ that you did earlier? How is it the same? How is it different?
- What have you tried? What happened?
- What did you try that did not work? Why did it not work?
- What do you already know about (concept/problem)?

Learning from Feedback
- What did you learn from the feedback?
- What do you need to do next?
- What did you see that showed you the answer was wrong?
- Explain why your answer was correct or incorrect.
- How did the earlier problems/levels work?

Extending and Connecting
- Please explain it in a different way.
- Is there another way to solve this puzzle?
- Can you represent this puzzle symbolically?
- Show me how this will work on the next problem.
- Why did you ____?

ST Math® Summer Immersion provides students in grades K-5 with an opportunity to accelerate math learning during the summer months. Students experience engaging and fun puzzles, lessons, and projects that focus on grade-level development of content knowledge, reasoning skills, and growth mindset.

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