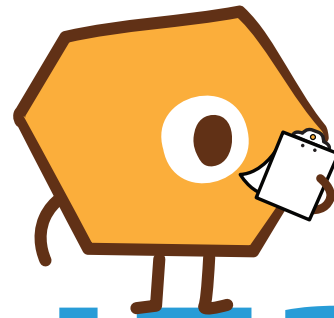




ST Math.
Summer Immersion



TEACHER GUIDE WITH LESSON PLANS

ST Math Summer Immersion

Grade 3

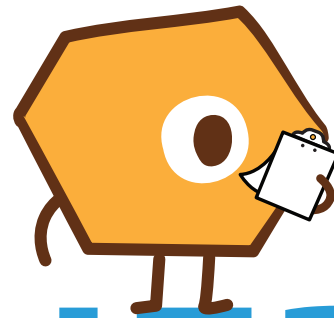
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ST Math.
Summer Immersion



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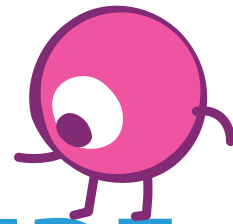
Grade 3

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ST Math[®] Summer Immersion



TEACHER GUIDE

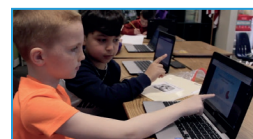
What Is ST Math Summer Immersion?

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.

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](#).

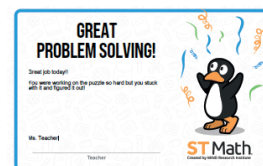
Creating a Reflection Poster

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.



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.

What Makes ST Math Summer Immersion Unique?

The Science Behind the Learning

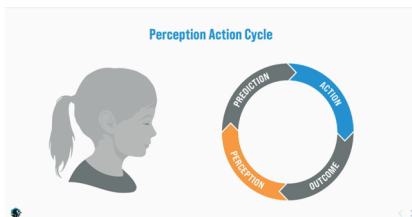
Building Schemas

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.

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.

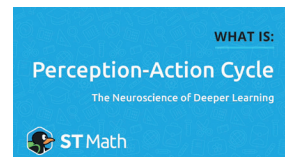
The Perception-Action Cycle is this continuous flow of information and action between the brain and the world around it. On and on it goes: sense, predict, act, adjust. Sense, predict, act, adjust. This PAC is embedded in our game-based learning design at MIND. ST Math puzzles take students through this 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.



Check out this video to learn more about [schema](#).

Blogs on Schema:

- [Schemas Are Key to Deep Conceptual Understanding](#)
- [Mathematical Coherence with ST Math](#)



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 Mindset 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.

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.

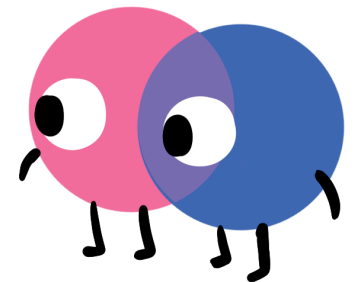


Blogs on Facilitation:

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

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

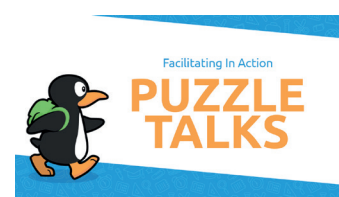
The use of ST Math puzzles to lead a whole group or small group short conversation is what we call Puzzle Talks. Similar to number talks or math talks, the goal is to get students to communicate and deepen their understanding of mathematics.

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.

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



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.

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.

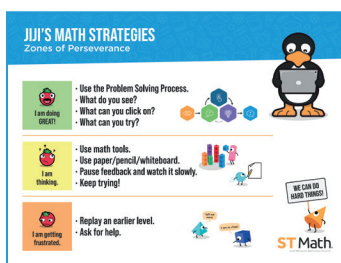


Problem Solving Resources

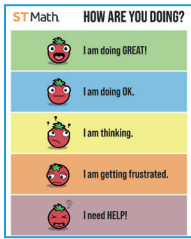
- [Problem Solving Strategy Discussions](#)
- [Problem Solving Facilitation Bookmark](#)

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

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.

Monitoring During Problem Solving

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.

Promoting Classroom Discussion Using Student Work

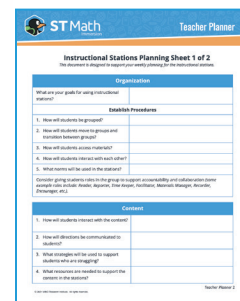
Order the work you selected to share from least sophisticated to most sophisticated. Include some work that has misconceptions and/or errors in reasoning.

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.



The image shows a screenshot of the 'Instructional Stations Planning Sheet 1 of 2' from the ST Math Teacher Planner. The form is divided into three main sections: 'Organization', 'Establish Procedures', and 'Customize'. Each section contains a list of questions for the teacher to answer, such as 'What are your goals for using this station?' and 'How will students be assessed?'. The form is designed to help teachers plan and implement instructional stations effectively.

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.

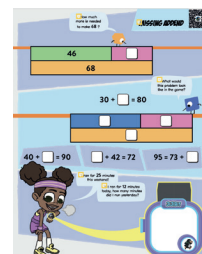


Focused Instructional Time

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

Station	Instructional Stations Rotations							
	Day 1		Day 2		Day 3		Day 4	
	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	

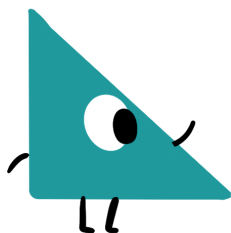
How Do We Monitor Students' Learning?

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.	<ul style="list-style-type: none">• 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?	<ul style="list-style-type: none">• 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.	<ul style="list-style-type: none"> • Are there words here you have never heard? • Do you know when you would use this? • What about this topic seems confusing? 	<ul style="list-style-type: none"> • “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

This also prepares students to be able to answer their own questions as they learn more about the topic.

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.	<ul style="list-style-type: none"> • 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? 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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? 	<ul style="list-style-type: none"> • 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

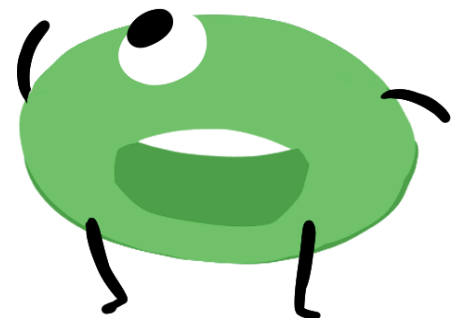
What challenges am I having/questions I still have about this topic?

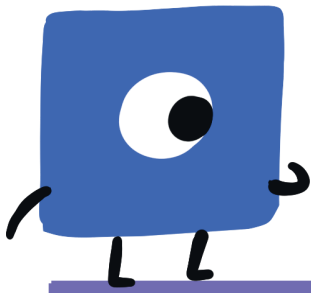
Goal/Purpose	Support Student Thinking Prompts	Look for
<p>Build the idea that our learning doesn't end and there is always more to know. It is also important for students to be okay with having lingering questions and become comfortable with not fully understanding something. This is what pushes us to grow.</p>	<ul style="list-style-type: none"> ● 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? 	<ul style="list-style-type: none"> ● 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.

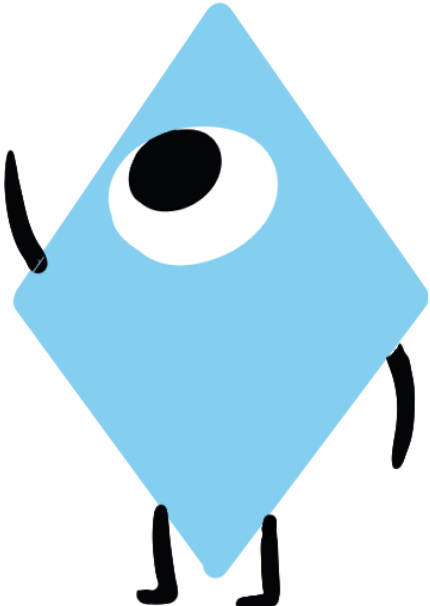
	Goal/Purpose	Support Student Thinking Prompts	Look for
Top Data Points	Students will be able to associate these numbers with their progress. This way they can hold themselves accountable as the numbers grow/decrease.	<ul style="list-style-type: none"> • What do [levels/percent/minutes/puzzles] tell us? • 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? 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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? 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none">• 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?	<ul style="list-style-type: none">• 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.

The screenshot displays the lesson plan for Kindergarten Module 2, titled "Adding Numbers up to 10". It is divided into seven numbered sections:

- 1 Topic: Adding Numbers up to 10**: Includes a QR code for resources and a brief description of the module's focus on addition strategies.
- 2 Module 2 at a Glance**: Lists various resources such as posters, games (Addition War, Pyramid Make Ten, etc.), mats, and immersion slide decks.
- 3 My Thinking Path**: A section for student reflection on the module's content.
- 4 ST Math Puzzle Talks**: Lists specific puzzles used during the module.
- 5 Problem Solving**: Details daily problem-solving activities, including slide decks and journal prompts.
- 6 Instructional Stations**: Describes four stations: Small Group Instruction, ST Math Puzzles, Table Games, and Design Challenge.
- 7 Day 5: Design Challenge**: A whole-group activity where students discuss and play a game based on their design challenge.

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.

STMath
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.

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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">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 <ul style="list-style-type: none">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

- My Thinking Path** - provides direction on how to get students thinking about the topic of the module.
- Puzzle Talks** - brings ST Math which engages students to practice mathematical discourse and problem solving.
- Problem Solving Process** - integrates the Problem Solving Process to engage students in mathematical discourse and to develop problem solving skills.
- Check for Understanding** - determines the level of understanding of the day's lesson using questions.
- 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.
- Instructional Stations** - provides details on the activities students will be working on in small groups at a particular designated rotating station.



ST Math[®] Summer Immersion



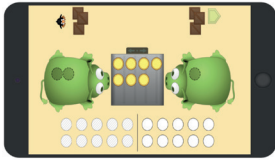
TEACHER PLANNER



Checklist: Module 1

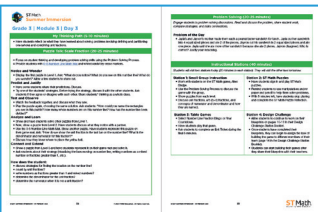
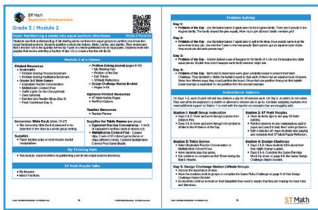
The focus of Module 1 is to get students acclimated to the structure of the program as well as to establish expectations, routines, and procedures.

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? <i>Example: Use quizzes or assessments, My Thinking Path, Exit Tickets, ST Math Puzzle Reflection, etc.</i>	
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.

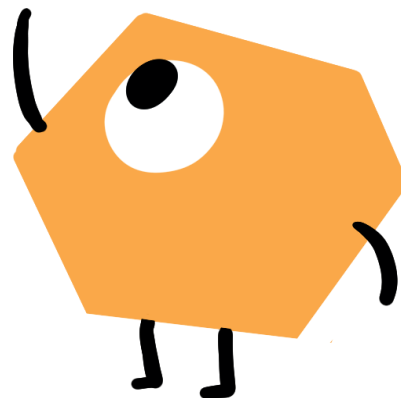
Module's Checklist

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.

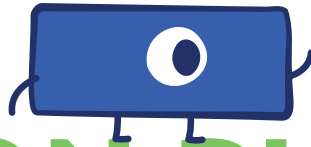
Lesson Preparation

- 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





ST Math[®] Summer Immersion



LESSON PLAN



Click or scan for resources



Grade 3 | Module 1

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 ST Math. 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, in 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

Immersion Slide Deck (slides 2–17)

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

Teacher Resources

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

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

- whiteboards/dry-erase markers

My Thinking Path

This daily opportunity for reflecting will be introduced on Day 3 of this module. Students will reflect on comparing fractions and counting by unit fractions.

ST Math Puzzle Talks

- Big Seed
- JiJi Cycle Basket
- JiJi Cycle

Problem Solving

Day 1:

- **Problem of the Day** - Create a class “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:
 - 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 our class that can be answered by adding fractions of the class. (Add questions and equations to the class chart. Example: the fraction of the class wearing glasses plus the fraction of the class not wearing glasses. Discuss that the total always equals a fraction equivalent to 1.)

Day 2:

- **Problem of the Day** - Remind students about yesterday’s Problem of the Day. How we can describe the class mathematically? For example: What fraction of the class has blue eyes? What fraction of the class has brown eyes? How can we write an equation to show the total of the fraction of blue eyes in the class plus the fraction of brown eyes in the class? Write another question about our class that can be answered by adding fractions of the class. Add these questions and equations to the class chart (for example, a fraction of the class wearing glasses plus the fraction of the class not wearing glasses). Discuss that the total always equals a fraction equivalent to 1.

Day 3:

- **Problem of the Day** - Compare these fractions, and explain how to locate them on a number line: $\frac{5}{8}$, $\frac{6}{8}$, $\frac{2}{8}$, $\frac{9}{8}$, $\frac{3}{8}$.

Day 4:

- **Problem of the Day** - Nancy, Bob, and Devin played a game to see who could get farthest on a number line. They each rolled a fraction cube. Nancy rolled $\frac{1}{4}$ and 1. Bob rolled $\frac{3}{4}$ and $\frac{3}{4}$. Devin rolled $\frac{3}{4}$ and $\frac{1}{2}$. Where did each player land on the number line? Who won?

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 (whole group)

- 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.



Grade 3 | 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?
- 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 use visual models 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 to the next.
 - Remind students that if they get a puzzle wrong, they can click anywhere on the screen to replay the animation or track movement on the screen to learn from their informative feedback.
 - For students in Grades 2 and up, share that each objective begins and ends with a short quiz.

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 “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 you may 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 Traffic Light Tic-Tac-Toe, 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 3 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.



Grade 3 | Module 1 | Day 2

ST Math Focus

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

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 in Level 1, 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 (hypothesis).
 - 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.

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

- 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 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 Dara, and if applicable, others in a small group with the teacher completing the Pre-Assessment and/or Pre-Quiz.



Grade 3 | Module 1 | Day 3

My Thinking Path (10 minutes)

Students will begin solving problems involving fractions and understanding fractions as numbers, including counting by unit fractions (fractions with a numerator of 1).

My Thinking Path Discussion

- Introduce the My Thinking Path page in their journal to students. Have them write in the topic, “Compare fractions and count by unit fractions.”
- Have students complete page 4 in their 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: JiJi Cycle Basket (20 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: “What do you notice? What do you wonder?” Allow students to share.

Predict and Justify

- Have students make a prediction and determine a strategy for solving the puzzle. Have students share their predictions, and why. Do they agree/disagree with each other?

Test and Observe

- Try one of the students’ ideas, and discuss the feedback. (As you try students’ strategies, be sure to try those that work and those that don’t.)

Analyze and Learn

- Ask students how what they saw happen compares to their prediction, such as: “How did you know where to place the basket?”
- Show a puzzle from Level 2. Repeat the Problem Solving Process, guiding students to share strategies and their reasoning.
- Discuss unit fractions, and identify the numerator and denominator of the fraction on the number line.
- Show another puzzle from Level 2.
- Discuss how students determine how many unit fractions to select.

Connect and Extend

- Show a puzzle from Level 3, and ask how it is different from Level 2.
- Discuss unit fractions and the numerator and denominator of the fraction on the number line, and the mixed number and a/b ($b > 0$) fraction name for the puzzles greater than 1.
- Show a puzzle from level 4. Discuss how this puzzle compares to the other levels, unit fractions, and the numerator and denominator of the fraction on the number line.
- Discuss unit fractions, mixed numbers vs. a/b ($a > b$, $b > 0$), how many unit fractions are needed to make 1.

Connect and Extend (continued)

- Continue with puzzles from levels 3 and 4.
 - Discuss unit fractions, mixed numbers vs. a/b ($a > b$, $b > 0$), how many unit fractions are needed to make 1.

How does the student:

- explain how they determined the size of the fraction piece? (It would take 4 pieces this size to make a whole circle.)
- count the fraction pieces? Count the fractions greater than 1? ($5 \text{ one-thirds} = 5/3$)
- determine the label for the whole numbers? ($3/3$ is equivalent to 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

Compare these fractions, and explain how to locate them on a number line: $5/8$, $6/8$, $2/8$, $9/8$, $3/8$.

Preparing for Instructional Stations (40 minutes)

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

Instructional Stations 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 Stations 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.



Grade 3 | Module 1 | Day 4

My Thinking Path (10 minutes)

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

Puzzle Talk: JiJi Cycle (20 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: "What do you notice? What do you wonder?" Allow students to share.

Predict and Justify

- Have students make a prediction and determine a strategy for solving the puzzle.
- Have students share their predictions, what they think will happen, and why. Do they agree or disagree with each other? Why?

Test and Observe

- Try one of the students' ideas. (As you try students' strategies, be sure to try strategies that work and those that don't. Analyze and discuss the feedback in both correct and incorrect solutions.)

Analyze and Learn

- Ask students how what they saw happen compares to their prediction.
- Show a puzzle from Level 2. Discuss how this level compares to the puzzles from yesterday's game.
- Have students think about and then discuss with a partner how they might solve the puzzle.
- Share whole group.
- Discuss unit fractions ($1/b$, $b > 0$) and the numerator and denominator of the fraction on the number line.

Connect and Extend

- Continue with puzzles in Levels 2, 3, and 4. Compare and contrast puzzles from the different levels and how to use what students have learned in previous levels to solve other puzzles.
- Discuss how puzzles can be represented with an expression (no equals sign) or equation.
- Discuss unit fractions, mixed numbers ($a > b$, $b > 0$), and how many unit fractions are needed to make 1.

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.

*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 Number Sense Games (15-20 minutes)

During this time, you will introduce Equivalent Fraction Concentration and Multiplication Connect Four. 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 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 minutes)

Problem of the Day

- Nancy, Bob, and Devin played a game to see who could get farthest on a number line. They each rolled a fraction cube.
 - Nancy rolled $\frac{1}{4}$ and 1.
 - Bob rolled $\frac{3}{4}$ and $\frac{3}{4}$.
 - Devin rolled $\frac{3}{4}$ and $\frac{1}{2}$.
 - Where did each player land on the number line? Who won?

Closing (10-15 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 3 | 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 3 | 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: JiJi Cycle

- **Play JiJi Cycle**
 - Project the game.
 - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: JiJi Cycle**
 - 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.



Grade 3 | Module 2

Topic: Partitioning a whole into equal sections (fractions)

Module 2 Resources

Students use their understanding of fair sharing whole numbers into equal groups to partition one whole into equal fractional sections. Students partition a whole into halves, thirds, fourths, and eighths. They understand that a fraction $\frac{1}{b}$ is the quantity formed by 1 part of a whole partitioned into b equal parts. Students work with puzzles that involve selecting a fraction of size $\frac{1}{b}$ to create a fraction $\frac{a}{b}$ ($b > 0$).

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)

- **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** - 2 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 reflect on partitioning a whole into equal sections (fractions).

ST Math Puzzle Talks

- Pie Monster
- Match Fractions

Problem Solving

Day 1:

- **Problem of the Day** - Joe the baker baked 2 apple pies for the Hughes family. There are 8 people in the Hughes family. The family shared the pies equally. How much pie did each family member get?

Day 2:

- **Problem of the Day** - Joe the baker baked 7 apple pies to sell in his shop. Four people came in at the same time to buy pie. Joe sold the 7 pies to the four people. Each person got an equal amount of pie. How much pie did each person buy?

Day 3:

- **Problem of the Day** - Gordon baked a pan of lasagna for his family of 4. He cut the lasagna into eight equal pieces. Explain how much lasagna each family member might eat.

Day 4:

- **Problem of the Day** - Brett and 3 classmates were given a bulletin board to present their Math Challenge. They decided to divide the bulletin board so that each of them had an equal amount of space. Show two different ways they could partition the board. Prove that one partition from your first bulletin board example is equivalent to one partition from the second example.

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

- Show and work through puzzles from Balance Pies
- Show and work through rich problems similar to the Problems of the Day.

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: Number Sense 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.



Grade 3 | Module 2 | Day 1

My Thinking Path (5-10 minutes)

- Remind students of the My Thinking Path document. Have them write in the topic, “Solving problems involving partitioning a whole into equal sections (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.
- 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: Pie Monster (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 students to share.
- Ask students to think of their strategy for solving the puzzle and predict what will happen when they try it.

Predict and Justify

- Have students think-pair-share their strategy with a partner, explaining their reasoning.
- Have students share out. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their strategy?

Test and Observe

- Try one of the students’ ideas. (As you try students’ strategies, be sure to try strategies that work and those that don’t.)
- Watch the feedback together for correct and incorrect tries, and discuss what you saw.

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction.
- Show another puzzle. Have students prepare to show how they would solve it.
- Share several examples. Look for students who also wrote the number, or ask students to write the number.
- Look for mixed numbers and $\frac{a}{b}$ ($b > 0$) fractions. Discuss counting fractions compared to counting whole numbers and equivalence. Ask how they know this fraction is equivalent to this mixed number (e.g., why is 2 the same as $\frac{4}{2}$).

Connect and Extend

- Open up some puzzles from Level 2. (Make sure you include puzzles with thirds and fourths.) Have students do a think-pair-share with a partner about what they notice. How is it different from Level 1?
- Continue to show a few other puzzles in Level 2 (especially partitioned into halves).
 - Have students share ideas on how they would solve the puzzle.
 - Share out several examples. Look for students who also wrote the number, or ask to write it.
 - Look for mixed numbers and $\frac{a}{b}$ fractions. Discuss counting fractions compared to whole numbers.
 - Discuss the equivalence.
- Do the same as above, but with puzzles from Level 3 showing thirds and fourths. Questions to ask: “How many thirds/halves/fourths did you need for each whole pie? How many thirds/halves/fourths are there altogether?”

How does the student:

- figure out how many unit fractions are needed for one whole?
- count unit fractions to find the total?
- understand that the $\frac{a}{b}$ ($b > 0$) fraction is equivalent to the mixed 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

Joe the baker baked 2 apple pies for the Hughes family. There are 8 people in the Hughes family. The family shared the pies equally. How much pie did each family member get?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Balance Pies*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through Level 2. Have students name fractions of pies. Discuss unit fractions and $\frac{a}{b}$ ($b > 0$) fractions.
- Students explore and discover how $\frac{a}{b}$ ($b > 0$) fractions are made up of a fractions of size $\frac{1}{b}$.
- Have students solve the problems similar to the Problem of the Day and puzzles. For example:
 - Twana baked a small pan of lasagna for her family of 4. Explain how she might cut the lasagna to serve her family equal sized pieces. How much lasagna will each person get?
 - Discuss what they know in the problem and what they need to know to solve the problem.
- Bring the discussion about each problem to the equation, and discuss what each of the numbers in the equation represents.
- Ask students to compare their drawings, etc., to the numbers in the equations.

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: Number Sense 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.



Grade 3 | Module 2 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving partitioning a whole into equal sections (fractions).

Puzzle Talk: Pie Monster (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 3. Ask: “What do you notice that is similar/different from the puzzle we did yesterday?”
- Allow a few students to share out.

Predict and Justify

- Ask students to think of their strategy for solving the puzzle and predict what will happen when they try it. Have students share out their predictions.

Test and Observe

- Select a student's solution to try, and watch the feedback. Ask students: “What happened when we tried that prediction? What did you see?”

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction. Was our answer correct? What did they learn from the feedback?
- Show another puzzle, and have students discuss with a partner what they think they need to do to solve the problem.
- Try one of the students' strategies. Discuss the feedback.
- Continue to try Level 3 puzzles and launch into a discussion with students around mixed numbers, unit fractions, and equivalence:
 - How can you check to make sure both monsters get enough pie?
 - How many thirds/halves/fourths are there altogether?
 - How could you write the fraction and the mixed number for monster 1 and monster 2?
 - How do you know this fraction is equivalent to this mixed number (e.g., why is 2 the same as $\frac{4}{2}$)?

Connect and Extend

- Choose some puzzles for students to write equations for on paper or whiteboard.
- Ask students a challenge question: “What if Pie Monster got ___ more pies? How many pieces of pie would Pie Monster have now?”
- Have students solve the new problem, and then allow a few students to share their strategies and their answers.

How does the student:

- write equations and inequalities to compare fractions?
- figure out how many unit fractions are needed for the whole and for each monster?
- count unit fractions to find the total?
- understand that the $\frac{a}{b}$ ($b > 0$) fraction is equivalent to the mixed 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

Joe the baker baked 7 apple pies to sell in his shop. Four people came in at the same time to buy pie. Joe sold the 7 pies to the four people. Each person got an equal amount of pie. How much pie did each person buy?

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Balance Pies*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through Levels 2. Have students name fractions of pies. Discuss unit fractions and $\frac{a}{b}$ ($b > 0$) fractions.
- Students explore and discover how $\frac{a}{b}$ ($b > 0$) fractions are made up of a fractions of size $\frac{1}{b}$.
- Have students solve the problems similar to the Problem of the Day and puzzles. For example:
 - Twana baked a small pan of lasagna for her family of 4. Explain how she might cut the lasagna to serve her family equal sized pieces. How much lasagna will each person get?
 - Discuss what they know in the problem and what they need to know to solve the problem.
- Bring the discussion about each problem to the equation, and discuss what each of the numbers in the equation represents.
- Ask students to compare their drawings, etc., to the numbers in the equations

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: Number Sense 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.



Grade 3 | Module 2 | Day 3

My Thinking Path (10 minutes)

- Have students reflect on what they have learned about solving problems involving partitioning a whole into equal sections (fractions).

Puzzle Talk: Match Fractions (20-30 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

- Ask students to predict where the rocket will go and explain their prediction.
- You may probe students by asking: "What does the numerator represent? What does the denominator represent?"

Test and Observe

- Select a student to share how to move the slider, how many parts they are dividing and coloring in, and why.

Analyze and Learn

- Ask students to explain what they learned from the feedback about numerators, denominators, and partitions. Replay the puzzle, and select the same answer. This time pause the feedback. Discuss.
- Ask students to share what they learned from the feedback. How can they use what they learned in the next puzzle?
- Show the next puzzle. Move the slider across the square at the bottom, and ask students to watch the animation. Ask: "How many pieces do you want to partition this square into so that it matches the fraction in the puzzle?"
- Remind students that the denominator tells how many equal pieces the whole has been divided into: "The denominator is ____, so we need to divide the square into ____ equal parts." Select the correct denominator. Remind students that the numerator counts how many of the equal pieces you have. The numerator in the puzzle is 1, which means that we just need one of the pieces. Ask students: "How could we represent just one of the pieces?" Move the cursor over the square again to show how to shade in the pieces, and watch the feedback.
- Solve the puzzle and watch the feedback.

How does the student:

- discuss the size and number of partitions created as the cursor moves from left to right?
- discuss the meaning of the denominator in the fractions?
- discuss the meaning of the numerator in the fractions?
- discuss unit fractions and count by unit 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

- Gordon baked a pan of lasagna for his family of 4. He cut the lasagna into eight equal pieces. Explain how much lasagna each family member might eat.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station).

Station 1: Small Group Instruction

- Work with students on the ST Math game, *Balance Pies*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through Level 2. Have students name fractions of pies. Discuss unit fractions and a/b ($b > 0$) fractions.
- Students explore and discover how a/b ($b > 0$) fractions are made up of a fractions of size $1/b$.
- Have students solve the problems similar to the Problem of the Day and puzzles. For example:
 - Twana baked a small pan of lasagna for her family of 4. Explain how she might cut the lasagna to serve her family equal sized pieces. How much lasagna will each person get?
 - Discuss what they know in the problem and what they need to know to solve the problem.
- Bring the discussion about each problem to the equation, and discuss what each of the numbers in the equation represents.
- Ask students to compare their drawings, etc., to the numbers in the equations

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: Number Sense 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.



Grade 3 | Module 2 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving partitioning a whole into equal sections (fractions). Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Match Fraction (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 2. Ask students: "What do you notice that is similar/different than the puzzles we did yesterday?"
- Have students predict how to solve the puzzle and share their prediction with a neighbor. Ask students: "Did your predictions match? What strategies did you use?"

Predict and Justify

- Have students share out. Try one of the students' ideas.

Test and Observe

- Watch the feedback together, and discuss what they saw. Discuss how the animation shows the numerator and denominator of the fraction.

Analyze and Learn

- Ask students to think about what they saw happen and how it compares to their prediction. What did they learn from the feedback?
- Show another puzzle from Level 2. Discuss how they determine the number of partitions to select: "Where is a unit fraction? How many unit fractions is this?"
- Have students write an addition equation to show that it takes a unit fraction of size $\frac{1}{b}$ to equal the $\frac{a}{b}$ ($b > 0$) fraction (e.g., $\frac{1}{6} + \frac{1}{6} = \frac{2}{6}$).

Connect and Extend

- Display the next puzzle and move the cursor along the square again. Ask students to turn to a partner and discuss what happens to the size of the fraction pieces as the denominator gets bigger. How many halves/thirds/fourths/fifths/sixths does it take to make 1 whole? Why? (Show that the bigger the denominator gets, the smaller the fraction pieces become.) Allow students to share their thinking whole group.
- Do a share-out, and try a student's solution, watching the feedback. Remind students that the numerator counts how many of the equal pieces you have (e.g., a numerator of 4 means that you have 1, 2, 3, 4 of the fraction pieces).
- Ask: "How many of these fraction pieces does it take to make the whole? Why?"

How does the student:

- discuss the size and number of partitions created as the cursor moves from left to right?
- discuss the meaning of the denominator in the fractions?
- discuss the meaning of the numerator in the fractions?
- discuss unit fractions and count by unit fractions?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Number Sense 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 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?
- Repeat with the second game.

Problem Solving - Optional, if time

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

Problem of the Day

- Brett and three classmates were given a bulletin board to present their Math Challenge. They decided to divide the bulletin board so that each of them had an equal amount of space. Show two different ways they could partition the board. Prove that one partition from your first bulletin board example is equivalent to one partition from the second example.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz (optional).
- 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.
- Have students review ST Math Problem Solving Journal pages for the module: My Thinking Path, Problem of the Day, Exit Tickets, and Puzzle Reflections.



Grade 3 | 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 Page 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: Pie Monster

- **Play Pie Monster:**
 - Project the game.
 - Play a few puzzles to help students understand the game.
- **ST Math Activity Page: Pie Monster**
 - 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.



Grade 3 | Module 3

Topic: Defining and partitioning one and combining unit fractions [Module 3 Resources](#)

Students work with puzzles involving partitioning a rectangle into equal areas. They understand that a fraction $\frac{1}{b}$ ($b > 0$) is the quantity formed by 1 part of a whole partitioned into b equal parts and combine the unit fractions to create $\frac{a}{b}$ ($b > 0$) fractions. Students work with puzzles involving representing fractions as a bar model, moving the bar model to a number line and understanding a fraction as a number on a number line. They represent a fraction $\frac{1}{b}$ on a number line by defining the interval from 0 to 1 and partitioning it into b equal parts. They recognize each of these parts as $\frac{1}{b}$. They represent fractions $\frac{a}{b}$ ($b > 0$) by a length of $\frac{1}{b}$ from

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)
- **Math Mat**
 - 0–5 Number Line Math 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 understanding fractions as parts of a whole

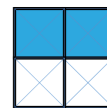
ST Math Puzzle Talks

- Equal Areas
- Equal Division
- Scale Fraction

Problem Solving

Day 1:

- **Problem of the Day** - Show and explain how the shaded part of this picture could represent each of these numbers: $\frac{1}{2}$, 2, 1



Day 2:

- **Problem of the Day** -

- This rectangle is $\frac{1}{2}$. Show one whole.
- This rectangle is $\frac{1}{3}$. Show $\frac{1}{2}$.

This rectangle is $\frac{1}{2}$. Show one whole.



This rectangle is $\frac{1}{3}$. Show $\frac{1}{2}$.

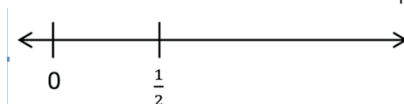


Day 3:

- **Problem of the Day** - Jayla's and Jayvon's mother made them each a peanut butter sandwich for lunch. Jayla cut her sandwich into 4 equal sized pieces and ate 2 of the pieces. Jayvon cut his sandwich in 2 equal sized pieces and ate one piece. Jayla said she ate more of her sandwich because she ate 2 pieces. Jayvon disagreed. Who is correct? Justify your reasoning.

Day 4:

- **Problem of the Day** - Place $\frac{3}{4}$ on this number line. Be as exact as possible.



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

- Students create a set of fraction strips including whole, halves, thirds, fourths, sixths, and eighths and use them to explore fractions.
- Play the ST Math game, *Alien Bridge*. Discuss unit fractions, $\frac{a}{b}$ ($b > 0$) fractions, and concepts of numerator and denominator and how they are named.

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: Number Sense 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.



Grade 3 | Module 3 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic, “Defining and partitioning one (whole) and combining unit 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: Equal Areas (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 the differences between the two rectangle choices.

Predict and Justify

- Have students make a prediction about which green rectangle to choose and why. They should think-pair-share their prediction, strategy, and their reasoning.
- Allow some students to share whole group and discuss: “How do you know the parts are equal?”
- Try one of the students' solution strategies. Before trying the strategy, discuss it with the other students (agree/disagree; what do they think will happen?).

Test and Observe

- Try a student's solution and watch the feedback. Talk with students about the animation.

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 their strategy?
- Solve additional puzzles in Level 1.

Connect and Extend

- Display the first puzzle in Level 2, and ask students which green rectangle would be correct. Discuss how each section of the rectangle would be named. Ask students: “How many parts are in this rectangle? Are all of the parts equal?”
- With the same puzzle, tell students you want to represent the correct rectangle using a unit fraction, but need their help. (A rectangle divided into three equal pieces is $\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$.)
- If needed, explain to students that the top number of a fraction (the numerator) is the counting number. Each of these pieces is one piece so the numerator is 1. Explain that the bottom number (the denominator) is the cutting number. It tells how many equal pieces or parts the whole has been cut or divided into. Ask students: “How many equal parts has this rectangle been divided into?” Write the unit fraction that would represent each piece, and have students write the unit fraction on their whiteboards.
- Highlight the need for each section to cover the same amount of area in the shape. Do not focus on the sections being exactly alike. They do not have to be congruent.
- Repeat with additional puzzles in Level 2.

Connect and Extend (continued)

- Display the first puzzle in Level 3. Say to students: “These rectangles look different from the ones in the last puzzles we solved. Can you select the rectangle with equal parts in this puzzle?”
- Solve additional puzzles in Level 3, and continue asking the same questions as above.

How does the student:

- identify the rectangle with equal parts?
- identify the total number of equal parts?
- discuss the need for each section of the rectangle to cover the same area as the other sections in the rectangle in order for them to be the same fractional part?

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

- Show and explain how the shaded part of this picture could represent each of these numbers: $\frac{1}{2}$, 2, 1.



Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Have students create a set of fraction strips including whole, halves, thirds, fourths, sixths, and eighths.
- Students use the strips to understand fractions $\frac{1}{b}$ and $\frac{a}{b}$ ($b > 0$), prove equivalence, and compare fractions.
- Have students combine their strips to model fractions greater than 1.
- Ask students questions to lead them to these understandings.
- Be sure students save their fraction strips for activities in later lessons.
- Work with students on the ST Math game, *Alien Bridge*.
- Use the Problem Solving Process to discuss the game with the group.
- Show puzzles from each level.
- Discuss unit fractions, $\frac{a}{b}$ ($b > 0$) fractions, and concepts of numerator and denominator and how they are named.

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: Number Sense 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.



Grade 3 | Module 3 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving defining and partitioning one (whole) and combining unit fractions.

Puzzle Talk: Equal Division (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? How many equal pieces does this rectangle have?” Allow a few students to share out.

Predict and Justify:

- Have some students share their predictions. Discuss.

Test and Observe

- Try a student’s solution, and watch the feedback. Talk with students about what happened as they solved the puzzle. Did it match 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.
- Show the next puzzle in Level 1. Ask the students: “Which rectangle do you think is the correct answer and why?”
 - Discuss and solve some puzzles from Level 1. For a few puzzles, move the cursor over the rectangle that students want to choose to solve each puzzle. Talk about how many equal parts are in the rectangle.
 - Discuss concepts of equal area/size and number of partitions. Name each partition as unit fraction $1/b$ (e.g., $1/3$ if rectangle is divided into 3 equal parts).
- Name different numbers of sections a/b ($b > 0$), and discuss how to determine those by counting the unit fractions (e.g., $2/3 = 1/3 + 1/3$).

Connect and Extend

- Show a new puzzle, and have students write a unit fraction to name each piece of the rectangle. “How could we name each of the equal pieces with a unit fraction? What would be our numerator and denominator?”
- Display the first puzzle in Level 2. Ask: “How is this puzzle different from the puzzles we just solved? Which direction of the dashed line(s) should we move to create equal pieces? Why?”
- Ask students which arrow they want to choose to move the line to the left or right and why. Predict what will happen with each choice before the arrow is selected. Watch the feedback from the puzzle after the arrow is selected. Discuss whether the resulting rectangle has equal pieces.
- Repeat with the remaining puzzles in Level 2.
- Have students draw more than one whole, partition each into the unit fractions, and then name different a/b ($b > 0$) fractions > 1 .
- Discuss the need for each of the wholes to be the same size.

How does the student:

- identify the rectangle with equal pieces?
- discuss the need for each section of the rectangle to cover the same area as the other sections in the rectangle in order for them to be the same fractional part?
- identify each section as a unit fraction and discuss how many unit fractions are in the whole?

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

- This rectangle is $\frac{1}{2}$. Show one whole.
- This rectangle is $\frac{1}{3}$. Show $\frac{1}{2}$.

This rectangle is $\frac{1}{2}$. Show one whole.



This rectangle is $\frac{1}{3}$. Show $\frac{1}{2}$.



Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station).

Station 1: Small Group Instruction

- Have students create a set of fraction strips including whole, halves, thirds, fourths, sixths, and eighths.
- Students use the strips to understand fractions $\frac{1}{b}$ and $\frac{a}{b}$ ($b > 0$), prove equivalence, and compare fractions.
- Have students combine their strips to model fractions greater than 1.
- Ask students questions to lead them to these understandings.
- Be sure students save their fraction strips for activities in later lessons.
- Work with students on the ST Math game, *Alien Bridge*.
- Use the Problem Solving Process to discuss the game with the group.
- Show puzzles from each level.
- Discuss unit fractions, $\frac{a}{b}$ ($b > 0$) fractions, and concepts of numerator and denominator and how they are named.

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: Number Sense 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.



Grade 3 | Module 3 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving defining and partitioning one (whole) and combining unit fractions.

Puzzle Talk: Scale Fractions (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process. □ Provide students with [0–5 Number Line 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 see on this number line? What do you wonder?” Allow a few students to share out.

Predict and Justify

- Have some students share their predictions. Discuss.
- Try one of the students’ strategies. Before trying the strategy, discuss it with the other students. Ask students if they agree or disagree with each other. Share students’ thinking as a whole class.

Test and Observe

- Watch the feedback together, and discuss what they saw.
- Play the puzzle again, choosing the same solution. Ask students: “How could you name the rectangles you see in this puzzle? How many whole numbers are on this number line? How has the number line been divided?”

Analyze and Learn

- Show and have students solve other puzzles from Level 1.
- Now, show a puzzle from Level 2. Have students discuss what they notice with a partner.
- Use the 0-5 Number Line Math Mat. Show another puzzle. Have students represent this puzzle on their game mat. Ask: “How do we show the unit fraction in the last bar on the number line? What is the denominator and numerator for this fraction?”
- Discuss how they knew where to place the yellow ball.

Connect and Extend

- Show a puzzle from Level 3, and have students represent it on their game mat and solve it.
- Ask students about their strategy (visualizing the bars moving on number line, writing numbers as a mixed number or fractions greater than 1, etc.).

How does the student:

- discuss strategies for finding the location on the number line?
- count by unit fractions?
- write numbers as fractions greater than 1 and mixed numbers?
- determine the denominator for the unit fraction?
- determine the numerator when it is not a unit 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

- Jayla's and Jayvon's mother made them each a peanut butter sandwich for lunch. Jayla cut her sandwich into 4 equal sized pieces and ate 2 of the pieces. Jayvon cut his sandwich in 2 equal sized pieces and ate one piece. Jayla said she ate more of her sandwich because she ate 2 pieces. Jayvon disagreed. Who is correct? Justify your reasoning.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station).

Station 1: Small Group Instruction

- Have students create a set of fraction strips including whole, halves, thirds, fourths, sixths, and eighths.
- Students use the strips to understand fractions $\frac{1}{b}$ and $\frac{a}{b}$ ($b > 0$), prove equivalence, and compare fractions.
- Have students combine their strips to model fractions greater than 1.
- Ask students questions to lead them to these understandings.
- Be sure students save their fraction strips for activities in later lessons.
- Work with students on the ST Math game, *Alien Bridge*.
- Use the Problem Solving Process to discuss the game with the group.
- Show puzzles from each level.
- Discuss unit fractions, $\frac{a}{b}$ ($b > 0$) fractions, and concepts of numerator and denominator and how they are named.

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: Number Sense 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.



Grade 3 | Module 3 | Day 4

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about solving problems involving defining and partitioning one (whole) and combining unit fractions. Students should complete the My Thinking Path reflection page in their journal.

Puzzle Talk: Scale Fractions (20-25 minutes)

- Provide students with whiteboards/dry-erase markers.
- It will be helpful to provide manipulatives during this talk (cubes, fraction strips, etc.).

Notice and Wonder

- Display the first puzzle in Level 4. Ask: “What do you notice? What do you wonder? What do you think you need to do to solve this puzzle?”

Predict and Justify

- 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.
- Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy?
- Additional prompts:
 - What do you see on this number line?
 - How could you name the rectangles you see in this puzzle?
 - How many whole numbers are on this number line?
 - How has the number line been divided?

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? How does this affect their strategy for solving the next puzzle?
 - What is the denominator for this fraction? Numerator? Why?
 - How did you determine where to place the yellow ball?

Connect and Extend

- Show some more Level 4 puzzles, and have students use their game mats to represent the puzzles.
- Have students build a bar model from a puzzle that has fourths. They may use their fraction strips, connecting cubes, blocks, or other fraction manipulatives.
- Discuss the different models.
 - Does one student’s model have to look like another student’s model?
 - Do all of the wholes in one student’s model have to be the same size?

How does the student:

- discuss strategies for finding the location on the number line?
- count by unit fractions?
- write numbers as fractions greater than 1 and mixed numbers?
- determine the denominator for the unit fraction?
- determine the numerator when it is not a unit fraction?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Number Sense 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.

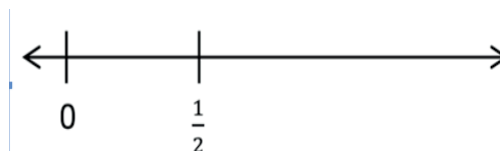
- Introduce one of the games.
- After explaining the game and playing it with the whole group, give students time to play it on their own.
- After playing the game, have them discuss:
 - What math did they learn or use?
 - What strategies did they try to win the game?
- Repeat with the second game.

Problem Solving - Optional, if time

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

Problem of the Day

- Place $\frac{3}{4}$ on this number line. Be as exact as possible.



Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz (optional).
- 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.
- Have students review ST Math Problem Solving Journal pages for the module: My Thinking Path, Problem of the Day, Exit Tickets, and Puzzle Reflections.



Grade 3 | 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.



Grade 3 | Module 4

Topic: Comparing fractions on a number line

[Module 4 Resources](#)

Students work with puzzles involving representing fractions as a bar model, moving the bar model to a number line and understanding a fraction as a number on a number line. They represent a fraction $1/b$ on a number line by defining the interval from 0 to 1 and partitioning it into b equal parts. They recognize each of these parts as $1/b$. They represent fractions a/b ($b > 0$) by a length of $1/b$ from zero. Students use benchmark fractions and unit fractions to place fractions on a number line diagram. They understand that two fractions are equivalent when they occupy the same point on a number line. They express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. Students use the number line diagram to compare fractions.

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)
- **Game Mats**
 - Estimate Fractions Game Mat
 - Number Lines Math Mat

- **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 per player, 1 small game piece per player
- **Five for Twenty-Five** - 1 deck of cards

My Thinking Path

- Daily reflection time for students on comparing fractions on the number line

ST Math Puzzle Talks

- Estimate Fractions on a Number Line
- Fraction Trap

Problem Solving

Day 1:

- **Problem of the Day** - Create a number line including the numbers 0–2 and all halves and fourths. Name every half and fourth. Circle all of the names for the location of 1 and 2. Explain why these are equivalent.

Day 2:

- **Problem of the Day** - Use your number line from yesterday or create a new one. Write three comparison statements, and prove them on the number line. Example: $1 = 4/4$ and $3/4 > 1/2$.

Day 3:

- **Problem of the Day** - $5/6$, $3/4$, $2/3$, $10/9$ Select the number closest to 1. Draw a number line, and place it on your number line. Explain how you knew this number was closest to 1. Explain how you knew where to place the number on the number line.

Day 4:

- **Problem of the Day** - $7/6$, $1/4$, $3/8$, $8/9$ Select the number closest to $1/2$. Draw a number line, and place it on your number line. Explain how you knew this number was closest to $1/2$. Explain how you knew where to place the number on the number line.

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

- Explore number lines using the Number Lines Math Mat.
- Discuss puzzles from the ST Math Game, *Number Line Trap*.

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: Number Sense 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.



Grade 3 | Module 4 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic, “Comparing fractions on a number line.”
- 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: Estimate Fractions on the Number Line (20-25 minutes)

- Focus on student thinking and developing problem solving skills using the Problem Solving Process.
- Provide students with [Estimate Fractions 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? 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 student’s strategy. Ask the students if they agree or disagree with the strategy and why. How does it relate to their own strategy?
- Try a student’s solution, and watch the feedback. Ask students to describe what happened.

Analyze and Learn

- Show and have students solve other puzzles from Level 1. Ask students how they know how many partitions to divide the number line into. (Denominator)
- Give each student the Estimate Fractions Game Mat. Show a Level 2 puzzle.

Connect and Extend

- Have students represent this puzzle on their game mat by sliding the rocket over to the point on the number line, and discuss their reasoning with a partner.
- Have students represent this puzzle on their game mat by sliding the rocket over to the point on the number line. Students share their reasoning.
- Engage in discussions about benchmark fractions and students comparing/equivalent fractions, pausing the feedback when necessary. Chart different student responses to:
 - What does the denominator tell you? (How many equal parts there are between each whole.) The numerator? (How many jumps JiJi makes.)
 - How did you partition the number line? Why?
 - Where do you think this fraction is located? Why?
 - How do we know this is a unit fraction?
- Show a puzzle in Level 3. You may repeat the Problem Solving Process again for more practice, and ask additional clarifying questions, such as: “How is this number line different from the other number line?”

How does the student:

- discuss strategies for partitioning a number line into fractions?
- define a unit fraction?
- estimate the location of a number on a number line by counting by unit fractions?
- discuss the role of the denominator in partitioning the number line?
- discuss the role of the numerator to locate a number on the number line?
- discuss the number of unit fractions that are equal to one?

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 number line including the numbers 0–2 and all halves and fourths. Name every half and fourth. Circle all of the names for the location of 1 and 2. Explain why these are equivalent.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Give students the [Number Lines Math Mat](#). Have them locate $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, and $\frac{5}{4}$ on each of the number lines.
- Have students discuss their strategy for locating the numbers on one of the number lines.
- Discuss how they partitioned each number line.
- Compare the location of the numbers on each number line. What is the same? What is different?
- Work with students on the ST Math game, *Number Line Trap*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through the levels, and discuss how students determine where to place each of the fractions on the number line.
- Make comparison statements as they explain the placement of the fractions. Write equations and inequalities for these comparisons.
- Discuss the numerator and denominator of each fraction as appropriate in comparing the fractions.

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: Number Sense 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.



Grade 3 | Module 4 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about comparing fractions on a number line.

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

- Focus on student thinking and developing problem solving skills using the guiding questions in each step of the Problem Solving Process.
- Provide students with paper or whiteboards/dry-erase markers.

Notice and Wonder

- Display the first puzzle in Level 4 that has a fraction greater than 1. Have them reflect on the differences from yesterday's puzzles and what they need to do to solve. Allow a few students to share out.
- Ask students to draw a 0–2 number line like the one in the puzzle on their paper/whiteboard.
- Ask: "What do you notice about this fraction? What does it mean when the numerator is greater than the denominator? Where do you think this fraction would be placed on this number line? Why?"

Predict and Justify

- Have students make a prediction. After some think time, have them share with a partner their strategies and reasoning.
- Have students share out their predictions and strategies as a whole group.

Test and Observe

- Select one student's strategy. Ask the students if they agree or disagree and why. How does it relate to their own? Have them turn and talk to a neighbor to discuss.
- Try the student's solution, and watch the feedback. Ask students to describe what happened.

Analyze and Learn

- Ask students what they learned from the feedback. How does this affect their strategy?
- Show the next puzzle. Ask students to determine how to partition the number line.
- Partition the number line to match the denominator and then count fraction pieces until you reach the fraction in the puzzle. Remind students that fractions, like numbers, go on forever, and don't stop at 1.
- Repeat with additional puzzles in Level 4.

Connect and Extend

- Display the first puzzle in Level 5. Ask students to draw a 0–3 number line on their paper/whiteboard. Ask: "How should we partition the number line? How do you know?"
- Use the denominator to divide the number line into equal parts. Then ask students: "How many of these equal pieces do we need?"
- Use the numerator to count out the correct number of equal pieces.
- Ask: "Is this fraction greater than, less than, or equal to 1? How do you know?"
- Repeat with additional puzzles in Level 5.

How does the student:

- visually partition the number line?
- explain why they partition the number line in this way?
- determine where to place the rocket?

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

- Use your number line from yesterday or create a new one. Write three comparison statements, and prove them on the number line. Example: $1 = 4/4$ and $3/4 > 1/2$.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Give students the Fraction Number Line Game Mat. Have them locate $1/4$, $2/4$, $3/4$, $4/4$, and $5/4$ on each of the number lines.
- Have students discuss their strategy for locating the numbers on one of the number lines.
- Discuss how they partitioned each number line.
- Compare the location of the numbers on each number line. What is the same? What is different?
- Work with students on the ST Math game, *Number Line Trap*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through the levels, and discuss how students determine where to place each of the fractions on the number line.
- Make comparison statements as they explain the placement of the fractions. Write equations and inequalities for these comparisons.
- Discuss the numerator and denominator of each fraction as appropriate in comparing the fractions.

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: Number Sense 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.



Grade 3 | Module 4 | Day 3

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about comparing fractions on a number line.

Puzzle Talk: Fraction Trap (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.
- Have students share out their predictions and related strategy.
- Select one student's strategy. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own 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? How does this affect their strategy?
- Display the next puzzle in Level 1. Ask students to draw a 0–2 number line to match the one in the puzzle.
- Ask: “What do you notice? What do you wonder? What do you know about the fraction in this puzzle?” Have students think, pair, share their thinking with a partner.
- Share students' thinking and solutions (e.g., drawing on their number line).

Connect and Extend

- Try a student's solution for a new puzzle, and watch the feedback.
- Ask students:
 - What do you know about this number line?
 - How is it different from the number line in the last puzzle?
 - How do we represent 1 on this number line?
 - What does the denominator tell us? The numerator?
- Repeat with additional puzzles in Level 1.
- Ask students questions about the variety of fractions that show up in the puzzles. For example, “What does a numerator of 0 tell us? What does a numerator of 1 tell us? How do we know a fraction is greater than 1?”

How does the student:

- discuss the role of the numerator and denominator in locating a fraction on the number line?
- create and partition a number line to locate fractions?
- count fraction parts to place a number on a number line?
- represent 1 as a fraction on a number line?
- compare number lines?

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

- $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{10}{9}$ Select the number closest to 1. Draw a number line, and place it on your number line. Explain how you knew this number was closest to 1. Explain how you knew where to place the number on the number line.

Instructional Stations (40 minutes)

Students will visit two stations today (20 minutes in each station). See [Instructional Stations Overview](#).

Station 1: Small Group Instruction

- Give students the Number Lines Math Mat. Have them locate $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, and $\frac{5}{4}$ on each of the number lines.
- Have students discuss their strategy for locating the numbers on one of the number lines.
- Discuss how they partitioned each number line.
- Compare the location of the numbers on each number line. What is the same? What is different?
- Work with students on the ST Math game, *Number Line Trap*.
- Use the Problem Solving Process to discuss the game with the group.
- Work through the levels, and discuss how students determine where to place each of the fractions on the number line.
- Make comparison statements as they explain the placement of the fractions. Write equations and inequalities for these comparisons.
- Discuss the numerator and denominator of each fraction as appropriate in comparing the fractions.

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: Number Sense 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.



Grade 3 | Module 4 | Day 4

My Thinking Path (5-10 minutes)

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

Puzzle Talk: Fraction Trap (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 that is similar/different to the puzzles we did yesterday? Is this fraction greater than, less than or equal to 1? How do you know?”
- 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.
- Select one student's strategy. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy?

Test and Observe

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

Analyze and Learn

- Display the next puzzle in Level 2. Ask students: “What do you know about the fraction in this puzzle? What do you know about this number line? How is it different from the number line in the last puzzle?”
 - Have students change the number line on their paper/whiteboards to match the puzzle.
- Solve the puzzles in Level 2, asking the same types of questions from Level 1.
- Display the first puzzle in Level 3.
- Ask: “How has the number line changed? How does this change our answers? How long could the number line get?” Discuss with students that as the number line extends to bigger numbers, the spaces between our whole numbers get smaller.

Connect and Extend

- Ask: “Is $\frac{1}{2}$ in the same location on the first number line we used (0-2) as it is on this number line (0-5)? Does the size of our number line affect the size of the fraction pieces? Why or why not?”
- Have some students think silently first, and then take some responses to share whole group.
- Explain that the location of $\frac{1}{2}$ doesn't change. It is still halfway between 0 and 2, but the size of the $\frac{1}{2}$ has gotten smaller because the size of the wholes on the number line have gotten smaller. Use an example to help the discussion, such as: “If we had $\frac{1}{2}$ of a cookie or $\frac{1}{2}$ of a pizza, they wouldn't be the same size because the wholes are different sizes.”
- Solve additional puzzles in Level 3.

How does the student:

- discuss the role of the numerator and denominator in locating a fraction on the number line?
- create and partition a number line to locate fractions?
- count fraction parts to place a number on a number line?
- represent 1 as a fraction on a number line?
- compare number lines?

Instructional Stations (40 minutes)

Repeat Instructional Stations from Day 3.

Whole Group Number Sense Games (15-20 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

- $7/6$, $1/4$, $3/8$, $8/9$ Select the number closest to $1/2$. Draw a number line and place it on your number line. Explain how you knew this number was closest to $1/2$. Explain how you knew where to place the number on the number line.

Closing (10 minutes)**Thinking and Reflecting Time**

- Have students complete the Post-Quiz (optional).
- 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.
- Have students review ST Math Problem Solving Journal pages for the module: My Thinking Path, Problem of the Day, Exit Tickets, and Puzzle Reflections.



Grade 3 | 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 get 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: Estimate Fractions on a Number Line

- **Play the Game: Estimate Fractions on a Number Line**
 - 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.



Grade 3 | Module 5

Topic: Compare fractions and equivalent fractions

[Module 5 Resources](#)

Students uses models to compare fractions and identify equivalent fractions.

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 identify equivalent fractions and compare fractions.

ST Math Puzzle Talks

- Fraction Bricks and Fraction Order Fill

Problem Solving

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

Day 1:

- **Problem of the Day-** Kiesha, Horatio, and Iris were seeing whose toy car would roll the farthest. They made a long track and marked it every fourth of a foot. Kiesha’s car rolled $\frac{13}{4}$ foot. Horatio’s car rolled $\frac{10}{4}$ foot. Iris’s car rolled $\frac{17}{4}$ foot. Whose car rolled the farthest? What was the order of the cars?

Day 2:

- **Problem of the Day-** Carlos, Lionel, Jamal, and Jane compared the amount of milk they each drank at lunch. Carlos drank $\frac{3}{4}$ of his milk, Lionel drank $\frac{1}{4}$ of his milk, Jamal didn’t drink any milk, and Jane drank $\frac{1}{2}$ of her milk. Compare the fraction of milk each person drank, and put them in order from most to the least amount of milk each person drank.

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 has 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.



Grade 3 | Module 5 | Day 1

My Thinking Path (5-10 minutes)

- Have students write in the topic, “Comparing fractions and equivalent 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: Fraction Bricks (20-25 minutes)

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

Notice and Wonder

- Display the first puzzle in Level 1. Ask “What do you notice about the fraction in the sky? How do we fill in the hole?” 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.
- Select one student’s strategy. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy?

Test and Observe

- Try a student’s solution and watch the feedback. Prompt students to describe what happened, and ask: “What does it mean if two fractions are equivalent?”

Analyze and Learn

- Play the same puzzle again to highlight equivalent fractions, and say to students: “Is there another fraction that is equal to this fraction?” “Can you figure out which fraction will fill this hole, too?”
- Ask students to record the solution on their paper/whiteboards by writing a number sentence using the equal sign (e.g., $2/4 = 1/2 = 3/6$).
- If the puzzle has more equivalent fractions, have students share out the missing fractions. Discuss the name of each fraction as it is added to the hole. Record the comparisons.
- Display the first puzzle in Level 2. Ask students to write down the fraction they think will fill the hole.

Connect and Extend

- Ask students to then write down a fraction that is less than the fraction shown and turn to their partner to share their fraction.
- Share some students’ solutions with the whole group.
- Ask students to then write down a fraction that is greater than the fraction shown and turn to their partner to share their fraction.
- Share some students’ solutions, and prove they are correct.
- Choose one puzzle from Level 2. Have students draw a number line and place the given fraction on the number line. Ask students:
 - How did you know where to place this fraction on the number line?
 - Why are equivalent fractions at the same spot on the number line?

How does the student:

- name each fraction before selecting it to fill the hole?
- determine an equivalent fraction?
- compare two fractions?
- write equations to show equivalence?
- discuss the numerator and denominator of each fraction?
- place equivalent fractions on a number line?

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

- Kiesha, Horatio, and Iris were seeing whose toy car would roll the farthest. They made a long track and marked it every fourth of a foot. Kiesha's car rolled $1\frac{3}{4}$ foot. Horatio's car rolled $1\frac{0}{4}$ foot. Iris's car rolled $1\frac{7}{4}$ foot. Whose car rolled the farthest? What was the order of the cars?

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.



Grade 3 | Module 5 | Day 2

My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about comparing fractions and equivalent fractions. 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.
- Give students the game mat and 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 know about the three fractions in the 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.
- Select one student’s strategy. Ask the students to think about if they agree/disagree with the strategy and why. How does it relate to their own strategy?

Test and Observe

- Try a student’s solution, and watch the feedback. Ask students to describe what happened using these questions:
 - How can you use the numerator to help compare these fractions?
 - How can you use the denominator to help compare the fractions?

Analyze and Learn

- What did they learn from the feedback? How does this affect their strategy?
- Show the next puzzle. Ask students: “If all of these fractions have the same denominator, how can we use the numerator to compare them?”
- 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. Ask the students: “How can you use what you know about 1 to order these fractions? How can you compare fractions with different denominators?”

Connect and Extend

- Have students order fractions by writing number sentences. Discuss students’ strategies. Did they change the 1 to a fraction? Did they represent the fraction with a denominator of 1? Did they make a model to find a common denominator?).
- 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 $=$.
- Repeat the questioning and number sentences for a few puzzles in Levels 1 and 2.
- Choose one puzzle from Level 2, and have students draw a number line and place the three fractions on the number line. Ask students to explain how they compared fractions using a number line.

- Display the first puzzle in Level 4, and ask students: "What is different about this puzzle and the other puzzles we have solved? How can you represent your solution to this puzzle using a number sentence?"
- Students should note that now the puzzles do not all have like numerators or denominators.
- Have students share out their strategies for comparing the fractions. Did they use an equivalent fraction? Did they decide if one of the fractions was closer to 0, $\frac{1}{2}$ or 1, etc.? Did they visualize where each fraction landed by looking at the empty spaces on the grass? Did they draw a number line? Celebrate creative strategies whenever possible.

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?

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, Lionel, Jamal, and Jane compared the amount of milk they each drank at lunch. Carlos drank $\frac{3}{4}$ of his milk, Lionel drank $\frac{1}{4}$ of his milk, Jamal didn't drink any milk, and Jane drank $\frac{1}{2}$ of her milk. Compare the fraction of milk each person drank, and put them in order from most to the least amount of milk each person drank.

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.



Grade 3 | 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 has 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:

Finalize Game Designs (Dark Blue Section)

No, Go to:

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 and 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



Grade 3 | 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 reflections 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 3 | Module 5 | Final Day

Learning Showcase and Celebration

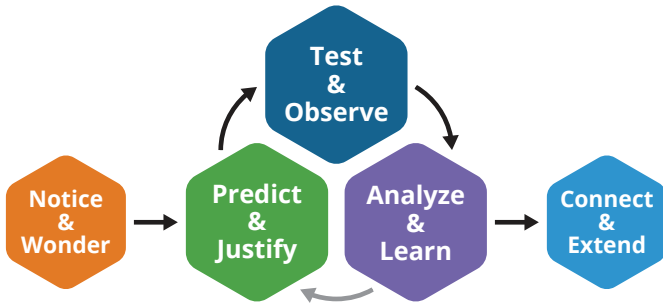
Families, board members, and community partners can be [invited](#) to attend. This is a great opportunity for students to showcase their learning from the Immersion program.

- 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 in their Activity Pages. Encourage students to keep practicing their math skills by continuing to play ST Math Puzzles at home and by completing this final activity page.



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

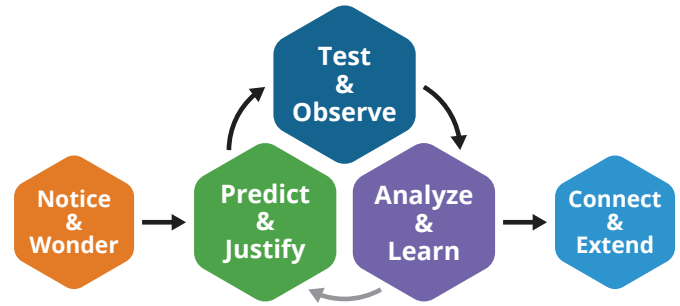
Facilitate students in analyzing the feedback/results.

- 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?



PROBLEM SOLVING PROCESS

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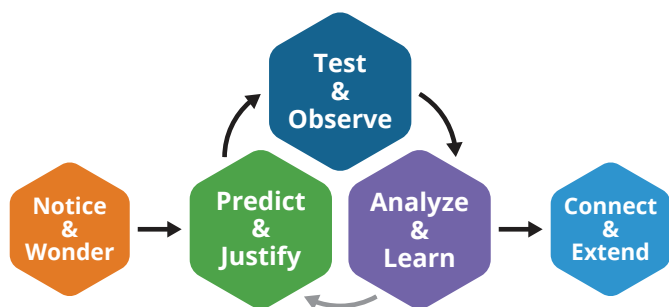
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PROBLEM SOLVING PROCESS

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

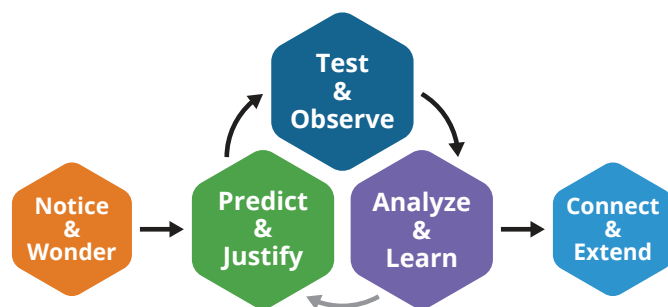
- Is there anything you learned from those earlier levels that can help you now?
- Is this like _____ that you did earlier? How is it the same? How is it different?
- What have you tried? What happened?
- What did you try that did not work? Why did it not work?
- What do you already know about (concept/problem)?

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 _____?



PROBLEM SOLVING PROCESS

When your students struggle with...

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- What do you know about this problem and what do you need to know?
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- 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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