ST Math
Summer Immersion

Kindergarten | Module 3

Topic: Subtracting Numbers up to 10

Module 3 Resources

Students work with puzzles to develop their understanding of addition and subtraction situations within 100 to solve one-step and two-step problems. Students use strategies involving situations of adding to, taking from, putting together, taking apart, and comparing unknowns in different positions. Students will represent situations with equations.

Module 3 at a Glance

Printed Resources

- **Bookmarks**
  - Problem Solving Process Bookmark
  - Problem Solving Facilitation Bookmark
- **K-2 Table Games Directions**
  - Tic-Tac-Ten
  - Number Path Race
  - *Addition War (optional)*
  - *Pyramid Make Ten (optional)*
  - *Number Kicker (optional)*
  - *Make Ten Concentration (optional)*
  - Addition Connect Four (Day 5)
  - Three Cards Make Ten (Day 5)
- **Game Mats**
  - Push Box Game Mat
  - Bird Expressions Game Mat
- **Problem Solving Journal** (pages 15–21)
  - My Thinking Path
  - Problem of the Day
  - Exit Tickets
  - ST Math Puzzle Reflections
- **Design Challenge Booklet** (pages 10–15)

Optional Printed Resources

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

Resources

- Intervention Planner

Immersion Slide Deck (slides 36–52)

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

Literature Connection (optional)

- *The Most Magnificent Thing* by Ashley Spires

Supplies for Table Games (per group)

- Tic-Tac-Ten - 1 deck of cards with face cards removed or 1 dice, 1 Tic-Tac-Ten game board, 2 different colored pencils, crayons, or markers
- Number Path Race - 1 dice, 1 game piece per player, 2 index cards (draw a + sign on one and a – sign on the other), 1 paper bag, number path game board 0-20

My Thinking Path

- This module, students will reflect on subtracting numbers to 10.

ST Math Puzzle Talks

- Push Box Subtraction
- Bird Expressions Subtraction

Problem Solving

Day 1:

- **Problem Solving Slide Deck** - She had 7 pencils in her backpack. She gave her friend some pencils. She has 5 pencils left. How many did she give to her friend?
- **Problem Solving Journal** - Students solve a similar missing addend problem involving pencils.

Day 2:

- **Problem Solving Slide Deck** - How could you describe JiJi's sticker collection to your friends? If JiJi put 2 heart stickers on his backpack and gave 1 blue star and 1 yellow happy face to Paco, how many stickers does JiJi have left?
- **Problem Solving Journal** - Students solve a problem with stickers.

Day 3:

- **Problem Solving Slide Deck** - JiJi went to the apple orchard to pick apples. If there were 10 apples on the tree and JiJi picked 4 of them, how many apples are left on the tree?
- **Problem Solving Journal** - Students solve a problem with birds flying from a tree.

Day 4:

- **Problem Solving Slide Deck** - JiJi baked some cookies for his party. How many cookies did JiJi bake? JiJi gave 2 cookies to Ostrich and 3 cookies to Robot. How many cookies did JiJi have left?
- **Problem Solving Journal** - Students solve a cookie problem.

Instructional Stations

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

Station 1: Small Group Instruction

- Days 1 & 2: Show and work through some of the puzzles in Select Box Subtraction
- Days 3 & 4: Give students problems with different problem situations. Discuss the journal questions.

Station 2: ST Math Puzzles

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

Station 3: Table Games

- Select Tic-Tac-Ten or Number Path Race.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Allow students to continue to work on their blueprints.
- Once students have completed their blueprints, they can begin to assign the task of building the game to different members of their team.
- Students can start building their games. (Note: Students need to share their blueprints with their teachers before building.)

Day 5: Design Challenge (whole group)

- Optional Literature Connection
  - Read *The Most Magnificent Thing* by Ashley Spires.
- This will be focused building time for the students. They need to complete the following tasks:
  - Complete their games.
  - Write clear rules.

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My Thinking Path (5-10 minutes)

- Have students write in the topic, “Subtracting 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.
- Have students complete the Pre-Quiz (optional).

Puzzle Talk: Push Box Subtraction (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with Push Box 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?" Allow a few students to share out.
- Give students the Push Box Game Mat. Have students come up with a strategy and illustrate their thinking on the mat.

Predict and Justify

- Give them a few minutes to discuss with a partner: What do they think is going to happen and why?
- Have a volunteer share their strategy. Before trying the strategy, discuss it with the other students (agree/disagree; what do they think will happen?).

Test and Observe

- Select a strategy and try it. Watch the feedback together and discuss what they saw.

Analyze and Learn

- Ask students what they learned from the feedback about their strategy?
- Display the next puzzle in Level 1. Ask students what they notice on the screen now. Have students Think, Pair, Share responses with a neighbor.
- Solve a couple more puzzles in Level 1 and then work together to write an equation to represent the puzzle. Remind students that the minus sign is used for subtraction. Ask students, “How do we know boxes are being subtracted in this puzzle?”

Connect and Extend

- Display the first puzzle from Level 2. Ask the students what this puzzle would look like with numbers and symbols. How would they represent it? Have students represent it on their game mat and solve it.
- Continue to work on the puzzles from Level 2. Ask students if the position of the holes in the ground matters in the puzzle. Have students share their strategies for solving the puzzles, and record students’ strategies.
- Repeat with some additional puzzles in Level 2 and Level 3.
- Do they notice any relationships or patterns? Discuss.

How does the student:

- model the problem on the Push Box Game Mat?
- write equations to represent the problem and solution?
- discuss what the numbers in their equation represent in the puzzle?
- explain the strategy they use to solve a subtraction problem?

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 (slide 39)

- She had 7 pencils in her backpack. She gave her friend some pencils. She has 5 pencils left. How many did she give to her friend?

Problem Solving Journal (page 16, top)

- Students will complete the Problem of the Day independently. Provide guidance as needed.
- Students solve a similar missing addend problem involving pencils.

Instructional Stations (40 minutes)

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

Station 1: Small Group Instruction

- Work with students on the ST Math game *Select Box Subtraction*.
- Use the Problem Solving Process to discuss the game with the group.
- Give students centimeter cubes to represent the problems.
- Have them line up the cubes they have to start (yellow squares) and show the action of taking some cubes away (red striped squares).
- Have students write equations to represent what is happening in the puzzles.

Station 2: ST Math Puzzles

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

Station 3: Table Games

- Select Tic-Tac-Ten or Number Path Race.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Allow students to continue to work on their blueprints on pages 10 –12 in their Design Challenge Booklet.
- Once students have completed their blueprints, they can begin to assign the task of building the game to different members of their team.
- Students can start building their games (students need to share their blueprints with their teachers before building).

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My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about subtracting numbers up to 10.

Puzzle Talk: Push Box Subtraction (20-25 minutes)

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

Notice and Wonder

- Ask students what they remember from the previous day's puzzles.
- Show a puzzle from Level 4. Ask the students what they notice about this puzzle. Ask them to wonder about what this puzzle would look like with numbers and symbols.
- How would they represent it? Have students represent it on their Push Box Game Mat.

Predict and Justify

- Have students think-pair-share with their neighbor explaining their representation, what they think will happen and why.
- Ask students to write an equation that represents how they solved the problem.

Test and Observe

- Have a volunteer share and try their strategy.
- What did the students notice that happened in the game?

Analyze and Learn

- Ask students to share how what they observed in the game feedback compares to the representation they created on their mat. How would the solution to this puzzle be written as an equation? How does that equation compare to their equations?
- Play through some more puzzles in this level.

Connect and Extend

- Help connect the math in the game to other problems. You can pose different addition and subtraction story problems and have students model the problems on their game mat, paper, or whiteboard.
  - For example: Gloria had 7 beads on a ring. She took 2 off to give to her friend. How many beads are on the ring now? Have students write an equation to represent the problem and solution.

How does the student:

- share their strategies to solve the puzzle?
- write equations to represent the solutions?
- write an equation to show the new total after adding 10 to the solution?
- find and discuss all the possible solutions for one puzzle?

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 42–43)

- How could you describe JiJi's sticker collection to your friends? If JiJi put 2 heart stickers on his backpack and gave 1 blue star and 1 yellow happy face to Paco, how many stickers does JiJi have left?

Problem Solving Journal (page 16, bottom)

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

Instructional Stations (40 minutes)

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

Station 1: Small Group Instruction

- Work with students on the ST Math game *Select Box Subtraction*.
- Use the Problem Solving Process to discuss the game with the group.
- Give students centimeter cubes to represent the problems.
- Have them line up the cubes they have to start (yellow squares) and show the action of taking some cubes away (red striped squares).
- Have students write equations to represent what is happening in the puzzles.

Station 2: ST Math Puzzles

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

Station 3: Table Games

- Select Tic-Tac-Ten or Number Path Race.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Allow students to continue to work on their blueprints on pages 10 –12 in their Design Challenge Booklet.
- Once students have completed their blueprints, they can begin to assign the task of building the game to different members of their team.
- Students can start building their games (students need to share their blueprints with their teachers before building).

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My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about subtracting numbers up to 10.

Puzzle Talk: Bird Expressions Subtraction (20-25 minutes)

¤ Focus on student thinking and developing problem solving skills using the Problem Solving Process.
¤ Provide students with Bird Expressions 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?" Allow a few students to share out.
- Ask: "How would you solve this puzzle?" Ask students to think of their strategy for solving the puzzle and predict what will happen when they try it.
- Work together to count out the number of birds shown in the sky. When the minus sign and number appears, say to students: “What do you think we need to do to solve this puzzle?”

Predict and Justify

- Have students come up with a strategy. Have some students share their strategies, explain what they think is going to happen and why.
- Try one of the students’ strategies. Before trying the strategy, discuss it with the other students. Ask students if they agree or disagree and what they think will happen.
- For those that disagree, ask them to propose an alternate strategy. Begin a list of students’ strategies for subtraction.

Test and Observe

- Watch the feedback together, and discuss what they saw.

Analyze and Learn

- Pause the animation, and ask students what the minus sign represents and what happens to the total number of birds when some of the birds fly away. Have students share out.
- Have students think about the feedback. What did they learn from it? What are some ideas they have about subtraction?
- Display the first puzzle from Level 2. Have students think about what they see in this puzzle and discuss what they notice.
- Give students the Bird Expressions Game Mat, and have them solve the problem on their mat.

Connect and Extend

- Try a couple of the strategies and discuss what the feedback teaches them about their strategy. Do they notice any relationships or patterns? Discuss.

How does the student:

- model the problem on the Bird Expressions Game Mat using math tools?
- discuss and chart the math concepts and vocabulary evident in the puzzles?
- represent the puzzle with numbers and symbols?
- write equations to represent the problem and solution?
- discuss what the numbers in their equation represent in the puzzle?

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 46–47)

- JiJi went to the apple orchard to pick apples. If there were 10 apples on the tree and JiJi picked 4 of them, how many apples are left on the tree?

Problem Solving Journal (page 17, top)

- Students will complete the Problem of the Day independently. Provide guidance as needed.
- Students solve a problem with birds flying from a tree.

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

- Give the students some problems involving subtraction within 10. For example:
- Maria won 10 bouncy balls at the fair. She gave some to her little sister. Now, Maria has 6 bouncy balls. How many bouncy balls did she give to her sister?
- 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 Accomplishments Log.

Station 3: Table Games

- Select Tic-Tac-Ten or Number Path Race.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Allow students to continue to work on their blueprints.
- Once students have completed their blueprints, they can begin to assign the task of building the game to different members of their team.
- Students can start building their games (students need to share their blueprints with their teachers before building).

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My Thinking Path (5-10 minutes)

- Have students reflect on what they have learned about subtracting numbers up to 10.

Puzzle Talk: Bird Expressions Subtraction (20-25 minutes)

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

Notice and Wonder

- Ask students to recall what they did in Levels 1 and 2 of Bird Expressions yesterday, perhaps pulling up a few puzzles.
- Now, open up a puzzle for Level 3 and ask students: "What do you notice? What do you wonder? How is this puzzle different?"

Predict and Justify

- Have students think-pair-share about their strategy, and encourage them to work out problems on their game mats or whiteboards.

Test and Observe

- Have students share out their strategies and test one. Observe the feedback and ask students what they see.

Analyze and Learn

- Ask students to think about how what they saw happen compares to their prediction. What did they learn from the feedback? Be sure to analyze the feedback in both correct and incorrect solutions.
- Brainstorm with students the math that they learned in this puzzle.

Connect and Extend

- Go through a few puzzles in Level 4 and 5, and ask students if they can write a number sentence to model how many birds they need to choose.

How does the student:

- model the problem on the Bird Expressions Game Mat using math tools?
- discuss and chart the math concepts and vocabulary evident in the puzzles?
- represent the puzzle with numbers and symbols?
- write equations to represent the problem and solution?
- discuss what the numbers in their equation represent in the puzzle?.

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 50–52)

- JiJi baked some cookies for his party. How many cookies did JiJi bake? JiJi gave 2 cookies to Ostrich and 3 cookies to Robot. How many cookies did JiJi have left?

Problem Solving Journal (page 17, bottom)

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

Instructional Stations (40 minutes)

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

Station 1: Small Group Instruction

- Give the students some problems involving subtraction within 10. For example:
  - Maria won 10 bouncy balls at the fair. She gave some to her little sister. Now, Maria has 6 bouncy balls. How many bouncy balls did she give to her sister?
- 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 Accomplishments Log.

Station 3: Table Games

- Select Tic-Tac-Ten or Number Path Race.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Allow students to continue to work on their blueprints.
- Once students have completed their blueprints, they can begin to assign the task of building the game to different members of their team.
- Students can start building their games (students need to share their blueprints with their teachers before building).

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Design Challenge (30-40 minutes)

Design Challenge

- Read the book *The Most Magnificent Thing* by Ashley Spires. (Optional literature connection)
  - What did you learn from this book?
  - The girl in the book used her imagination. Why is imagination important?
  - How does your imagination help you when you are designing something?
  - What did the girl do when her thing did not turn out the way she expected?
  - What did she learn from all the times she tried?
  - Do you ever try things and then get frustrated when they don't work?
  - What are some things you can do when something doesn't work?
  - Why is it important to learn from what you are doing?
- Point out the CREATE part of the Design Process. Now that students have their idea, they have planned their idea, thought about their game board, and created rules, it is time to create their game.
- Remind students that as they create their game, it might not turn out the way they were expecting, but just like the young lady in the story, we can learn from our mistakes. The idea here is to encourage the students so they don't get overly frustrated.
- Take the time to meet with groups and have them share their blueprints and game ideas. Use the game design facilitation questions to help unpack their thinking. This will help them as they are creating.
- Use the remaining time to have students start to build their games.

Whole Group Games (15-20 minutes)

During this time you will introduce Addition Connect Four and Three Cards Make Ten. 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?
- If time, repeat with the second game.

Optional Activity Page (15-20 minutes) - whole group

ST Math Activity Page

- Project the game *Bird Expressions*.
- Play a few puzzles to help students understand the game.
- Have students turn to the Activity Page: *Bird Expressions*.
- 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.

Focused Instructional Time (20 minutes)

Focused Instructional Time

- During this station time, students do not rotate. They can either be assigned to a station or allowed to choose which one to go to.
- This is an excellent opportunity to pull students who need additional support to Station 1: Small Group Instruction, where they can work with the teacher on concepts they are struggling with. Use the Intervention Planner to help target this time with students.

Station 1: Small Group Instruction

- Identify specific students for intervention or extension.
- Choose the ST Math puzzle or problem solving question that the students struggled with.
- You may choose to use the Intervention Planner to help you plan your instruction.

Station 2: ST Math Puzzles

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

Station 3: Table Games

- Allow students to choose one of the games they have learned.
- Have students play that game.
- Ask students to complete an Exit Ticket during the final 5 minutes.

Station 4: Design Challenge

- Once students have completed their blueprints and have assigned the task of building to members of their team, they can start to build their games.

Closing (10 minutes)

Thinking and Reflecting Time

- Have students complete the Post-Quiz (optional).
- Have students review their 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.