

# Puzzle Talk Facilitation Guide



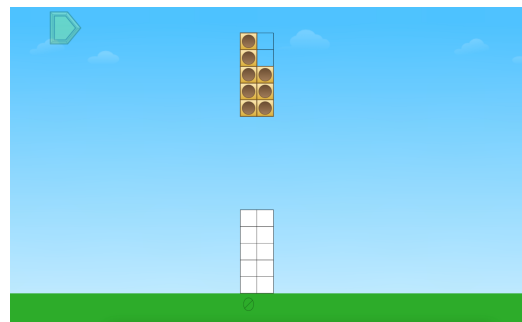
**ST Math**  
Created by MIND Research Institute

*This is a guide to provide support for facilitating student thinking as teachers engage students in academic discourse around math concepts and strategies using ST Math puzzles. This talk can be done over multiple days. **Pre-work can be given to encourage students to think about the concept prior to the Puzzle Talk.** Read the [Puzzle Talks Overview](#) to learn more.*

**Grade Level:** Kindergarten

**Objective:** Making 10 and Number Pairs

**Game:** Ten Frame



## Teacher Prep

### Description

- **Purpose:** Focus on student thinking and developing problem solving skills using guiding questions for each step in the Problem Solving Process.
- **Materials Needed:** Provide students with a [Ten Frame Math Mat](#), a [Two Empty Ten Frames Math Mat](#), a whiteboard, a dry erase marker, and counters.
- **Puzzle Location:** Grade K > Making 10 and Number Pairs > Ten Frame > Level 1
- **Duration:** Multiple days
- **Time:** May vary 10 - 20 minutes each session

### Look Fors

#### How does the student:

- model the problem on the single Ten Frame Math Mat
- write numerals to represent the number of counters and equations to represent the problem and solution?
- discuss the need to organize counters as they fill the Ten Frames?
- use the Two Empty Ten Frames Math Mat to help them solve the puzzles?
- discuss the benefits of using Ten Frames for solving problems?
- use the Two Empty Ten Frames Math Mat to help them solve the puzzles?
- discuss what each number in the equation represents in the puzzle?

### Puzzle Progression

Puzzles include ten frames with a given number of spaces shaded. In Level 1, students must create a matching ten frame. As students progress through the puzzles, they are given a partially filled ten frame or holes in the ground and need to find the missing addend to make ten or make five.



## Facilitation Suggestions (This is what a student-led discussion might look like.)

*This would occur over multiple days*

### Notice and Wonder

- Display the first puzzle from level 1.
- Ask students, "What do you notice? What do you wonder?"
- Have students turn and talk to a neighbor about what they notice and wonder about the puzzle.

### Predict and Justify

- Ask students, "How do you think we solve this puzzle?"
- Have students model and solve the puzzle on their math mat then explain to a neighbor how they solved it.
- Have students share their solutions.

### Test and Observe

- Select one of their solutions to try.
- Solve the puzzle and have students describe what happened.
- You can use the animation controls by double-clicking on the screen to pause the puzzle while students check if their answer matches the puzzle on the screen. Discuss how this might provide evidence for why the solution will work - or not work.

### Analyze and Learn

- Ask students how what happened compared to what they thought would happen.
- You can use the puzzle controls to replay and examine what happens in the puzzle.
  - If the puzzle was correct, discuss why the strategy used was successful.
  - If the puzzle was incorrect, analyze what happened and consider how to adjust the strategy to try again.
- Show the next puzzle in level 1.
- Have students model and solve the puzzle on their math mat then explain to a neighbor how they solved it.
- Have students write the numeral for the number of counters they are representing on their math mat.
- Talk with students about the ten frame and how it is organized. Ask students questions like:
  - "How many would you have if you added one more (two more) counters?"
  - "How many would you have if you took one (two) away?"



- “How does organizing the counters on the ten frame help you know the number quickly?”
- Have students share their counting strategies.
- Repeat with additional puzzles in level 1.

## Levels 2-4

- Display the first puzzle in level 2.
- Ask students, “What do you notice that is different? How might this change the strategy that you were using?”
- Have students think of how they would like to solve the puzzles. Allow a couple of volunteers to share their strategies.
- Discuss the strategies with the class. What do they think will happen?
- Play the puzzles and ask students to observe and see what happens. Discuss the feedback.
  - You can use the animation controls to pause the puzzle while students check if their answer matches the puzzle on the screen. Discuss how this might provide evidence for why the solution will work or not work.
- Display the next puzzle in level 2.
- Give students the Two Empty Ten Frames Math Mat. Have students model the puzzle on their math mat to show the solution.
- Brainstorm with students the math that they learned in this game.
- Ask students, “How do you think having the ten frame helped you solve these puzzles?”
- Repeat with additional puzzles in level 2.
- Continue to have the students work through the problems, modeling the problems on the math mats and creating equations.
- Show a puzzle from level 3 (5 holes in the ground).
- Ask students, “How is this puzzle different from the puzzles from levels 1 and 2?”
- Have students represent the puzzle on their math mats, solve the puzzle, and write an equation to represent the solution.
- Ask students what each of the numbers in the equation represents in the puzzle.
- Ask students what they know and what they need to find out in the equation.
- Solve the puzzle from level 3 and pause the animation.
- Ask students questions like:
  - “How does organizing the counters in a ten frame help you to quickly know

## Connect and Extend



- how many counters you have?”
- “How many would we have if we add \_\_\_ more counters to the ten frame?”  
“How do you know?”
- “How did having a ten frame help you to solve these puzzles?”
- Repeat with additional puzzles in level 3.
- Display the first puzzle in level 4.
- Model for students how to write an equation that includes an unknown. For example, say to students, “This puzzle shows  $7 + \text{some more} = 10$ . We could write this problem as  $7 + ? = 10$ . What number does the “?” represent? How do you know?”
- Ask students to solve for the unknown and write the completed equation on their whiteboards (e.g.,  $7 + 3 = 10$ ).
- Repeat with other puzzles in level 4.

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## Additional Ideas for Connecting and Extending this Puzzle

### Number in a Flash

Give students whiteboards and dry erase markers.

- Tell students that you are going to show different puzzles from level 1 and they should try to determine the number of counters shown and write down that number on their whiteboards as quickly as possible.
- Display a puzzle from level 1 for about 10 seconds and then hide the puzzle from students. Have students write down the number they saw and compare their answer to their neighbor's answer.
- Share answers as a class to determine which number most of the students decided was shown. Display the puzzle again to check students' answers and discuss counting strategies. Display another puzzle and repeat.
- As you do this activity, begin to shorten the time that you display the puzzle to encourage students to "read" the ten frame quickly. You may want to go through the level 1 puzzles multiple times for practice.

### I Want, I Have, I Need

Give students a copy of the "I Want, I Have, I Need" work mat and a dry erase marker. (Laminate the work mat or put it in a page protector.)

Explain to students that they want to have 10. Have them write the number 10 in the "I Want" column.

Tell students that you will display a puzzle from level 2. They should determine how many counters are shown in the puzzle and put that number in the "I Have" column. They should then determine how many counters are needed to make ten and write that number in the "I Need" column.

- Display a puzzle from level 2. Share students' solutions. Record the solutions as a number sentence. Repeat with other puzzles in level 2 and level 4.

### Math Stories

- Give students a Two Empty Ten Frames Math Mat and some counters.
- Pose different story problems and have students represent the problem using the ten frames and solve the problem. For example, "Danny has a magnet collection. He has 2 circle magnets and 8 square magnets. How many magnets does Danny have in all?"

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## **Support students who may not understand that there are multiple ways to make 10.**

- Give students a Single Ten Frame Game Mat and ten two-color counters. Have students place the counters in the ten frame one at a time. Have students count out loud to prove that there are ten total. Have students look at the filled ten frame and ask, “How many red counters are there? How many yellow counters are there? How many total counters are there?” Record students' answers as an equation. Then ask students to change a few red counters to the yellow side (or vice versa). Say to students, “Do we still have 10 counters? How would our equation change?” Work together to figure out the new equation and record it. Have students change the counters again and record the new equation. Ask students if they think they have all of the ways to change the counters but still have 10. Work together until students have found the equations and recorded them.

## **Support students who may not understand how to represent a model with an equation.**

- Give students a whiteboard, dry erase marker, 8 two-color counters and a small cup. Ask students to count the counters as they place them in the cup. Have students spill the counters and sort them into two piles by color. Have them place the piles on their whiteboard, count the number in each pile and record that number under the corresponding pile. Say to students, “How many total counters did we put in the cup? Your yellow counters plus your red counters equal 8. We can represent your piles of counters by writing an addition sentence (e.g., 3 yellow and 5 red counters would be  $3 + 5 = 8$ ).
- Have students put the counters back in the cup, spill again and repeat. Increase or decrease the number of counters as needed.



## Making Ten and Number Pairs: Ten Frame

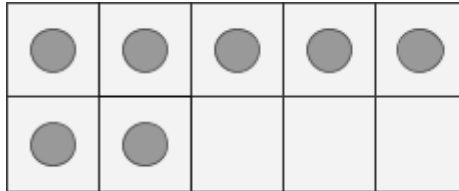
Name: \_\_\_\_\_

Date: \_\_\_\_\_

Draw 10 squares. 

Draw 10 circles. 

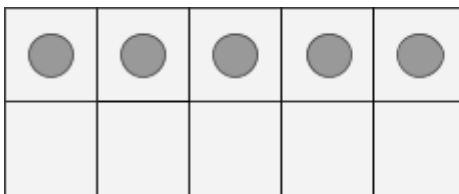
Can you make 10?



How many more?

$$7 + \underline{\quad} = 10$$

Can you make 10?



How many more?

$$5 + \underline{\quad} = 10$$

# I Want, I Have, I Need Work Mat



I WANT	I HAVE	I NEED