

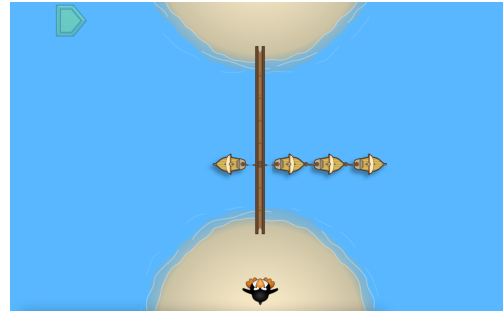


This is a guide to provide support for facilitating student thinking as teachers engage students in academic discourse around math concepts and strategies using ST Math puzzles. This talk can be done over multiple days. **Pre-work can be given to encourage students to think about the concept prior to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

**Grade Level: Second**

**Objective: Even and Odd Numbers**

**Game: Tug Boat**



## Teacher Prep

### Description

- **Purpose:** Focus on rearranging boats to create equal groups. Use guiding questions for each step in the [Problem Solving Process](#).
- **Materials Needed:** Provide students with counters, whiteboards, and markers.
- **Puzzle Location:** Grade 2 > Even and Odd Numbers > Tug Boat > Level 1
- **Duration:** Multiple days
- **Time:** May vary 10 - 20 minutes each session

### Look Fors

#### How does the student:

- think about the boats they need to move? (e.g., Do they try to equal out each row? Do they understand that they only need to make sure there are an equal number of boats on each side?)
- write the equations? (e.g., (Do they understand that the expressions on each side need to have the same total, but not necessarily the same numbers?)
- solve the puzzle? (e.g., Do they count the total and divide it in half? Do they “fair share” the boats? Do they make a 1:1 match on each side?)

### Puzzle Progression

Puzzles include an uneven amount of tugboats on either side of a bridge. Students move the tugboats to create an even amount of boats on either side of the bridge. Puzzles begin with between 4 and 18 tugboats to arrange evenly. As students progress through the puzzles, they encounter sets of boats on cards that need to be arranged evenly.



## 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 about this puzzle?"
- Allow a few students to share their thinking with the whole class.

### Predict and Justify

- Ask students to think individually about how they could solve the puzzle, then turn and share with a partner before sharing as a class.
- Students should provide mathematical reasoning for the idea they want to try. They can use their math tools and whiteboard to demonstrate their thinking.
- As students share their strategies, list these ideas for the class to consider.

### Test and Observe

- Select one of their solutions to try.
- Solve the puzzle and have students describe what happened.
- You can use the puzzle 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 to compare what happened to what they thought would happen.
- Discuss what was observed in the animation. Ask students questions like:
  - "What did we need to do to make the bridge open?"
  - "What happens if all of the boats are on one side of the bridge?"
- Repeat with additional puzzles in Level 1.
- 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.

### Connect and Extend

Levels 2-3

- As you solve puzzles, have students model their strategies and solutions on their game mats. Ask questions like:
  - "What equation could we write to represent this puzzle?" (e.g.,  $2 + 3 + 1 = 4 + 2$ )

# Puzzle Talk Facilitation Guide



**ST Math**  
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- "Is this expression true? How can we prove it?"
- "Why is the number of boats always an even number?"



## Additional Ideas for Connecting and Extending this Puzzle

### Boat Problem

- Pose the following problem to students:
  - Jiji counted 20 boats by the bridge. Show 6 different ways the boats could be arranged to open the bridge.
  - Give students math tools and pencil/paper.
  - Ask students to record their solutions as expressions.

### Weighty Problems

- Use a balance scale and 1 gram weights (or a number balance) to model the puzzles.
- Represent the puzzle before you solve it on the scale. One side will have more and be down.
- Explain that the puzzle right now is an inequality- the sides are not equal.
- Have students solve the puzzle and represent the solution on the scale.
- Show students that now the scale is balanced. Both sides equal the same number.
- Repeat with other puzzles.

### Support students who may not understand that the equal sign means balanced and not “the answer is.”

- Show students the following equations:  $2 + 3 = 5$ ,  $5 = 2 + 3$ ,  $5 = 5$ ,  $4 + 1 = 2 + 3$ . Ask them if they think each equation is true or not. Have students share their thinking. Use a balance scale or number balance to model each equation. Help students to see that the equal sign represents equality and balance (or the same amount on both sides).

### Support students who may not understand what makes a number even or odd.

- Say to students, “Jiji and Paco like to share everything! They always make sure they both have the same amount with no leftovers. Which of the following groups of things could they share and have no leftovers? (4, 9, 10, 8, 11)” Have students use math tools to model each number and split them into two equal groups. Students should note that 4, 10 and 8 will split into two groups with no leftovers and 9 and 11 will not. Explain to students that even numbers will split into 2 groups with no leftovers and odd numbers will not.



## Even and Odd Numbers: Tug Boat

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

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

Can you share 8 pieces of candy equally with a friend? What about 11 pieces of candy?  
Show how you know.

True or False:  $5 + 1 = 4 + 2$ .

Explain how you know.

Sandra has 14 crayons. She has some red, some green, and some yellow. She wants to share them equally with her sister. Show three different ways that she and her sister will have the same number of crayons and the same number of each color.