

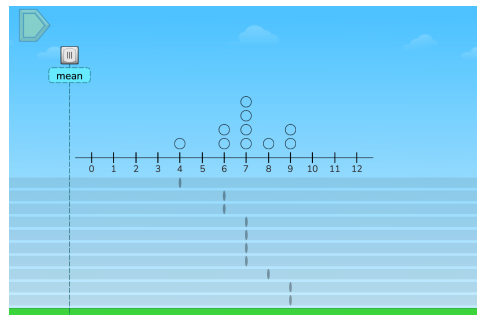


This is a guide to provide support for facilitating student thinking as teachers engage students in academic discourse around math concepts and strategies using ST Math puzzles. This talk can be done over multiple days. **Pre-work can be given to encourage students to think about the concept prior to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

Grade Level: Seventh

Objective: Line Plots and Summary Statistics (G7)

Game: Mean Absolute Deviation



Teacher Prep

Description

- **Purpose:** Focus on finding the mean absolute deviation of a given distribution. Use guiding questions for each step in the [Problem Solving Process](#) to support student thinking and the development of problem solving skills.
- **Materials Needed:** Provide students with centimeter cubes (or other counters), whiteboards, and markers
- **Puzzle Location:** Grade 7 > Line Plots and Summary Statistics (G7) > Mean Absolute Deviation > Level 1
- **Game in a Minute:** [View video](#)
- **Duration:** Multiple days
- **Time:** May vary 10 - 20 minutes for each session

Look Fors

How does the student:

- find the mean for a given data set?
- use math vocabulary to describe their thinking?
- calculate the mean absolute deviation?

Puzzle

Progression

Puzzles include finding the mean and the mean absolute deviation of a data set given some visual clues. As students progress through the levels, they are given fewer visual clues.



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, "What do you notice about this puzzle?"
- Allow a few students to share. Listen for ideas that might include:
 - "There is a dot plot labeled from 0 to 12."
 - "There is a slider bar labeled with the word mean."
 - "There are marks under the line plot that appear to line up with the data on the dot plot."
- Ask, "What do you wonder about this puzzle?" Allow students to share. Listen for ideas that might include:
 - "What could we click on this puzzle?"
 - "Where would we need to move the slider bar to represent the mean for this data set?"

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 might use centimeter cubes (or other counters) to build a dot plot, which they can then move to find the mean. Additionally, students can use their whiteboard to represent the puzzle. Ask students to consider what each part of the dot plot represents mathematically.
- List these ideas for the class to consider.

Test and Observe

- Select one of the students' strategies.
- Solve the puzzle and have students describe what happened.

Analyze and Learn

- Ask students how what happened compared to what they thought would happen.
- Replay the puzzle and pause the animation. Engage students in discussions by asking questions like:
 - "In this puzzle, how is the mean represented?"
 - For example, the position of the mean shows the blocks to the left in red and the blocks to the right in yellow. The red and yellow blocks are paired to create zero pairs.



- “This puzzle introduces vocabulary. What is deviation? What is absolute? Along with the visual in this puzzle, how can these words help us understand mean absolute deviation?”
 - For example, write these words and the students’ ways of defining them on the board. Continue to revise and clarify the meaning as you work through the remaining puzzles.
- “The mean absolute deviation is named as a number. What does this number represent in the puzzle?”
- You can use the puzzle 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.
- Repeat with additional puzzles from Level 2.

Levels 3-5

- Continue with puzzles from Level 3.
- Discuss strategies students use to find the mean average deviation.
 - “With the information we've been given, how can we find the mean average deviation?”
 - For example, adjust the slider bar until you have half of the blocks in red and half of the blocks in yellow.
 - “Is there a way we could represent this process using math symbols?”
 - For example, how does this puzzle connect to the formula to calculate absolute mean deviation?
- You can use the puzzle controls to replay and examine what happens in the puzzle.
 - If the answer was incorrect, discuss what was learned and what they think is best to try next. Have students share why that is the best way to solve the puzzle.
 - If the answer was correct, how can they take what they learned and apply it to the next puzzle?
- Continue with puzzles from Levels 4 and 5.
 - “How are these puzzles different from the puzzles we’ve solved before?”
 - “How can we calculate the mean?”
 - “How can we calculate the mean absolute deviation?”

Connect and Extend