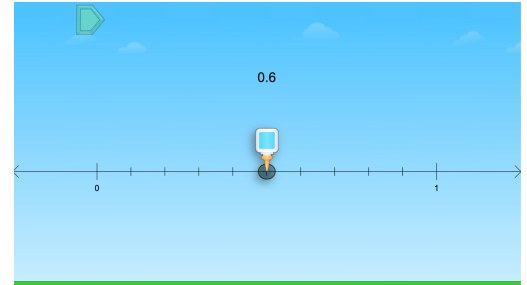


This is a guide to provide support for facilitating student thinking as teachers engage students in academic discourse around math concepts and strategies using ST Math puzzles. This talk can be done over multiple days. **Pre-work can be given to encourage students to think about the concept prior to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

Grade Level: Seventh

Objective: Rational Concepts (G7)

Game: Fraction, Percent, Decimal Trap



Teacher Prep

Description

- **Purpose:** Focus on estimating the location of fractions, decimals, and percents on the number line. 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 whiteboards and markers.
- **Puzzle Location:** Grade 7 > Rational Concepts (G7) > Fraction, Percent, Decimal Trap > Level 1
- **Duration:** Multiple days
- **Time:** May vary 10 - 20 minutes each session

Look Fors

How does the student:

- convert between fractions, decimals, and percents?
- describe the relationship between fractions, decimals, and percents?
- apply their knowledge of fractions, decimals, and percents?
- connect the number line model to other models?

Puzzle Progression

This game includes six levels. In level 1, students place a decimal or a fraction on the number line. The equivalent fraction or decimal is shown to them. Percents are introduced in level 2. Level 3 puzzles include fractions and decimals in tenths and hundredths. Level 4 introduces familiar fractions and students place equivalent fractions, decimals, and percents on the number line. In level 5, the fractions require students to do some conversion first. For example, $\frac{2}{5}$ to $\frac{4}{10}$, in order to place on the number line. In level 6, students encounter mixed numbers.



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 out. Listen for ideas that might include:
 - "There is a number line with a glue bottle above it."
 - "There is a decimal number in the sky."
- Ask, "What do you wonder about this puzzle?" Allow students to share out. Listen for ideas that might include:
 - "What could we click on this puzzle?"
 - "How could we place the glue bottle on the number line?"

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 whiteboard to represent the puzzle by drawing a number line.
- List these ideas for the class to consider.

Test and Observe

- After the students share their strategies, select one solution to try.
- Solve the puzzle and have students describe what happened.

Analyze and Learn

- Ask students how what happened compared to what they thought would happen.
 - 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?
- Show the next puzzle and have students discuss their strategies for solving it and why.
- Engage students in a discussion by asking questions like:
 - "What do the tick marks on the number line represent?"
 - For example, students might notice that there are 10 tick marks between 0 and 1 and each represents 1/10th.
 - For example, students might notice that all the fractions and decimals shown in this level are between zero and one.



- “How are fractions and decimals related?”
 - For example, students might know that a decimal is another way of writing a fraction.
 - For example, students might be able to use fractions and decimals interchangeably allowing for flexible thinking.
- 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 or will not work.
- Continue with puzzles from Levels 1 and 2. Level 1 puzzles contain only fractions and decimals. Level 2 puzzles contain percents.
- Discuss different representations in the puzzle.
 - “How can we tell whether this puzzle shows tenths or hundredths?”
 - For example, if the decimal has one number after the decimal it is tenths. If there are two numbers, it is hundredths.
 - “Looking at the number provided, choose a place on the number line that will NOT work. If we use that place, what do we expect to happen in the puzzle?”
 - For example, have students predict where the number line will be marked. Play the puzzle to see whether their prediction is correct.
 - “What is the meaning of the denominator in the fractions?”
 - “What is an equivalent fraction, decimal, or percent?”
- You can use the puzzle controls to replay and examine what happens in the puzzle.
 - If the puzzle was correct, discuss why the strategy was successful.
 - If the puzzle was incorrect, analyze what happened and consider how to adjust the strategy to try again.

Connect and Extend

Level 3

- Continue with puzzles from Level 3.
 - “How are these puzzles different from the puzzles we’ve solved before?”
 - “What are the equivalent fractions, decimals, or percents?”
 - “Is there more than one way to write this number?”
 - “Besides the number line, is there another way to represent this fraction, decimal, or percent?”