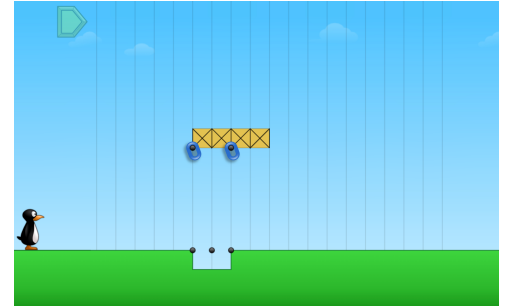


This is a guide to provide support for facilitating student thinking as teachers engage students in academic discourse around math concepts and strategies using ST Math puzzles. This talk can be done over multiple days. **Pre-work can be given to encourage students to think about the concept prior to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

Grade Level: Seventh
Objective: Proportional Relationships
Game: Stretch-A-Block



Teacher Prep

Description

- **Purpose:** Focus on representing proportional relationships by stretching or shrinking a given block. 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 a [Stretch-A-Block Game Mat](#), centimeter cubes, whiteboards, and markers.
- **Puzzle Location:** Grade 7 > Proportional Relationships > Stretch-A-Block > Level 2
- **Duration:** Multiple days
- **Time:** May vary 10 - 20 minutes each session

Look Fors

How does the student:

- determine whether the block needs to stretch or shrink?
- write an expression to represent the multiplicative relationship?
- extend the pattern using proportional reasoning?

Puzzle Progression

Puzzles include blocks in the sky with bands and holes in the ground. Students use the bands to stretch or shrink the blocks using proportional reasoning so that they fill the holes in the ground. As students progress through the puzzles, they become increasingly more challenging.



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 2.
- Ask students, "What do you notice?"
- Allow a few students to share their thinking with the whole class. Listen for ideas that might include:
 - "There is a block in the sky."
 - "There is a space in the ground. The space is smaller than the block 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 fill in the space in the ground?"

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 the Stretch-A-Block Game Mat and/or their whiteboard to represent the puzzle. Ask students to consider what needs to happen mathematically for the block in the sky to fit into the hole in the ground.
- 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 the discussion by asking questions like:
 - "Is the block in the sky stretching or shrinking?"
 - For example, students might notice that the block shrinks to fit the space in the ground.
 - "How could we represent the way the block changes using mathematical symbols?"



- For example, students might suggest multiplying by a fraction.
- 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.
- Continue with puzzles from Levels 2 and 3.
- Discuss ways to represent the change in the block. If you would like a quick formative assessment of students' thinking, students can write their ideas on whiteboards and hold them up to share.
 - "Does it matter where we place the bands?"
 - For example, try placing bands in a location that will not solve the puzzle. What do you learn from these incorrect solutions?
 - "How could the lines in the background help us describe the change in the block?"
 - For example, students might notice that the block in the sky has a length of 6 units while the hole in the ground has a length of 3 units.
 - "What expression could we write to represent how the block will change to fit the hole in the ground?"
 - For example, students might write $6 \times \frac{1}{2}$ to represent a block shrinking from 6 units to 3 units.
- 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 4-5

- Continue with puzzles from Levels 4 and 5.
 - "How are these puzzles different from the puzzles we've solved before?"
 - "If we use the relationship given in this puzzle with the number 8 (*or another number of your choice*), what would we expect to happen?"
 - "Design a puzzle using your Stretch-A-Block Game Mat. Write a description of how to solve the puzzle."