

## Objective

By the end of this lesson, the student will have a better understanding of pre-algebra concepts, specifically focusing on problem-solving techniques inspired by Richard Rusczyk. The lesson will enhance their ability to approach mathematical problems creatively and critically, using the Art of Problem Solving (AoPS) methods.

## Materials and Prep

- A notebook and pencil for taking notes and working through problems.
- Access to Alcumus for practice problems and additional resources.
- Printed examples of Richard Rusczyk's problem-solving strategies (can be found online).
- A comfortable space to work in, free from distractions.

Before the lesson, familiarize yourself with the Alcumus platform and explore some basic pre-algebra topics that you find interesting.

## Activities

### 1. Problem-Solving Warm-Up:

Start with a few warm-up problems that challenge your thinking. Use Alcumus to select problems that are slightly above your current level. This will get your brain engaged and ready to tackle more complex issues.

### 2. Creative Problem-Solving Session:

Choose a problem from Richard Rusczyk's resources and try to solve it using different approaches. Write down your thought process and any alternative methods you can think of. This will help you see that there is often more than one way to arrive at a solution.

### 3. Art of Problem Solving Project:

Create a mini-project where you teach a pre-algebra concept to someone else (a family member or friend). Use visuals or drawings to explain your concept, making it engaging and fun. This reinforces your understanding and helps develop your teaching skills.

### 4. Reflection and Discussion:

At the end of the lesson, reflect on what you learned. Write down three new things you discovered about problem-solving in pre-algebra. Discuss these with your teacher or mentor to deepen your understanding.

## Talking Points

- "Understanding pre-algebra is like building a foundation for a house; without a strong base, everything else might crumble."
- "Richard Rusczyk emphasizes that the process of solving a problem is just as important as the final answer. Can you think of a time when you learned more from making mistakes?"
- "In pre-algebra, we often deal with variables. Think of them as 'mystery numbers' that we need to uncover!"
- "Creativity in math isn't just for artists; it's about finding unique ways to solve problems. What's the most creative solution you've come up with?"
- "Using Alcumus is like having a personal math coach. It adapts to your level and helps you

grow at your own pace."

- "When you encounter a tough problem, take a step back. Sometimes, the best ideas come when you're not directly focused on the answer."
- "Try to explain your thought process out loud; teaching others can clarify your own understanding."
- "Look for patterns in problems. Often, recognizing these can simplify complex questions."
- "Remember, math is a language. The more you practice, the more fluent you become!"
- "It's okay to struggle with a problem; that's where real learning happens. What do you think is the hardest part of pre-algebra for you?"
- "Each problem you solve builds your confidence. Celebrate your small victories!"
- "Math is not just about numbers; it's about logic and reasoning. How can you apply these skills outside of math?"
- "Don't be afraid to ask for help. Every great mathematician had mentors along the way."
- "The more problems you encounter, the better you become at tackling new challenges. How do you feel about facing a new type of problem today?"
- "Finally, remember that practice makes perfect. The more you engage with pre-algebra, the more natural it will feel."