

# art of problem solving richard rusczyk Printable PDF

## Art of Problem Solving Richard Rusczyk

### Introduction to the Art of Problem Solving and Richard Rusczyk

The Art of Problem Solving (AoPS) is a renowned educational platform dedicated to fostering problem-solving skills and mathematical thinking among talented students worldwide. Central to the development of AoPS is Richard Rusczyk, an influential mathematician, educator, and author whose contributions have transformed how students approach mathematics and problem-solving. His philosophy emphasizes deep understanding, creative thinking, and perseverance, equipping students not just for competitions but for lifelong analytical skills.

### The Origins and Philosophy of Art of Problem Solving

#### The Birth of AoPS

Founded in 2003 by Richard Rusczyk and his colleagues, AoPS was conceived as a response to the need for challenging and engaging math resources that go beyond standard curricula. Rusczyk, himself a former math competition participant and winner, recognized that many students lacked access to rigorous training that could unlock their potential. The platform was designed to provide advanced problem-solving materials, interactive courses, and a community for motivated students.

#### Core Educational Philosophy

At its core, AoPS emphasizes:

- Deep understanding over rote memorization: Encouraging students to understand underlying concepts rather than merely memorize formulas.
- Problem-solving as a skill: Viewing problem-solving as an art that can be learned and refined through practice.
- Learning from mistakes: Promoting resilience and learning from errors as a vital part of growth.
- Community engagement: Building a collaborative environment where students can learn from peers and mentors.

This philosophy has resonated with students and educators, making AoPS a leading platform for

mathematical enrichment.

## Richard Rusczyk's Contributions to Mathematics Education

### Authoring Influential Textbooks

Richard Rusczyk has authored and co-authored multiple acclaimed books, including:

- The Art of Problem Solving Series: Covering topics from pre-algebra to calculus, these books are known for their clarity, challenging problems, and insightful solutions.
- Problem-Solving Strategies: Emphasizing techniques such as working backwards, pattern recognition, and combinatorial reasoning.
- Contest Preparation Materials: Specifically tailored for math competitions like Math Olympiads and AMC.

These resources have become essential tools for students aiming to excel in math competitions and develop a robust problem-solving toolkit.

### Developing Courses and Online Resources

Rusczyk played a pivotal role in designing AoPS's interactive online courses, offering instruction in:

- Problem-solving strategies
- Algebra, geometry, number theory, and combinatorics
- Advanced topics for high school students

The courses incorporate video lectures, problem sets, and discussion forums, creating an engaging and comprehensive learning environment.

### Promoting a Growth Mindset

Rusczyk advocates for cultivating a growth mindset, believing that abilities can improve with effort. This approach encourages students to persist through challenging problems and view setbacks as opportunities for learning.

## The Impact of Richard Rusczyk's Work

### Transforming Mathematics Education

Rusczyk's influence extends beyond AoPS:

- Raising standards: Inspiring students worldwide to pursue high-level mathematics.
- Creating a community: Connecting motivated learners, coaches, and teachers.
- Supporting talented students: Providing resources and mentorship to students from diverse backgrounds.

### Success Stories and Achievements

Many students who engaged with AoPS and Rusczyk's materials have achieved extraordinary success, including:

- Winning medals at international math Olympiads
- Gaining admission to top-tier universities
- Developing careers in STEM fields

His work demonstrates that with the right resources and mindset, students can reach remarkable heights.

### The Pedagogical Techniques Promoted by Rusczyk

#### Emphasizing Conceptual Understanding

Rusczyk's approach prioritizes understanding over memorization. Techniques include:

- Breaking complex problems into manageable parts
- Visualizing problems to gain insights
- Connecting new concepts to previously learned material

#### Encouraging Creative Problem Solving

Students are encouraged to develop their own strategies, such as:

- Working backwards: Starting from the desired outcome
- Looking for patterns: Recognizing structures that simplify problems
- Generalizing solutions: Extending specific solutions to broader cases

## Using Socratic Questioning

In courses and discussions, Rusczyk advocates for a Socratic method?guiding students to discover solutions through strategic questioning rather than direct instruction.

## The Structure of the Art of Problem Solving Program

### Courses and Curriculum

The AoPS curriculum is structured to build progressively:

- Foundational Courses: Prealgebra, algebra, and geometry
- Intermediate Courses: Number theory, combinatorics, and advanced algebra
- Advanced Courses: Calculus, linear algebra, and beyond
- Competition Prep: AMC, Math Olympiad, and other contests

Each course combines theory, problem sets, and collaborative discussion.

### Community and Competitions

A vital aspect is the AoPS community, which includes:

- Online forums: For discussing problems and sharing solutions
- Math competitions: Providing training, practice problems, and strategies
- Local and national events: Hosting MathCounts, AMC, and Olympiad training camps

This ecosystem fosters peer learning and mentorship.

## The Legacy and Future of Rusczyk's Work

### Continuing Innovation

Rusczyk and AoPS continue to innovate with:

- New courses on emerging topics like computer science
- Interactive problem-solving platforms
- Integrations with university-level courses

## Inspiring Future Educators

Many former students and teachers trained through AoPS now contribute to the community, perpetuating Rusczyk's educational philosophy.

## Broader Impact on Education

The success of AoPS has influenced educational reform, emphasizing challenge-based learning and critical thinking in STEM education.

## Conclusion

The art of problem solving as championed by Richard Rusczyk is a profound approach that intertwines creativity, perseverance, and conceptual understanding. His dedication to nurturing mathematically curious minds has created a global community where talented students are empowered to excel. Through his textbooks, courses, and vision, Rusczyk has transformed mathematics education into an inspiring and accessible art form—one that cultivates not only problem-solving skills but also resilience, curiosity, and a lifelong love for learning.

## Art of Problem Solving Richard Rusczyk: An In-Depth Examination of a Mathematical Phenomenon

Mathematics has long fascinated scholars, students, and enthusiasts alike, serving as a universal language that transcends cultural and geographical boundaries. Among the many contributors to the field of mathematical education and problem-solving, Richard Rusczyk stands out as a pivotal figure, particularly through his pioneering work with the Art of Problem Solving (AoPS) community. This article provides a comprehensive exploration of Art of Problem Solving Richard Rusczyk, delving into his background, philosophy, educational initiatives, and the profound impact he has had on mathematics education worldwide.

## Introduction to Richard Rusczyk and the Art of Problem Solving

Richard Rusczyk, born in 1971, is an American mathematician and educator renowned for his dedication to cultivating problem-solving skills among young learners. His journey into mathematics began early, marked by a passion for challenging problems and competitive math competitions. Recognizing the need for accessible, rigorous mathematical resources, Rusczyk co-founded the Art of Problem Solving in 2003, a platform dedicated to high-performing students seeking to deepen their understanding of mathematics beyond standard curricula.

The Art of Problem Solving has since evolved into a comprehensive educational ecosystem, offering online courses, textbooks, math competitions, and community forums. The core philosophy centers on fostering mathematical creativity, resilience, and critical thinking—skills that Rusczyk believes are

essential for success in mathematics and beyond.

## Background and Educational Philosophy of Richard Rusczyk

### Early Life and Mathematical Foundations

Growing up in Colorado, Rusczyk was an avid participant in math competitions from a young age. His exemplary performance in the Math Olympiad and other contests highlighted his innate talent and passion. This early exposure shaped his belief that challenging problems are not only essential for mastery but also vital in developing problem-solving intuition.

### Core Educational Principles

Rusczyk's approach to mathematics education hinges on several key principles:

- Problem-Centric Learning: Emphasizing solving non-routine, creative problems over rote memorization.
- Deep Understanding: Encouraging students to grasp underlying concepts rather than superficial familiarity with formulas.
- Growth Mindset: Promoting perseverance, resilience, and the view that difficulty is an opportunity for learning.
- Community and Collaboration: Building supportive networks where students can share ideas, strategies, and solutions.

This philosophy is reflected in the structure of AoPS resources, which challenge students to think critically and explore multiple solution pathways.

## The Art of Problem Solving: Educational Resources and Initiatives

### Textbooks and Curriculum

One of Rusczyk's most significant contributions is the development of highly acclaimed textbooks designed for students aiming to excel in mathematics competitions and beyond. Notable titles include:

- The Art of Problem Solving series (Volumes 1 and 2)
- Introduction to Algebra
- Introduction to Counting & Probability
- Precalculus

These texts are characterized by their rigorous exercises, emphasis on problem-solving techniques, and engaging explanations. They serve as primary resources for students preparing for competitions like MathCounts, AMC, and Olympiads.

## Online Courses and Webinars

Building on the foundation of print resources, Rusczyk pioneered online courses that provide interactive lessons, problem sets, and real-time feedback. The AoPS online platform offers courses such as:

- Intermediate and advanced problem-solving
- Number theory
- Geometry
- Combinatorics

These courses are tailored to challenge students at various levels and often include problem sets designed to develop creative solutions.

## Math Competitions and Community Engagement

Rusczyk's vision extends beyond textbooks and courses. He has been instrumental in organizing and promoting math competitions, including:

- AMC (American Mathematics Competitions)
- AIME (American Invitational Mathematics Examination)
- USA Mathematical Olympiad (USAMO)

Furthermore, the AoPS community forums foster peer-to-peer learning, discussion, and mentorship, creating a vibrant ecosystem for aspiring mathematicians.

## Impact and Recognition

### Transforming Math Education

Through his initiatives, Rusczyk has significantly impacted math education for talented students. His resources have empowered thousands of students worldwide to develop problem-solving skills, pursue mathematical competitions, and pursue STEM careers with confidence.

The success stories of AoPS alumni—many of whom have gone on to attend prestigious universities

and win national and international awards?attest to the effectiveness of his approach.

## Academic Achievements and Awards

While Rusczyk himself is not primarily recognized for academic awards, his influence is acknowledged through the widespread adoption of his materials and the success of students trained under his methodology. Organizations like the Mathematical Association of America (MAA) have lauded AoPS's contributions to nurturing mathematical talent.

## Critical Analysis of Rusczyk's Methodology

### Strengths

- Rigorous yet Accessible: The balance between challenge and accessibility makes AoPS resources appealing to motivated students.
- Focus on Critical Thinking: Encourages students to develop reasoning skills that transcend memorization.
- Community Building: Fosters collaboration and peer support, which are crucial for sustained engagement.

### Challenges and Limitations

- Intensive Nature: The rigorous approach may be daunting for some students and could create barriers for those with less prior exposure.
- Resource Accessibility: While online resources are extensive, they may be less accessible in regions with limited internet connectivity.
- Potential for Overemphasis on Competition: While competitions are excellent motivators, an overemphasis might overshadow pure mathematical curiosity and exploration.

Despite these challenges, Rusczyk's methodology remains influential and widely respected in the realm of mathematical problem solving.

## Conclusion: The Legacy of Richard Rusczyk and the Art of Problem Solving

The Art of Problem Solving Richard Rusczyk epitomizes a transformative approach to mathematics education—one that champions problem-solving excellence, critical thinking, and community engagement. His work has not only elevated the standards of math competitions but also inspired countless students to pursue mathematical discovery with passion and perseverance.

As the landscape of education continues to evolve, Rusczyk's emphasis on deep understanding and resilient problem-solving remains profoundly relevant. His contributions serve as a blueprint for educators and learners aspiring to push the boundaries of mathematical achievement.

In summation, Richard Rusczyk's legacy is rooted in his unwavering commitment to nurturing the next generation of mathematicians—an art that combines rigor, creativity, and perseverance to unlock human potential through numbers and logic.

**Question** Who is Richard Rusczyk and what is his contribution to problem solving?  
**Answer** Richard Rusczyk is a mathematician and educator known for founding Art of Problem Solving (AoPS), which provides resources and training to students interested in advanced problem solving and math competitions. What is the main goal of the Art of Problem Solving program created by Richard Rusczyk? The main goal of AoPS is to develop mathematical problem-solving skills in students through challenging problems, courses, and a community that prepares them for math competitions and deep mathematical understanding. How does Richard Rusczyk's approach to teaching problem solving differ from traditional math education? Rusczyk emphasizes exploring problems creatively, encouraging critical thinking, and understanding fundamental concepts deeply, rather than rote memorization and standard procedures. What are some popular books authored by Richard Rusczyk related to problem solving? Some popular books include 'The Art of Problem Solving' series, which covers topics like algebra, geometry, and number theory, designed to challenge and develop students' problem-solving abilities. How has Richard Rusczyk influenced math competition culture through his work? By creating resources, courses, and problem sets that push students beyond traditional curricula, Rusczyk has helped elevate the level of problem-solving skills among young mathematicians worldwide. What role does Richard Rusczyk's Art of Problem Solving community play in student development? The AoPS community provides forums, online classes, and competitions where students collaborate, share ideas, and learn from experts, fostering a supportive environment for advanced problem solving. How can students best utilize Richard Rusczyk's resources to improve their problem-solving skills? Students should actively engage with the problem sets, participate in online discussions, attend courses, and study the solutions thoroughly to enhance their understanding and creative problem-solving abilities.

**Related keywords:** problem solving, Richard Rusczyk, math competitions, math curriculum, Art of Problem Solving, problem solving strategies, math olympiad, math education, contest math, math training

## problem and solution short passages 6th grade

**problem and solution short passages 6th grade** are essential tools for young students to develop

their reading comprehension, critical thinking, and writing skills. These passages help students identify issues within a story or real-life scenario and think creatively about how to resolve them. In the 6th grade, students are at a crucial stage where they can begin to understand more complex texts and practice summarizing information concisely. This article explores the importance of problem and solution short passages for 6th graders, provides strategies for teaching and learning these skills, and offers example passages to enhance understanding.

## Understanding Problem and Solution Short Passages for 6th Graders

### What Are Problem and Solution Passages?

Problem and solution passages are a type of reading comprehension text that presents a specific issue or challenge (the problem) and then discusses one or more ways to resolve or address the issue (the solution). These passages are designed to help students practice identifying key elements within a story or informational text.

Key features of problem and solution passages include:

- Clear presentation of a problem or challenge.
- Multiple potential or actual solutions.
- Explanation of how solutions work or why they are effective.
- Contextual clues to help identify parts of the passage.

### Why Are They Important for 6th Grade Students?

For 6th graders, mastering problem and solution passages supports several academic and cognitive skills:

- Enhances reading comprehension by focusing on main ideas and details.
- Develops critical thinking by analyzing how problems are addressed.
- Prepares students for more complex texts in later grades.
- Builds writing skills through summarizing and explaining solutions.
- Encourages problem-solving attitudes applicable in real life.

## Strategies for Teaching Problem and Solution Passages to 6th Graders

Teaching 6th graders how to effectively understand and write problem and solution passages involves engaging activities, guided practice, and scaffolded instruction. Here are some effective

strategies:

## 1. Use Visual Aids and Graphic Organizers

Graphic organizers help students visually map the problem and solutions within a passage. Examples include:

- T-charts labeled "Problem" and "Solution."
- Cause-and-effect diagrams.
- Story maps highlighting the problem and resolution.

## 2. Practice Guided Reading

Read passages aloud as a class, pausing to discuss:

- What the problem is.
- Possible or actual solutions.
- How the solution addresses the problem.

## 3. Encourage Questioning

Ask students targeted questions:

- What is the main problem in this passage?
- How do the characters try to solve the problem?
- Why do you think the solution worked or didn't work?

## 4. Have Students Write Their Own Passages

Students can practice creating their own problem and solution passages by:

- Writing about personal experiences.
- Creating stories with clear problems and resolutions.
- Summarizing existing stories or articles.

## 5. Incorporate Real-Life Scenarios

Use real-world problems relevant to students' lives to make learning meaningful, such as:

- Bullying at school.
- Environmental issues.
- Family conflicts.

## **Examples of Problem and Solution Short Passages for 6th Grade**

Below are sample passages suitable for 6th-grade learners to practice identifying problems and solutions.

### **Example 1: School Lunch Issue**

Problem:

Many students at Lincoln Middle School didn't enjoy the new lunch menu. The food was cold, and students felt it didn't taste good.

Solution:

The school cafeteria staff asked students for feedback and started offering a variety of popular dishes. They also improved food storage to keep meals warm.

Discussion:

Students can identify the problem as dissatisfaction with school lunches and the solution as gathering feedback and improving food quality.

### **Example 2: Lost Pet**

Problem:

Emma's family's dog, Max, ran away during a walk in the park. Emma was worried because Max was not used to being outside alone.

Solution:

Emma and her family put up flyers around the neighborhood and checked local shelters. Soon, someone recognized Max and called them.

Discussion:

In this passage, the problem is Max running away, and the solution involves community help and searching efforts.

### **Example 3: Road Construction Delay**

Problem:

The main road to the town was closed for construction, making it difficult for residents to get to work and school.

Solution:

The city authorities set up a detour route and shared updates through local radio and signs to help drivers find alternative paths.

Discussion:

The problem is the road closure, and the solution is providing detours and communication to minimize inconvenience.

## **Tips for Creating Effective Problem and Solution Passages**

When designing your own passages or helping students write them, keep these tips in mind:

Key points for effective passages:

- Clearly state the problem at the beginning.
- Use descriptive details to make the problem relatable.
- Offer logical and feasible solutions.
- Include transitional words like "because," "so," "therefore," to connect ideas.
- End with a summary or a reflection on the effectiveness of the solution.

## **Practice Activities to Reinforce Learning**

To help 6th graders master problem and solution short passages, consider incorporating these activities:

- Story Mapping: Students read a passage and fill out a story map highlighting the problem and solutions.
- Group Discussions: Small groups analyze passages and discuss possible alternative solutions.
- Writing Exercises: Students write their own problem and solution stories based on prompts.
- Quiz Games: Use quizzes to identify problems and solutions in various texts.

## Conclusion

Problem and solution short passages are powerful educational tools for 6th grade students. They not only improve reading comprehension but also foster critical thinking and problem-solving skills. By understanding how to recognize problems and think about effective solutions, students become better prepared for academic challenges and real-life situations. Teachers and parents can support this learning by providing engaging activities, clear examples, and opportunities for creative writing. With consistent practice, 6th graders will develop confidence in analyzing texts and expressing their ideas clearly and effectively.

Remember: The key to mastering problem and solution passages is practice, discussion, and application. Encourage students to look for problems and solutions everywhere—from stories and articles to everyday life—and watch their skills grow!

## Problem and Solution Short Passages 6th Grade: A Guide to Developing Critical Reading Skills

### Introduction

Problem and solution short passages 6th grade is a fundamental component of reading comprehension education at this level. As students transition into middle school, they encounter more complex texts that require not only understanding the main idea but also analyzing the structure of the passage. One common format that educators emphasize is the problem and solution passage. These passages help students develop critical thinking by identifying challenges and understanding how they are addressed. This article explores what problem and solution passages are, why they are important for 6th-grade learners, and practical strategies to improve skills in reading and analyzing these types of texts.

### What Are Problem and Solution Short Passages?

#### Defining the Structure

Problem and solution passages are a specific type of informational text that presents a challenge and then offers one or more ways to resolve it. They are designed to help students recognize how authors organize information and to develop their ability to identify key ideas quickly.

### Key Characteristics:

- **Introduction of a Problem:** The passage begins by describing an issue or challenge that needs attention.
- **Explanation of the Problem:** Details about why the problem exists and its impact.
- **Proposed Solutions:** The text then discusses possible ways to solve or address the problem.
- **Resolution or Conclusion:** Often, the passage ends with the most effective solution or a summary of how the problem is resolved.

### Example:

Imagine a paragraph about a neighborhood with a lot of litter. It explains how trash affects wildlife and the community's health. Then, it discusses solutions such as organizing cleanup events and installing trash bins. The passage ends by emphasizing the importance of community effort.

### Why Are Problem and Solution Passages Important for 6th Graders?

#### Developing Critical Thinking

At the 6th-grade level, students are expanding their vocabulary and comprehension skills. Recognizing the problem-solution structure helps them:

- **Understand Cause and Effect:** See how problems lead to certain consequences and how solutions can prevent or fix issues.
- **Enhance Analytical Skills:** Identify the main ideas and supporting details.
- **Improve Writing Skills:** Learn how to structure their own writing logically.

#### Real-World Relevance

These passages mirror real-life situations, such as solving community issues, personal challenges, or environmental problems. By mastering this reading skill, students become better equipped to analyze situations critically and contribute thoughtfully to discussions.

#### Challenges Students Face with Problem and Solution Passages

While these passages are valuable, students often encounter difficulties such as:

- **Identifying the Problem:** Sometimes, the problem is implied rather than explicitly stated.

- Distinguishing Between Multiple Solutions: Recognizing which solution is most effective or emphasized.
- Understanding Vocabulary: Complex words or technical terms can hinder comprehension.
- Connecting Ideas: Linking the problem with its solution requires careful reading and analysis.

Recognizing these challenges is the first step toward developing effective strategies to overcome them.

### Strategies to Improve Reading and Comprehension of Problem and Solution Passages

- Teach Signal Words and Phrases

Signal words help students identify parts of the passage. Examples include:

- Problem indicators: "The issue is," "The challenge," "A common problem."
- Solution indicators: "To solve this," "One way to fix it," "The solution is."

- Use Graphic Organizers

Visual tools aid in breaking down the passage:

- Problem-Solution Charts: Students can record the problem and note each proposed solution.
- Flowcharts: Show the progression from identifying a problem to implementing a solution.
- Mind Maps: Connect related ideas and solutions visually.

- Practice Summarization

Encourage students to paraphrase each section:

- Restate the problem in their own words.
- Summarize the proposed solutions.
- Conclude with the overall resolution.

This deepens understanding and retention.

### - Ask Guided Questions

Use targeted questions to activate critical thinking:

- What is the main problem discussed?
- Why is this problem important?
- What solutions are suggested?
- Which solution do you think is the best? Why?
- How does this passage relate to real life?

### - Build Vocabulary Skills

Introduce new words within context and practice using them in sentences. Understanding key terms makes comprehension smoother.

## Classroom Activities to Reinforce Skills

### Interactive Read-Alouds

Read problem and solution passages aloud, pausing to discuss key points and signal words.

### Identify and Highlight

Provide students with texts where they highlight problem and solution phrases, fostering close reading.

### Group Discussions

Small groups analyze a passage together, identifying problems and solutions, then share findings with the class.

### Writing Practice

Have students write their own problem-solution paragraphs about issues they care about, reinforcing structure and comprehension.

## Examples of Problem and Solution Passages for 6th Grade

### Sample Passage 1:

**Problem:** Many students in the school cafeteria waste food because they don't finish their meals.

**Solution:** The school can implement a "finish your plate" campaign and donate leftovers to local shelters.

**Outcome:** These actions help reduce waste and support community members in need.

**Sample Passage 2:**

**Problem:** The local park is overrun with litter, making it unpleasant for visitors.

**Solution:** Organizing monthly cleanup days and installing more trash bins encourage visitors to keep the park clean.

**Outcome:** A cleaner park becomes more inviting and safe for everyone.

**Conclusion**

Mastering problem and solution short passages is a vital skill for 6th-grade students. It enhances their ability to analyze texts critically, understand cause-and-effect relationships, and develop logical thinking. By learning to identify key signal words, using graphic organizers, practicing summarization, and engaging in interactive activities, students can become confident readers capable of tackling complex informational texts. These skills not only support academic success but also prepare them to navigate real-world challenges with insight and problem-solving abilities. As educators and parents, fostering these skills early lays the foundation for lifelong critical thinking and effective communication.

**Question** What is a problem and solution short passage? A problem and solution short passage is a short text that explains a problem and then describes how it can be solved. Why is it important to understand problem and solution passages? Understanding these passages helps you improve reading comprehension and learn how problems can be fixed in real life. How can I identify the problem in a passage? Look for sentences that describe an issue or something that is going wrong; these often start with words like 'problem,' 'issue,' or 'difficulty.' What clues indicate the solution in a problem and solution passage? Solutions are usually described after the problem, often starting with words like 'to fix,' 'solution,' 'so,' or 'therefore.' Can you give an example of a problem and solution short passage? Yes. Example: 'Many students forget their homework. To solve this, students can use a planner or remind themselves before leaving school.' How can I practice identifying problems and solutions in passages? Practice by reading short stories or articles and underlining the problem and solution parts. Then, check if you identified them correctly. What are some common words used in problem and solution passages? Common words include 'problem,' 'issue,' 'difficulty,' 'solution,' 'fix,' 'answer,' and 'therefore.' Why are problem and solution passages

useful in everyday life? They help you understand how to think about problems and find ways to solve them in situations like school, home, or with friends. What should I do if I can't find the solution in a passage? Try reading the passage carefully again and look for sentences that suggest how the problem can be fixed or improved. How can teachers help students understand problem and solution passages better? Teachers can provide examples, ask questions about the passages, and have students practice identifying problems and solutions regularly.

**Related keywords:** problem-solving, short passages, 6th grade reading, comprehension, solutions, reading skills, text analysis, critical thinking, practice passages, educational resources

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