

Problem Solving Tasks Fostering Mathematical Discourse

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Outline of Workshop

- Problem Solving
- Sharing Solutions
- Principles to Actions

Problem Solving

- (1) Provide a solution strategy to the problem.
- (2) Make sure to list any questions you have on the problem while you are working on it, such as:
 - clarifying questions,
 - investigation questions,
 - extension questions.
- (3) Address as many of your neighbor's question as you can.

Reverse-Subtract-Reverse-Add *Problem

- Take a three-digit number and Reverse its digits
- Subtract the smaller from the larger to get your new number.
- For that new number, reverse the digits.
- Add together the new number with its reversal.

Example

- 123 and Reversal: 321
- Subtract: $321 - 123 = 198$
- Reversal: 891
- Add: $891 + 198 = \mathbf{1089}$

Try this process with several numbers. What do you notice about the final number? Make a conjecture about the final number and test your conjecture.

*Driscoll, M. (1999). *Fostering Algebraic Thinking: A Guide for Teachers, Grades 6-10*. Heinemann, 361 Hanover Street, Portsmouth, NH 03801-3912.

Mathematical Practices & Observations

- What mathematical practices did you engage in during this problem?
- What aspects of this experience facilitated connecting the math content to these practices?

Mathematics Teaching Practices

Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.

Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

- **Facilitating meaningful mathematical discourse:** Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
- **Posing purposeful questions:** Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.
- **Supporting productive struggles:** Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Math Teachers' Circle

- Find a circle near you:

<http://www.mathteacherscircle.org/member-circles/>

- The Northern Colorado Math Teachers' Circle:

<http://www.unco.edu/nhs/mathsci/mtc/>

NORTHERN COLORADO MATH TEACHERS' CIRCLE

