

Differentiated Math Instruction: Using Rich Problems to Reach All Learners

Syllabus (Subject to change.)

Rich problems invite a variety of solution strategies. They provide an effective vehicle for accommodating a range of levels and learning styles. In this six-week course for teachers of grades 3-8, participants will explore strategies for using problem solving to build skills and concepts for struggling students and to provide challenge for those who soar. The problems will be drawn from the Math Fundamentals service (FunPoW, upper elementary grades).

Course Goals

- To enhance your understanding of NCTM's Content Standards and the role of rich problems in addressing them.
- To develop your own ability to solve and analyze math problems in order to take better advantage of a problem's potential..
- To learn problem solving strategies that allow all children to grow.
- To learn how rich problems help teachers differentiate instruction for learners with diverse developmental levels and learning styles.
- To learn strategies for making problems both more accessible and more challenging in order to reach all learner.
- To participate in an ongoing community of teachers using rich problems.

Instructor: [Claire Mead](#), FunPoW Coordinator

Course Requirements

- Participation requires Problem of the Week membership at the Class level or higher. Non-members or Individual Teacher members may purchase the necessary access at a discounted rate.
- This moderated course will take place in Drexel's Blackboard Vista environment (formerly WebCT). The only technical requirements are a web browser and Internet access.
- The course will consist of six one-week sessions that each begin on Thursday morning and end Wednesday night. Participants will have some flexibility within each week but are expected to complete the activities during the assigned week. Each week's assignments are due by Wednesday night, unless otherwise noted. Participants should expect to spend 3-5 hrs per week on course activities.
 - Readings: All required readings are available from within the course or elsewhere online.
 - Online discussions and blogs: Much of the value of the course will come from sharing ideas among the group. You will be expected to post your own thoughts and experiences, and to read and respond thoughtfully to your classmates' postings.
 - Online Chats: These will be offered during two time slots each week. Participants are required to attend at least four of them during the span of the course and are welcome to arrange additional chats with the instructor or each other.

Credit

Participants who successfully complete the course will receive a certificate indicating that they have completed 20 hours of professional development. This is equivalent to 2 Continuing Education Units (CEUs).

Course Activities

Week 1 – Know the Math

- Introduce yourself to the rest of the group via the Week 1 *Getting to Know You* Discussion topic.
- Read Lessons:
 - Introduction
 - Characteristics of a Rich Problem
 - Know the Math
- Read NCTM's Content Standard on **Number and Operations**.
- Adopt a problem in the Number and Operations Discussion blogs: Solve and post your solution. List key concepts and skills. Align to your curriculum..
- Read "A Problem-Solving Platform," from *The Differentiated Classroom: A Guide for Teachers, K–8*, by Miki Murray.
- Post an initial message to the Week 1 *What makes it rich?* Discussion topic.

Week 2 – Know the Students

- Return to the Number and Operations blogs.
 - Choose a classmate's problem. Add an alternate solution method.
 - Choose a different classmate's problem. Ask a clarifying question or make a suggestion that the solver can use to improve her/his solution.
 - Read questions and/or suggestions about your Week 1 solution and revise.
- Return to the Week 1 *What makes it rich?* Discussion topic. Read the postings of your classmates and post a thoughtful reply to at least two of them.
- Read NCTM's Content Standard on **Algebra**.
- Adopt a problem in the Algebra Discussion blogs: Solve and post your solution. List key concepts and skills. Align to your curriculum.
- Read:
 - Know the Students and complete the included assignments
 - *Formative and Summative Assessments in the Classroom*
 - "Two Thumbs Way, Way Up"
- Post to the Week 2 *Know the Students* Discussion topic.

Week 3 – General Strategies: Creating a Community of Math Learners & Understanding the Problem

- Return to the Algebra blogs.
 - Choose a classmate's problem. Add an alternate solution method.
 - Choose a different classmate's problem. Ask a clarifying question or make a suggestion.
 - Read questions and/or suggestions from classmates about your Week 2 solution and revise.
- Return to the Week 2 *Know the Students* Discussion topic. Respond to at least two classmates.
- Read NCTM's Content Standard on **Geometry**.
- Adopt a problem in the Geometry and Miscellaneous Discussion blogs.
- Read:
 - Preparing to Teach with PoWs
 - Understanding the Problem
 - Creating a Community of Math Learners
 - "Orchestrating Discussions"
- Reflect on the week's readings by posting to the Week 3 *General Strategies* Discussion topic.

Week 4 – Strategies for Making Problems More Challenging

- Return to the Geometry and Miscellaneous blogs.
 - Choose a classmate's problem. Add an alternate solution method.
 - Choose a different classmate's problem. Ask a clarifying question or make a suggestion.
 - Read questions and/or suggestions from classmates about your Week 3 solution and revise.

- Return to the Week 3 *General Strategies* Discussion topic. Respond to at least two classmates
- Read NCTM's Content Standard on **Measurement**.
- Adopt a problem in the Measurement blogs.
- Read:
 - Aspects and Characteristics to Consider
 - Make a Problem More Challenging
 - General Strategies for Accommodating High Achieving Students
 - Three journal articles about increasing the level of challenge for gifted math students
- Reflect on the week's readings by posting to the Week 4 *Strategies for High Achieving Students* Discussion topic.

Week 5 – Strategies for Making Problems More Accessible

- Return to the Measurement blogs.
 - Choose a classmate's problem. Add an alternate solution method.
 - Choose a different classmate's problem. Ask a clarifying question or make a suggestion.
 - Read questions and/or suggestions from classmates about your Week 4 solution and revise.
- Return to the Week 4 *Strategies for High Achieving Students* Discussion topic. Respond to at least two classmates
- Read NCTM's Content Standard on **Data Analysis and Probability**.
- Adopt a problem in the Data Analysis and Probability blogs.
- Read:
 - Making a Problem More Accessible
 - Hint Cards
 - Two journal articles about accommodating special needs students in the math classroom.
- Reflect on the week's readings by posting to the Week 5 *Strategies for Struggling Students* Discussion topic.

Week 6 – Putting it All Together

- Return to the Data Analysis and Probability blogs.
 - Choose a classmate's problem. Add an alternate solution method.
 - Choose a different classmate's problem. Ask a clarifying question or make a suggestion.
 - Read questions and/or suggestions from classmates about your Week 5 solution and revise.
- Read:
 - "Creating Multiple Representations in Algebra: All Chocolate, No Change"
 - The Role of Technology
 - Math Tools
 - Spreadsheets as Tools for Learning
- Develop a plan for using a problem in your classroom.
- Share some ways in which this course has shaped your thinking and teaching in the Week 6 *Final Reflections* Discussion topic.
- Complete our course evaluation.

Please email [Claire Mead](#) with any questions.