Teaching Mathematics with the Problems of the Week

Instructor: Claire Mead

This course is designed for subscribers of any of our Problem of the Week services, who want to implement problem solving more effectively in their classrooms. The content will be at the Math Fundamentals level (FunPoW, upper elementary grades). We assume that participants...

- have some familiarity with PoWs.
- are able to locate them and submit a solution online.
- work with children who will be able to submit solutions online (classroom teachers, math coaches, curriculum supervisors, etc).
- are able to spend 3 to 5 hours per week on course activities.

Course Goals

We hope this course helps you:

- Enhance your understanding of NCTM's Process Standards and the role of PoWs in addressing them.
- Develop concepts of mathematical problem solving and communication, both your own and your students'.
- Learn more about assessing student work and providing effective feedback.
- Expand your toolkit of strategies for managing problem solving in your classroom.
- Participate in an ongoing community of teachers using PoWs.

Course Requirements

The course will take place online using the Epsilen environment of the New York Times Knowledge Network and the Math Fundamentals Problem of the Week (FunPoW). Participants will need to have:

- PoW Class Membership (or higher)
- Computer with Internet access

The course will consist of six one-week sessions that each begin on Thursday morning and end Wednesday night. It will cover the cycle of three FunPoWs (designated A, B, and C below). Participants will have some flexibility within each week but are expected to complete the activities during the assigned week. Please complete each week's assignments by Wednesday, unless otherwise noted.

> **Discussions and Journals**: 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. You are required to attend at least four of them during the span of the course. Participants are welcome to arrange additional chats with the instructor or each other.

Credit

Participants who successfully complete the course activities will receive a Certificate of Completion from the Drexel University School of Education indicating they have completed 15 hours of Professional Development.

Course Outline

Week 1 – Problem solving as a vehicle for teaching and learning mathematics.

Activities:

- Get oriented to Blackboard Vista.
- Introduce yourself to the group.
- Preview the upcoming FunPoW (FunPoW A), solve it, and submit your solution online.
- Analyze the math of FunPoW A and share strategies.
- Read the NCTM's Process Standard on Problem Solving.
- Read an online article about teaching mathematics through problem solving.
- Reflect on the two readings with regard to FunPoW A.

Week 2 – The nature of good communication in problem solving and the teacher's role in facilitating it.

Activities:

- Compare your strategy for solving FunPoW A with your classmates' strategies.
- Revise your submission for FunPoW A.
- Read the NCTM Process Standard on Communication.
- Read an article about the role of writing in math problem solving.
- Reflect on the two readings with relation to FunPoW A.
- Examine and comment on samples of student work on FunPoW A.

Week 3 – Developing a repertoire of representational strategies in a problem solving context.

Activities**:**

- Solve FunPoW B. Submit your solution online.
- Analyze the math of FunPoW B and share your strategy.
- Read the NCTM Process Standard on Representation.
- Read an article suggesting alternatives to teaching key words.
- Reflect on the two readings with relation to FunPoW B.
- Prepare to introduce FunPoW B to your students by reading The Math Forum's support materials and some suggested strategies. Post your plan.
- Introduce FunPoW B to your students. Prepare to to have some of them submit their solutions online.

Week 4 – Developing the ability to reason in mathematics; managing problem solving in the classroom.

Activities:

- Revise your submission for FunPoW A.
- Have at least three students, or teams submit their FunPoW B solutions online.

- Report on your experience of using FunPoW B with students.
- Read the Process Standard on Reasoning and Proof. Discuss ways to develop student's ability to justify their thinking.
- Learn about effective ways of responding to students. Compose questions to help your student submitters progress toward solving FunPoW B, or to help them move their thinking to a higher level.
- Read an article about managing a program of problem solving in a third grade class.
- Read suggestions for selecting appropriate problems.
- Share strategies for managing problem solving in your classroom.

Week 5 – The role of problem solving in developing metacognitive skills and making connections.

Activities:

- Read the mentor's replies to your students' FunPoW B submissions. Post your observations.
- Have at least three students, or teams revise their online FunPoW B solutions.
- Solve and submit your solution to FunPoW C.
- Read the Process Standard on Connections.
- Read and respond to an article about the role of reflection in problem solving.
- Prepare to use FunPoW C with your students. Post your plan.
- Introduce FunPoW C to your students and have some of them prepare to submit their solutions online.

Week 6 – Using a rubric to assess student work; providing constructive feedback to students.

Activities:

- Revise your own submission to FunPoW C.
- Have at least three students or teams submit their FunPoW C solutions online.
- Learn about assessing student work with our rubric. Study the Scoring Grid and Expected Solutions in the Teacher Packet for FunPoW C.
- Read three sample student submissions and score them. Compare your scores with a mentor's.
- Reflect on your scoring experience in a journal entry.
- Learn to use the Teacher Office and use it to mentor three of your student submitters.
- Have at least three students or teams revise their online FunPoW C solutions.
- Share some ways in which this course has transformed your thinking and teaching.
- Complete our course evaluation.

Required Readings

Principles and Standards for School Mathematics, National Council of Teachers of Mathematics (NCTM, 2000)
If you are not an NCTM member and do not have access to the print form of this document, you can sign up for 120-day free online access to the full Principles and Standards at NCTM's website. This document will be used throughout the course.

Two articles from *Teaching Children Mathematics* and two articles from *Mathematics Teaching in the Middle School,* NCTM (periodicals).
PDFs of these are available from within the course.