

**Topics and Activities for *Problem Solving in Geometry and Measurement*,
Courses I and II, for Teachers of Grades 3-8**

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Many of the readings come from *Reconceptualizing Mathematics, Part 3: Reasoning About Shapes and Measurement*. PDF files of the required pages will be available through the course – no book purchase is required.

Courses typically run Wednesday through Tuesday, with a midweek due date of Saturday night. Most of the work is asynchronous, but synchronous chats will be scheduled once or twice a week, depending on participant availability. The course will probably be conducted in Epsilon.

The Math Forum often uses an activity we call “noticings and wonderings”. This is both a method of starting to problem solve and a form of looking at student work and picking out elements with specific characteristics (such as strengths, weaknesses, and concepts understood or not), based on evidence, and then voicing questions we have about that work using the language of “wondering”. Whenever this activity is used, as it is below, more specific instruction is given as to the nature of the activity in the given context, but which isn’t made explicit in this outline.

Course I

Introduction: Measurement Basics

Week 1 by Saturday night

Read	23.1: Key Ideas of Measurement 23.2: Length and Angle (only pages 535-537) 24.1: Area and Surface Area
Do	problem set from the three readings
Post	answers to and reflections on postings

Week 1 by Tuesday night

Discuss	answers to activities and reflections
Solve	Frog Farming (PoW 3499)
Play	NLVM Geoboard applet
Post	journal entry with solution

Week 2 by Saturday night

- Discuss journal entries
- Read student solutions to Frog Farming
- Post noticings and wonderings for at least three student solutions
- Discuss noticings and wonderings
- Optional Shodor.org: Area Explorer*

Volume and Surface Area

Week 2 by Tuesday night

- Read 24.2: Volume
article from NCTM journal
- Do problem set from reading
- Post answers and reflections on reading

Week 3 by Saturday night

- Solve Finding the Volume of a Box (PoW 1875)
- Post journal entry with solution

Week 3 by Tuesday night

- Discuss journal entries
- Read student solutions to Volume of a Box
- Post noticing and wonderings for at least three student solutions
- Discuss noticing and wonderings
- Optional Illuminations: Cubes*

Problem Solving

Week 4 by Saturday night

- Read TCM: "Fostering Mathematical Thinking"
John Van de Walle: "Reform Mathematics vs. The Basics:
Understanding the Conflict and Dealing with It"
- Post reactions to readings/prompts

Week 4 by Tuesday night

- Discuss posts about readings
- Read Math Forum: "Getting Started with Problem Solving"
- Discuss article and scenarios from initial two problems in course

Triangles

Week 5 by Saturday night

- Read TCM: "Learning Geometry in a Dynamic Computer Environment"
- Explore Dynamic geometry activity: Types of Triangles
- Post journal entry of activity answers and reflection

Week 5 by Tuesday night

- Discuss answers and reflections
- Solve Forming Triangles from a Folding Ruler (PoW 3416)
- Post journal entry with solution

Week 6 by Saturday night

- Discuss journal entries
- Read student solutions from Folding Ruler
- Post noticings and wonderings for student solutions
- Discuss noticings and wonderings

Week 6 by Tuesday night

- Discuss tying up loose ends

Course II

Symmetry in the Plane

Week 1 by Saturday night

- Read 18.1: Symmetry of Shapes in the Plane
- Do Activity 1: Symmetries of an Equilateral Triangle
- Activity 2: Does a Parallelogram Have Any Symmetries?
- Activity 3: Symmetries in Some Other Shapes (pent, hex, n-gon)
- Post solutions to activities and reflections on the reading

Week 1 by Tuesday night

- Discuss solutions and reflections
- Solve Symmetry Surprise (PoW 2924)
- Post journal entry with solution

Week 2 by Saturday night

- Discuss journal entries
- Read student solutions to Symmetry Surprise
- Post noticing and wonderings for at least three student solutions
- Discuss noticing and wonderings

Circles

Week 2 by Tuesday night

- Solve Lincoln's Top Hat (PoW 3092)
- Post journal entry with solution

Week 3 by Saturday night

- Discuss journal entries
- Read student solutions to Lincoln's Top Hat
- Post noticing and wonderings for at least three student solutions
- Discuss noticing and wonderings

Problem Solving

Week 3 by Tuesday night

- Read TCM: "No Tears Here!"
- MTMS: "Never Say Anything a Kid Can Say!"
- NCTM's Process Standards
- Post reflections on readings

Week 4 by Saturday night

- Discuss reflections

Similarity

Week 4 by Tuesday night

- Explore Dynamic geometry activity: Proportions in Similar Triangles
- Post journal entry of activity answers and reflection
- Read "answer key" for dynamic geometry activity
- Post additional reflection based on answers

Week 5 by Saturday night

- Discuss reflections
- Solve All the Similar Triangles (PoW 3140)
- Post journal entry with solution

Week 5 by Tuesday night

- Discuss journal entries
- Read student solutions to All the Similar Triangles
- Post noticing and wonderings for X student solutions
- Discuss noticing and wonderings
- Optional 20.1: Size Changes in Planar Figures*
- 20.2: More About Similar Figures*
- Optional Dynamic geometry activity: Similar Figures*

Measurement Wrap-Up

Week 6 by Saturday night

- Read 24.3: Issues for Learning: Measurement
NCTM Yearbook article on measurement
- Discuss prompts about the readings

Week 6 by Tuesday night

- Discuss outstanding issues and topics chosen by participants