

SATURDAY ENRICHMENT PROGRAM: FALL 2017
THE MATHEMATICAL PROBLEM SOLVER

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Course Description

Problems are the heart of mathematics. Solving mathematical problems and identifying their meaning favor the search and development of reasoning that will lead to creativity (Haylock, 1987). Creative problem solving is a skill that can be developed by solving challenging problems and developing different strategies to solve them.

Schroeder and Lester (1989) differentiate the problem solving work in the classroom in three categories to teach about problem solving, to solve problems or via problem solving. This class will provide all.

The goal of this class is to train students to be better problem solvers. Developing problem solving techniques will be the focus of the course. In order to do this, this course is designed to challenge you with problems with secrets, to develop your thinking and strategy skills to unravel those secrets.

Because this is essentially a problem-solving class, we will be looking at a wide spectrum of puzzles and problems, including some that can be related to real life. We will have visual puzzles that have strong visual elements that test students' attention to detail. There will be practical problems that involve a hands-on approach as well as logical ones that are predominantly mathematical or require a structured approach. And as always, there will be those that require a spark of insight to solve. All in all, you can expect tens of problems or puzzles to be tackled over the duration of the course. Students can expect light, fun homework they can work on or play with, either alone or within the company of friends or parents.

How the students unravel the secrets of a given problem to reach the solution will be more important than the solution itself. To this end, active participation in the class will be encouraged, and problem-solving strategies will be explained, or analyzed and discussed.

Essential Questions

- What can you see that causes you to think there's a problem?
- What would be the initial train of thought?
- What could be an alternative approach to the problem?

Where can we find the problem's secret?
What is my strategy?

Learning Outcomes

What students will know:

- Polya's problem solving steps

What students will understand:

- How to solve problems

What students will be able to:

- Understand problems,
- Use their own words to explain what they understand,
- Devise a plan to solve problems,
- Carry out the plan,
- Look back.

Instructional Strategies

Students will work individually and as a group. During group work, students are expected to work cooperatively and help each other.

Student Assessment

Through discussion and development of their own problems, students will demonstrate their understanding of the steps to problem solving.

Resources and Materials

Please bring the following each day*:

Journal

*All other material will be provided by the instructor

Tentative Course Schedule

Date	Topic(s)	In-Class Activities
Week 1	Review of Problem Solving Strategies	Polya's Problem Solving Strategies.
Week 2	Match Puzzle	Moving matches to create new patterns. Playthink 162-167
Week 3	Tangram	Solving Tangram Puzzles. Playthink 441-443 962
Week 4	Hamilton Game	By cutting 15 planes and placing them on the diagram. Playthink 214-215
Week 5	Peg Board Triangles	By using geoboard try to connect 3 points to get 11 different triangles. Playthink 333,334,351
Week 6	Tower of Hanoi	Solving a Tower of Hanoi puzzle
Week 7	Logic Games	Playing 'Space Rescue' game. Playthink 431
Week 8	Battleships	Playing games by using problem solving strategies.