SATURDAY ENRICHMENT PROGRAM: FALL 2017
Riddle Me This

Instructor: Reese Johnston
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Course Description

How do you survive on an island where half the people always lie? How do you give someone a third of your camels, if you have seventeen of them? How do you guess the color of a hat you can't see? Sometimes, the best math puzzles aren't solved with an equation, and often they don't even have numbers at all. In this class, we'll learn to think out-of-the-box to tackle riddles like these and more.

Essential Questions

This course will concentrate on the challenge of solving puzzles that are math, but can't be solved using arithmetic. Our central goal will be to develop a list of new tools for handling this sort of puzzle, and to further explore the world of puzzles by creating some of our own.

Learning Outcomes

What students will know:

- A number of general problem formats which new problems they encounter may be similar to
- A range of strategies for solving these problems

What students will understand:

- The usefulness of logic and clear reasoning
- The strengths and limitations of intuition in math

What students will be able to do:

- Recognize problems that are math, but need techniques that aren't number-based
- Select and apply an appropriate strategy for solving such a problem
- Construct new variations on a problem that can throw light on the original problem

Instructional Strategies

Instruction will be through a mix of whole-class and small-group work, with group work being the primary teaching method. Much of class time will be spent with the students exploring a new problem or class of problems and discussing their results with one another or

with the instructor. Lectures will be rare and brief, if they occur at all; more common will be conversations involving the whole class, facilitated by the instructor.

Student Assessment

Of course, there are no grades assigned in this course, but the instructor will be observing the students' degree of participation; a student who is getting the most out of this course will be a student who frequently involves himself or herself in discussions and engages with partners in group work.

Resources and Materials

Please bring the following each day*:

- Notebook paper
- Pencil or pen (with a sharpener or extra lead, depending on the type of pencil)
- Folder (or other means of organizing papers)

*All other material will be provided by the instructor

Tentative Course Schedule

Date	Topic(s)	In-Class Activities
Week 1	Liar problems (Knights and Knaves)	Solving liar problems; constructing new liar problems; dealing with liar problems that can't be solved
Week 2	Tiling	Tiling a chessboard with oddly-shaped dominoes; when can it be done?
Week 3	Tiling II: Counting tilings	How many ways can you tile a chessboard with 1-by-2 dominoes?
Week 4	Inductive problems	The Magic Sheep problem, the Pirates problem, and other problems involving building up from below
Week 5	The Haberdasher problem	The Haberdasher problem; strategies for communicating information
Week 6	Games	The game of Nim, Tic-Tac-Toe, and related games; developing winning strategies
Week 7	Games II: Not Enough Information	Games involving probability or other people's decisions; the Prisoner's Dilemma
Week 8	Puzzlemaking	Creating new variations of problems we've seen, investigating what these new problems tell us about the originals

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