

## Apogee Program Session 1

### Course Title: Math: Puzzles and Games

#### Course Description

After a typist wrote 10 letters and addressed the 10 corresponding envelopes, a careless mailing clerk inserted the letters in the envelopes at random, one letter per envelope. What is the probability that all 10 letters were inserted in the proper envelopes? Students in this course examine a wide variety of math topics through the lens of puzzles and games including chess, Go, Sudoku, modern strategy games, card and carnival games of chance, and game shows. Concepts range in complexity from pre-algebra to high school level math, including an advanced exploration of probability and statistics. The course culminates with a student-designed carnival applying the statistical and probabilistic concepts learned in class.

#### Essential Questions

- How do you determine the likelihood of occurrence of different events?
- How do you evaluate the fairness of games based upon the experimental and theoretical probabilities?

#### Outcomes

Upon successful completion of this course, students will:

- Know the difference between theoretical and experimental probability
- Understand how to utilize various mathematical models to evaluate possible situations
- Apply probability and statistics concepts to a variety of situations
- Analyze the experimental and theoretical probabilities of a carnival game of their creation

#### Instructional Strategies

Students will be grouped flexibly to allow them to work with others at a pace that is appropriate for them; the groups will reflect what each student shows they understand and are ready to learn via assessment. Students will learn more material than they would in a regular classroom through curriculum compacting and using a higher-level textbook. Students will be given work to do that is on the level that they need through the use of tiered assignments.

#### Resources and Materials

- **Books**
  - a. *Connected Mathematics 2: Grade 7: What Do You Expect?* Lappan, Fey, et al, Pearson Prentice Hall, 2009. ISBN 9780133661446
  - b. *Connected Mathematics 2: Grade 7: Data Distributions* Lappan, Fey, et al, Pearson Prentice Hall, 2009. ISBN 9780133661453
  - c. *Sudoku Easy to Hard, Volume 2* Shortz and Ritmeester, St. Martin's Press, 2005. ISBN 9780312355036
- **Materials**
  - a. Student-supplied calculator

#### Student Assessment

- **Pre-Assessment**

Students will be given an assessment of several types of problems that will allow them to show their prior knowledge of the course material.

- **Documentation of Learning**

Students will show their mastery of the subject matter throughout their work on their own creative carnival game and in preparation for their final presentation. Students will have daily homework assignments, and periodic short quizzes to assess their understandings.

- **Post-Assessment**

Students will take a final exam to demonstrate their level of mastery of the coursework. On the final day of the course, students will give an Expo presentation showing what they have learned about evaluating experimental and theoretical outcomes.

## Schedule

Date	Topic(s)	In-class Activities	Assignments/Assessments
M 6/27	-- Course Intro -- Understanding Basic Probability -- Experimental vs. Theoretical Probability -- Chess	-- Meet Your Classmates -- Hopes and Dreams Posters -- Pre-Assessment Exam -- Strategy Games -- What Do You Expect /Data Distributions	-- Course Pre-Assessment (in class) -- ACES problems -- Chess Reading
T 6/28	-- Understanding Basic Probability -- Experimental vs. Theoretical Probability -- Decision Making Using Mathematical Models -- Strategy Games	-- Class Rules -- What Do You Expect/Data Distributions -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
W 6/29	-- What is statistics? -- Decision Making Using Mathematical Models -- Strategy Games	-- What Do You Expect/Data Distributions -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
Th 6/30	--Probability and Statistics -- Decision Making Using Mathematical Models -- Strategy Games	-- What Do You Expect/Data Distributions -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
F 7/1	--Probability and Statistics -- Decision Making Using Mathematical Models -- Strategy Games	-- What Do You Expect/Data Distributions -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
M 7/4	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems

<b>Date</b>	<b>Topic(s)</b>	<b>In-class Activities</b>	<b>Assignments/Assessments</b>
T 7/5	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
W 7/6	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
Th 7/7	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
F 7/8	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
M 7/11	--Probability and Statistics -- Decision Making Using Mathematical Models -- Testing math in real life simulations -- Strategy Games	-- What Do You Expect/Data Distributions -- Carnival Game Preparation -- Go over homework -- Strategy Games -- Brainteasers -- Sudoku	-- ACES problems
T 7/12	--Carnival Day!	-- Carnival Simulation -- Strategy Games -- Brainteasers -- Sudoku	-- Carnival analysis
W 7/13	--Expo Day Preparation --Course Content Summarization	--Comparing experimental and theoretical probabilities of Carnival Day games --Presentation Preparation --Board Games --Brainteasers --Sudoku	-- Carnival analysis -- Final Presentation Practice
Th 7/14	--Expo Day Preparation --Course Content Summarization	--Comparing experimental and theoretical probabilities of Carnival Day games --Presentation Preparation --Board Games --Brainteasers --Sudoku	-- Final Presentation Practice
F 7/15	Expo Day	Expo Day	

**CTD Statement on Third-Party Web Sites**

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.

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