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HONORS DISCRETE MATH

Discrete Mathematics introduces students to the mathematics of networks, social choice, and decision making. The course extends students' application of matrix arithmetic and probability. Applications and modeling are central to this course of study. Discrete data, known as countable sets, is data that is not continuous or in some pattern. Essentially Discrete Math encompasses any quantity that does not vary smoothly (such as Calculus). In our course we will cover topics including:

(1) **Set Theory -** the branch of mathematics that studies sets, which are collections of objects, such as {blue, white, red} or the (infinite) set of all prime numbers, and learning the specific language of such sets.

(2) **Logic -** the study of the principles of valid reasoning and inference.

(3) **Sequences and Series** – Exploring recursion to solve problems such as the amount of antibiotics remaining in the bloodstream and learning how to write a warranty that will almost always run out before the product breaks down.

(4) **Election Theory** – Understanding the role mathematics plays in the politics of voting and apportionment.

(5) **Statistic**s – Understanding how counting and probability theory can explain lotteries, gambling, and the genetics of inherited diseases.

(6) **Graph Theory -** Graphs can model many types of relations and process dynamics in physical, biological and social systems. In computer science, they represent networks of communication, data organization, computational devices, the flow of computation.

(7) **Matrices** – Understand how to organize and model data effectively, explore long term trends in data, and transform geometric objects (the fundamental techniques in producing computer graphics).

NC Standard Course of Study: Discrete Mathematics	
GOAL 1: The learner will use matrices and graphs to model relationships and solve problems.	2.02 Use theoretical and experimental probability to model and solve problems. a) Use addition and multiplication principles. b) Calculate and apply permutations and combinations. c) Create and use simulations for probability models. d) Find expected values and determine fairness. e) Identify and use discrete random variables to solve problems. f) Apply the Binomial Theorem.
1.01 Use matrices to model and solve problems. a) Display and interpret data. b) Write and evaluate matrix expressions to solve problems.	
1.02 Use graph theory to model relationships and solve problems.	
GOAL 2: The learner will analyze data and apply probability concepts to solve problems.	2.03 Model and solve problems involving fair outcomes: a) Apportionment. b) Election Theory. c) Voting Power. d) Fair Division.
2.01 Describe data to solve problems. a) Apply and compare methods of data collection. b) Apply statistical principles and methods in sample surveys. c) Determine measures of central tendency and spread. d) Recognize, define, and use the normal distribution curve. e) Interpret graphical displays of data. f) Compare distributions of data.	**GOAL 3: The learner will describe and use recursively-defined relationships to solve problems.**
	3.01 Use recursion to model and solve problems. a) Find the sum of a finite sequence. b) Find the sum of an infinite sequence. c) Determine whether a given series converges or diverges. d) Write explicit definitions using iterative processes, including finite differences and arithmetic and geometric formulas. e) Verify an explicit definition with inductive proof.
Additional Content for Honors	
2.03 Model and solve problems involving fair outcomes: e) Conduct in-depth investigations of municipal, state, and national elections as they occur. Include pre-election polls, election law, and voting patterns. f) Conduct in-depth investigations of legislative and congressional apportionment with respect to a recent census. Include legal and historic perspectives.	

CLASSROOM POLICIES

Assignment Policy

Assignments are given to reinforce concepts learned in class, prepare for upcoming lessons, extend learning, teach responsibility, and help develop positive study habits. Completed assignments are one of the key ways to be successful in this course.

- Assignments will be given **daily** unless there are extenuating circumstances. Always check Canvas even if verbal instructions were missed.
- Your success in this course is directly proportional to your dedication to your commitment to your work.
- Assignments must be worked on during class. If time does not permit the work to be completed, it should be taken home and finished.

Grading Policy

- Grades will be based on tests, quizzes, homework and class work.
- Tests will be given at the end of each unit and will be announced.
- Quizzes will be frequent and may be unannounced.
- Homework will be checked daily – late work will NOT be accepted.
- Your grade will be calculated by total points and may be averaged at any time by dividing your total number of points earned by the total number of possible points.
- Each student will receive a progress report during each grading period. The progress report will require a parent signature and will need to be returned by a certain date.
- If a student is caught cheating, a penalty of <u>zero</u> will be given for that assignment, quiz, or test. and the student will be given a discipline referral to administration.

Attendance and Lock Outs

- It is to your benefit to be in class every day. Use good judgment in scheduling doctor appointments, and other activities so that they do not interfere with your responsibility to attend class.
- Remember to check Canvas on the day you are absent in order to get notes, homework, etc. to help you stay caught up.
- If you have a planned absence, please let me know in advance.
- Be ready to begin class when the tardy bell rings - there will be a warm-up for you to complete each day.

Make-up Work

- This course moves at a quick pace, therefore attendance is very important. When you are not in class, **it is your responsibility to make-up any missed assignments**.   Copy any notes for the class you missed from a classmate.
- Check with me if there are any handouts you need.   DO NOT copy class work or homework. This is considered cheating and will be subject to consequences.
- **When you are absent on a test day <u>or</u> review day only, you <u>will be</u> required to take the test <u>on the day you return</u>.**
- Make up tests and quizzes in a reasonable time (approx 1 week). I am flexible, but I will not wait until the end of the grading period to allow make up tests from the beginning of the grading period!

Classroom Expectations

- Follow all school rules and use class time wisely.
- **Give respect – Get respect!**
- Homework should be on your desk when the tardy bell rings.
- Bring supplies to class daily . . . **ALWAYS** be prepared!
- Bathroom breaks should be taken for emergencies only and should not be taken during teacher-led instruction.
- No food or drink is allowed in the classroom (except water).
- Cell phone = no no.
- I will let you know when we are finished. Not the clock.

Possible **consequences** for breaking the classroom rules include removal from the classroom, phone calls to parents, or referrals to administration.

Tutoring

- Tutoring is available each week on Tuesdays and Thursdays after school. Check the door the schedule. I am also available before school by appointment.