WDHS Curriculum Map: created by
Course: Discrete Math March 2012

Time Interval/ Content	*Standards/ Strands*	*Essential Questions*	*Skills*	*Assessment*
1st MP *Unit 1: Paths, Circuits, & Networks* *For All Practical Purposes* *Chapter 1 Street Networks 2 weeks* *Chapter 2 Visiting Vertices 3 weeks*	G-MG.1. Use geometric shapes, their measures, and their properties to describe objects G-MG.3. Apply geometric methods to solve design problems N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MA 9-12. Engaging in critical path analysis, eg, applied to turning around an aircraft.	Can all circuits be Eulerized? Explain. What is the difference between Euler Circuits & Hamiltonian Circuits? What situations can be best modeled using an Euler Circuit? A Hamiltonian Circuit? A minimum cost spanning tree? Is there an algorithm that will always yield an optimal solution to a Hamiltonian Circuit? Explain.	*Students will understand that…* • *Euler Circuits trace each edge exactly once and start and end at the same vertex.* • *Hamiltonian Circuits visit each vertex exactly once and start and end at the same vertex.* • *No algorithm will yield an optimal solution for a Hamiltonian Circuit.* *Students will know…* *Euler Circuits, Hamiltonian Circuits, Nearest Neighbor Algorithm, Sorted Edges Algorithm, Minimum Cost Spanning Tree* *Students will be able to…* • *eulerize a graph and complete an Euler circuit* • *complete a Hamiltonian circuit using the Nearest Neighbor and Sorted Edges Algorithms* • *complete a Minimum Cost spanning tree*	Classwork Practice Homework Quizzes Tests Euler Circuit Letter Writing Project: Write a letter to anyone in charge of devising routes in which you suggest that management science techniques, like the ones we studied in class, be used to plan routes. You must use technical terminology, but remember you are explaining your proposal to someone who knows nothing about Euler Circuits. You must provide a graph of your proposed route that has been properly eulerized. The graph must have the some degree of difficulty. The letter must be typed, but the graph may be drawn by hand.

Unit 2: Planning, Scheduling & Bin Packing *Vertex Coloring & Conflict Resolution* *For All Practical Purposes* *Chapter 3* *5 weeks*	G-MG.1. Use geometric shapes, their measures, and their properties to describe objects G-MG.3. Apply geometric methods to solve design problems N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MA 9-12. Engaging in critical path analysis, eg, applied to turning around an aircraft.	Will increasing the number of processors decrease completion time? Explain. Will the decreasing time list algorithm guarantee an optimal solution? What situations can be best modeled using order-requirement digraphs? A machine scheduling problem? What is the maximum number of colors needed to color any map? How can the vertex coloring algorithm be applied to resolve conflict?	*Students will understand…* • *Increasing the number of processors will not always decrease completion time. Sometimes it increases it.* • *Decreasing time list algorithm does not guarantee and optimal solution.* *Students will know…* *List Processing Algorithm, Decreasing Time List Algorithm, First-Fit, Next-Fit and Worst-Fit Bin Packing Algorithms, Vertex Edge Graph, Vertex Coloring Algorithm* *Students will be able to…* • *determine the critical path from an order-requirement digraph* • *use the list-processing algorithm and order-requirement digraphs to complete a machine scheduling problem* • *use the First-Fit, Next-Fit and Worst-Fit bin-packing algorithms to schedule independent tasks into a minimal number of bins* • *color regions of maps with minimal colors so that no two adjacent states have the same color. They should be able to employ Brooke's Theorem that says the maximum chromatic number is four.* • *take an existing vertex graph, create a priority coloring list based on descending order of*	Classwork Practice Homework Quizzes Tests Performance Tasks: Create and solve your own unique problem that can be solved using a vertex edge graph. Your problem must include a minimum of seven vertices, a matrix with <u>different</u> row and column labels, a conflict chart, a colored and labeled vertex graph, a priority list, and groups. The problem must be typed. Your vertex graph, charts, lists and groups may be handwritten.

			vertex valences, use the vertex coloring algorithm to color the vertices and arrive at an optimal solution for compatibility. • *read a conflict resolution problem, display the conflicts in a conflict chart and draw a vertex graph based on the information in the conflict chart.*	
2nd MP *Unit 3: Linear Programming* *For All Practical Purposes Chapter 4* *3 weeks*	A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales A-REI.12. Graph the solutions to a linear inequatlity in two variables as a half-plane, and graph the solution set to a system of linear inequalities in two variables A-SSE.1.b. Interpret complicated expressions by viewing one or more of their parts as a single entity A-SSE.1.a. Interpret parts of an expression, such as terms, factors, and coefficients A-REI.6. Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables A-REI.10. Understand the graph of an equation in two variables is the set of all its solutions plotted in a coordinate plane G-CO.12. Make formal geometric constructions with a variety of tools and methods	What methods can be used to solve systems of equations and inequalities? How are systems of linear equations and inequalities useful?	*Students will understand…* • *Systems of equations and/or inequalities are used to model and solve real-world problems involving two or more variables.* *Students will know…* • *How to graph a linear equation* • *How to graph a linear inequality* • *How to solve systems of linear equations algebraically and graphically* • *How to solve linear inequalities graphically* • *Feasible regions* • *How to maximize profit and/or minimize cost* *Students will be able to…* • *read an optimization problem and set up an appropriate table from which constraints can be derived.* • *graph a system of inequalities, shade the feasible region, and determine any points of*	Classwork Practice Homework Quizzes Tests Performance Tasks

	N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.		*intersection.* • *evaluate the profit or cost function at each corner point to determine the optimal solution.*	
Unit 4: Number Systems *2.5 weeks*	F.BF1c. Build a function that models a relationship between two quantities. N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	What is a specific example of a situation where binary numbers are used? What is a specific example of when hexadecimal numbers are used?	*Students will understand…* • *There are number systems other than base 10.* *Students will know…* • *Binary* • *Decimal* • *Hexadecimal* • *Octal* *Students will be able to…* • *Convert between binary and decimal systems.* • *Add, subtract, multiply and divide numbers in binary form.* • *Convert between octal-decimal and octal-binary.* • *Convert between hexadecimal-decimal, hexadecimal-binary and hexadecimal-octal systems.*	Classwork Practice Homework Quizzes Tests Performance Tasks:
Unit 5: Fair Division *1.5 weeks*	F.BF1c. Build a function that models a relationship between two quantities. N-Q.2. Define appropriate quantities for the purpose of descriptive modeling. N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. N-VM.6. Use matrices to represent and manipulate data, e.g., to represent payoffs	*How does the method chosen to count votes in an election impact the outcome of the election?*	*Students will understand…* • *The method used to count votes may changes the outcome of an election.* *Students will know…* • *Preference Schedule* • *The Plurality Method* • *The Run-Off Method* • *The Sequential Run-Off Method* • *The Borda Method* • *The Method of Averages*	Classwork Practice Homework Quizzes Tests Performance Tasks:

	or incidence relationships in a network.		• *The Condorcet Method* • *Insincere Voting* *Students will be able to…* • *Show that the method used to count votes often changes the outcome of an election.*	
Unit 6: Identification Numbers & Coding *For All Practical Purposes Chapter 9* *1.5 weeks*	F.BF1c. Build a function that models a relationship between two quantities. N-Q-3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	What methods can be used to develop codes? How are check digits used to detect errors in codes?	*Students will understand…* • *Codes are used in many areas of everyday life.* *Students will know…* • *Postnet Bar Codes* • *Money Order Codes* • *UPS Codes* • *Airline Ticket Codes* • *UPC Codes* • *ISBN Codes* • *Driver's License Numbers* *Students will be able to…* • *Decipher codes and create codes using alpha, numeric, and pictoral codes.* • *Understand coding methods used for zip codes, ISBN codes, driver's license numbers, money order codes and UPC bar codes, and will be able to utilize error-detecting methods to correct errors in codes.*	Classwork Practice Homework Quizzes Tests – open book/open notes Performance Task: Product Code Scrapbook