

COURSE NAME DISCRETE

**Conceptual Category: Geometry**  
**Domain: Modeling with Geometry**  
**Cluster: Apply geometric concepts in modeling situations.**  
**Essential Questions: What is the minimum time required to build an addition on a house given a list of tasks? How can scheduling be done effectively? What makes a good physical model of a situation?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
G.MG-3 Apply geometric methods to solve design problems.(e.g., designing an object or structure to satisfy physical constraints or minimize cost.)	To represent real life situations using the concepts of graph theory. a) Euler Circuits and Paths b) Hamiltonian Circuits and Paths c) Critical paths and Pert Method d) Traveling Salesman Problem e) Graph Coloring	Garfinkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch. (1-3)	Use critical thinking to recognize problematic aspects, create mathematical models and present and defend solutions. Apply the scheduling methods to a given situations. West Nile Project- short paper Apply Color Theory to graphs/maps.	Classroom observations Homework review Modeling Problems Worksheets Quizzes Project

**Conceptual Category: Geometry**  
**Domain: Similarity, Right Triangles, and Trigonometry**  
**Cluster: Prove theorems using similarity.**  
**Essential Questions: Where might you see fractals in everyday life?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
GSRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Symmetry and Patterns Draw a fractal by iteration. Draw a Koch Curve. Draw a Koch Snowflake	Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.19 Web sites	Program TI calculator to draw a fractal. Sierpinski Triangle	Classroom observations Homework review Modeling Problems Worksheets Quizzes Project

**Conceptual Category: Function**  
**Domain: Interpreting Functions**  
**Cluster: Understand the concept of a function and use function notation.**  
**Essential Questions: How does the golden ratio relate to the Fibonacci Sequence?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
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<p>F.IF- 3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.</p>	<p>Apply Symmetry in situations such as the Golden Ratio. Students will extend the Fibonacci Sequence. Students will find examples of the Fibonacci sequence in nature. Students will derive the golden ratio.</p>	<p>Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.19 Web sites.</p>	<p>Make sound predictions and generalizations based on patterns and relationships.</p>	<p>Classroom observations Homework review Modeling Problems Worksheets Quizzes Project</p>
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**Conceptual Category: Geometry**

**Domain: Congruence**

**Cluster: Experiment with transformations in the plane.**

**Essential Questions: Given a tessellation what type of congruence transformations can you identify? Given one or more shapes (in a specific sizes) of tiles, can they tile the plane?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
<p>G.SO-5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another..</p>	<p>Draw tiling s(tessellations) with regular polygons and irregular polygons Create tilings using translations . Explore M.C. Escher work. Apply Tiling to problem-solving in graphic design and in the arts</p>	<p>Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.20 Web sites.</p>	<p>Creating tilings by hand and by computer.</p>	<p>Classroom observations Homework review Modeling Problems Worksheets Quizzes Project</p>

**Conceptual Category: Statistics and Probability**  
**Domain : Conditional probability and the Rules of Probability**  
**Cluster: Understand independence and conditional probability and use them to interpret data.**  
**Essential Questions: Does Aspirin Help Prevent Heart Attacks?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
S.CP1 Describe events as subsets of a sample space (of the set of outcomes) using characteristics (or categories of the outcomes, or as union, intersections, or complements of other events.	Trials Outcomes Sample space Venn diagrams Disjoint (mutually exclusive) Complement Rule Addition Rule Independence (informally) Tree diagrams	<u>Discrete Mathematics Through Applications</u> , W .H .Freeman Ch. 6	Class activities to develop the concepts of probability.	Classroom observations Homework review Modeling Problems Worksheets Quizzes
S.CP2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characteristic to determine if they are independent.	Independence (formally) Conditional Probability Real life problems should come from multiple sources- medicine, law, science, business.	<u>Discrete Mathematics Through Applications</u> , W .H .Freeman Ch.6 <u>Algebra 2 Explorations and Applications</u> , McDougal Littell Practice Bank		Classroom observations Homework review Modeling Problems Worksheets Quizzes
S.CP - 3&5 Understand the probability of A given B as $P(A \text{ and } B)/P(B)$ and interpret independence of A and	Independence (formally) Conditional Probability Real life problems should come from	<u>Discrete Mathematics Through Applications</u> , W .H .Freeman Ch.6		Classroom observations Homework review Modeling Problems Worksheets Quizzes

<p>B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as B. Recognize and explain the concepts of conditional probability and independence in everyday situations.</p> <p>S.CP-4          Construct and interpret two-way tables frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.</p>	<p>multiple sources- medicine, law, science, business.</p> <p>Independence (formally)          Conditional Probability          Real life problems should come from multiple sources- medicine, law, science, business.</p>	<p><u>Algebra 2 Explorations and Applications,</u>          McDougal Littell          Practice Bank -(79-86)</p> <p><u>Discrete Mathematics Through Applications,</u>          W .H .Freeman          Ch.6</p> <p><u>Algebra 2 Explorations and Applications,</u>          McDougal Littell          Practice Bank -(79-86)</p>		<p>Classroom observations          Homework review          Modeling Problems          Worksheets          Quizzes</p>
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**Conceptual Category: Category: Statistics and Probability**  
**Domain : Conditional probability and the Rules of Probability**  
**Cluster: Use the Rules of Probabilities of compound events in a uniform probability model.**  
**Essential Questions: What is the probability that a person who tests positive for a disease actually has it?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
S.CP-6 Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.	Decide if events are: dependent, independent, disjoint.  Solve problems that require the use of conditional probability theory.	<u>Discrete Mathematics Through Applications</u> , W .H .Freeman Ch. 6	Real life problems should come from multiple sources- medicine, law, science, business.	Classroom observations Homework review Modeling Problems Worksheets Quizzes
S.CP-(7 & 8) Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret in terms of the model. Apply the general Multiplication Rule in a uniform probability model.	Adapt the addition and multiplication principles of counting to probability questions.  Draw Venn and tree diagrams to use as a visual tool for determining the probability of an event occurring.  Bayes Formula	<u>Discrete Mathematics Through Applications</u> , W .H .Freeman Ch. 6	Real life problems should come from multiple sources- medicine, law, science, business.	Classroom observations Homework review Modeling Problems Worksheets Quizzes

<p>S.CP-9          Use permutation and combinations to compute probabilities of compound events and solve problems.</p>	<p>Solve various counting problems in which the order matters (permutations) and when the order does not matter. (combinations)</p> <p>Decide if two or more events are disjoint.</p> <p>Use the addition and multiplication principles for counting situations.</p> <p>Use binomial and geometric probability models to solve real-world problems.</p>	<p><u>Discrete Mathematics Through Applications</u>, W .H .Freeman Ch. 6</p> <p><u>Algebra 2 Explorations and Applications</u>, McDougal Littell Practice Bank -(79-86)</p>	<p>Prior knowledge of independent events and counting techniques should allow students to discover the formula themselves,</p> <p>Problems should focus on the student’s ability to see the binomial or geometric nature of a problem. Real life problems should come from multiple sources- medicine, law, science, business</p>	<p>Classroom observations          Homework review          Modeling Problems          Worksheets          Quizzes          Chapter Test</p>
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**Conceptual Category: Statistics and Probability**  
**Domain: Interpreting Catagorical and Quantitative Data**  
**Cluster: Interpret Linear models**  
**Essential Questions : Are Leonardo’s predictions about the human body true today?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
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S.ID- 7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	Least-Squares Regression Residual Plots Interpret slope, y-intercept and the coefficient of determination in context of problems.	Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.6	Use the regression line to make predictions.	Classroom observations Homework review Modeling Problems Worksheets Quizzes
S-ID-8 Compute (using technology) and interpret the correlation coefficient of a linear model in the context of the data.	Use a TI-83 calculator to find the correlation coefficient. Use this value as one of the determining factors to decide whether or not a linear model is appropriate.	Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.6	Internet game- guessing the correlation.	Classroom observations Homework review Modeling Problems Worksheets Quizzes
S.ID-9 Distinguish between correlation and causation.	Collect data and attempt to use a linear model to make inferences. Use real life problems to distinguish between what appropriate conclusions you can draw.	Garfunkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.6		Classroom observations Homework review Modeling Problems Worksheets Quizzes

**Conceptual Category: Statistics and Probability**  
**Domain: Interpreting Catagorical and Quantitative Data**  
**Cluster: Summarize, represent, and interpret data on a single count or measurement variable.**  
**Essential Questions: Which statistics should I compare? Which plots should I use? What do the comparisons mean in a real world situation?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
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<p>S.ID-1          Represent data with plots on the real number line. (dot plots, histograms, and box plots)</p>	<p>Exploring and Understanding Data          What is statistics?          Surveys          Variables          Data -quantitative and categorical          Display, describe and compare categorical and quantitative data.</p> <p>Draw visual displays- bar charts, pie charts, box plots, parallel box plots, dot plots, stem plots, histograms and frequency plots.</p>	<p>Garfinkle. Comap (2009).          For All Practical Purposes.          New York. W.H. Freeman          Ch.5</p>	<p>Interpret graphs that are used in various types of media.          Draw conclusions about the context of the articles.</p>	<p>Classroom observations          Homework review          Worksheets          Quizzes          Activities</p>
<p>S.ID-2          Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (Interquartile range, standard deviation) of two or more different data sets.</p>	<p>Measures of center and spread -          Calculate the mean, median and mode.          Identify the Five Number Summary          Calculate by hand and by using a graphics calculator the standard deviation and variance.</p>	<p>Garfinkle. Comap (2009).          For All Practical Purposes.          New York. W.H. Freeman          Ch.5</p>		<p>Classroom observations          Homework review          Worksheets          Quizzes</p>
<p>S.ID-3          Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points. (outliers)</p>	<p>Chose the appropriate visual display for a data set and draw possible conclusions about the data by looking at the shape, center and spread.          Describe patterns and departures from patterns. Look for any data that may be considered an outlier and decide possible reasons for the extreme data points.</p>	<p>Garfinkle. Comap (2009).          For All Practical Purposes.          New York. W.H. Freeman          Ch.5</p>		<p>Classroom observations          Homework review          Worksheets          Quizzes</p>

**Conceptual Category: Statistics and Probability**  
**Domain: Interpreting Categorical and Quantitative Data**  
**Cluster: Summarize, represent, and interpret data on a single count or measurement variable.**  
**Essential Questions: What fraction of a kindergarten class would you expect to be less than 3 feet tall?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
S.ID 4 Use the mean and the standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate, Use calculators, spreadsheet, and tables to estimate area under the normal curve.	The Normal Distribution- Calculate quartiles, standardize scores, (z-scores). Use the normal distribution as a model for measurement. Use the normal model to solve real world problems.	Garfinkle. Comap (2009). For All Practical Purposes. New York. W.H. Freeman Ch.5	Simulations- Use graphics calculator to collect data and see if the normal model is appropriate. Normal Project- Collect data, describe data, Check if normal approximation is realistic.	Classroom observations Homework review Modeling Problems Worksheets Quizzes

**Conceptual Category: Number and Quantity**  
**Essential Questions: How does the voting method affect the outcome of the election? How can estates be divided fairly? How is the number of representatives determined for each state?**

Framework Standard	Content / Skills	Resources	Instructional Strategies	Assessments
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<p>Quantitative reasoning is used to make sense of quantities and their relationships on problem situations.</p>	<p>Voting and Social Choice          Plurality Method, Borda Method          Runoff Method, Condorcet Method,          Approval Voting          Weighted Voting</p> <p>Fairness and Game Theory          a)Fair division- methods to settle an estate.          b)Apportionment Problem</p>	<p>Garfunkle. Comap (2009).          For All Practical Purposes.          New York. W.H. Freeman          Ch. (1-3)</p>	<p>Apply Voting and weighted voting methods to a set of data.          Apply the appropriate Fair Division method to settle an estate.          Apply Apportionment (Hamilton, Jefferson, Adams, Webster, and Hill's methods to a set of data.          Look at elections involving the Electoral College.</p>	<p>Classroom observations          Homework review          Modeling Problems          Worksheets          Quizzes          Project</p>
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