Precalculus: Unit 6 Instructional Focus – Discrete Math

Topic	Instructional Foci
Topic 1: Combinatorics/Binomial Theorem	The Fundamental Counting Principle, permutations, combinations, and factorials can be used to determine probabilities of compound events and to solve problems. The Binomial Theorem can be used to expand $(x+y)^n$. ***Background:*** Building on probability concepts that began in the middle grades, students in C2.0 Algebra 2 developed sample spaces and used them to calculate probabilities of events. Conditional probabilities were determined using two-way tables. The concepts of dependent and independent events were explored. Events and their probabilities were represented using Venn and tree diagrams and two-way frequency tables. The rule for conditional probability, the addition rule, and the multiplication rule for independent events were developed and applied. Honors Algebra 2 students developed and applied the general multiplication rule. The focus was on applying probability concepts to real-world situations. ***Concepts:*** 1. Understand how the Multiplication Principle of Counting can be used to determine the number of ways a procedure can occur. (Addison-Wesley §9.1, Glencoe §13.1) 2. Develop and apply the formula for the number of permutations of *n* objects taken *r* at a time. (Addison-Wesley §9.1, Glencoe §13.1) 3. Develop and apply the formula for the number of combinations of *n* objects taken *r* at a time, and be able to explain the difference between a combination and a permutation. (Addison-Wesley §9.1, Glencoe §13.1) 4. Develop and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of *x* and *y* for a positive integer *n*, where *x* and *y* are any numbers, with coefficients determined by Pascal's Triangle or combinations. (Addison-Wesley §9.2, Glencoe §12.6, §13.6) 5. Use permutations and combinations to compute probabilities of compound events and solve problems. (Addison-Wesley §9.3, Glencoe §13.6)

Topic	Instructional Foci
Topic 2: Sequences and Series	The sum of the terms of a sequence is a series. The sequence of partial sums of a series can be expressed recursively or explicitly. Sums of finite geometric series can be used to solve real-world problems. *An infinite series will have a sum if the sequence of partial sums has a limit, as the number of terms increases without bound.* *An infinite geometric series will have a sum of* $S = \frac{a_1}{1-r}$, *if* $0 < \lvert r \rvert < 1$ *Series can be expressed using summation notation.* ***<u>Background:</u>*** In C2.0 Algebra 1, students recognized that arithmetic sequences are linear functions whose domain is a subset of the integers. They recognized that geometric sequences are exponential functions whose domain is a subset of the integers. They described arithmetic and geometric sequences both explicitly and recursively. ***<u>Concepts:</u>*** 1. *Find limits of infinite sequences by recognizing the end behavior of the underlying function.* (Addison-Wesley §9.4) 2. *Use summation notation to describe a series.* (Addison-Wesley §9.5) 3. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. (Addison-Wesley §9.5, Glencoe §12.1, §12.2) 4. *Prove and apply the formula for the sum of an infinite geometric series.* (Addison-Wesley §9.5)