Summit Public Schools

Summit, New Jersey

Grade Levels 11th - 12th / Content Area: Mathematics

Length of Course: Full Academic Year

Pre-Calculus

Submitted by:

Eric Fontes

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Curriculum

Course Description:

Pre-Calculus is a full-year course offered as part of the mathematics curriculum. This course develops the ideas associated with circular, polynomial, exponential, logarithmic, and trigonometric functions. The various functions are applied to real world situations. Additional topics include conic sections, parametric and polar equations, sequences and series, and a brief introduction to limits. Students will also have the opportunity to explore data using technologic resources such as Google Sheets, Desmos, as well as their graphing calculators. Students will receive a graphing calculator for their use throughout the course. They are responsible for the calculator just as for their text.

Quarter 1: Units 1-3, maybe a little Unit 4

Unit 1 – Functions and Their Graphs

Topic	Time Frame
First Day of School	1
Pre-assessment; give out 1.1.-1.3 review handout	1
1.3 Types of functions, domain/range, piecewise functions	1
1.4 Transformations of functions and more domain/range	1
1.5-1.6 composition of functions, inverse functions, one-to-one	1
Review	1
Test Chapter 1	1
Total	7

Unit 2 – Polynomial Functions

Topic	Time Frame
2.1-2.2 Factoring, solving quadratic equations	2
2.3 Finding zeros, possible rational zeros, Descartes rule of signs	2
Review, HW questions, then Quiz 2.1-2.3	1
2.4 Imaginary and complex numbers; multiply by the conjugate	2
2.5 Finding all zeros (real and imaginary); synthetic/long division	1
2.5 Wrap synthetic/long division; focus on graphs of polynomials	1
Review	1
Test Ch 2.1-2.5	1
Total	11

Unit 3 – Exponents and Logarithmic Functions

Topic	Time Frame
3.1 Exponential functions, applications and graphing	1
3.2 Graphing logarithmic functions	1
3.3 Properties of logarithms, expanding/condensing expressions	1
Review 3.1-3.3, maybe start 3.4 (solving exponential/log equations)	1
Quiz 3.1-3.3, continue 3.4	1
Wrap up 3.4 solving exponential/log equations	1
3.5 Word problems exponential growth/decay	1
3.5 Half-life, logistic growth; also did exponential/logistic regression on the calculator as a nice application	2
Review	1
Test Chapter 3	1
Total	11

This is almost the end of Quarter 1; We did 4 days of Unit 4 before the official end

Quarter 2: Units 4-6

Unit 4 – Introductory Trigonometric Principles

Topic	Time Frame
4.1 Radian and degree measure, co-terminal, linear/angular speed	1.5
4.2-4.3 Right triangle trig and the unit circle (show all approaches to finding exact trig values); practice finding exact trig values	1.5
Practice finding basic sin/cos/tan exact values then Quiz 4.1-4.3	1
4.4 Reciprocal functions and trig values for angles beyond 2pi	1
Quiz #2 on all 6 trig functions and exact values for any radian/degree measure (focus on speed; they need to sketch circle quickly if they do)	0.5
4.7 Inverse trig functions (no graphing), finding exact values/radians	1.5
Review	1
Test Ch 4.1-4.4 & 4.7	1
Total	9

Unit 5 – Graphing trigonometric functions

Topic	Time Frame
4.5 Graphing sine and cosine functions	1.5
4.5 More challenging phase shifts for sin/cos and pop quiz	2
4.6 Cosecant, secant, tangent and cotangent graphs	3
Review	1
Test Ch 4.5-4.6	1
Total	8.5

Unit 6 – Trigonometric expressions, equations and properties

Topic	Time Frame
5.1-5.2 Pythagorean identities and simplifying expressions or verifying	3
Quiz 5.1-5.2	0.5
5.3 Solving trig equations, including a 5.3 Quiz at end of Day 3	2.5
Quiz 5.3	0.5
5.4 Sum and difference formulas	2
Quiz 5.4	0.5
5.5 Double and half-angle formulas (half-angle formulas given on test)	1.5
Review	1.5
Test Chapter 5	1
Total	13

Modeling real-world situations with trig functions is a 3-day project that ideally fits before the midterm, but in 2017-18 due to snow days and the calendar we did it the first 2.5 days after the midterm. More project details provided in this document

Midterm review should be 2 or 3 days

Quarter 3: Units 7-9

Unit 7 – Law of Sines/Cosines and Trigonometric Word Problems

Topic	Time Frame

6.1-6.2 Basic law of sines and cosines problems solving for unknown sides and angles; area of triangle formulas	1
6.1 Ambiguous case for law of sines	1
4.8 Right triangle trig world problems; can also use law of sines/cosines to solve	1
4.8, 6.1, 6.2 All types of word problems, emphasize compass bearings	2
Review	1
Test Chapter 6.1-6.2, 4.8	1
Total	7

Unit 8 – Vectors and trig form of complex numbers

Topic	**Time Frame**
6.3 Vectors, component form, unit vector, magnitude, direction angle, sketching resultant, etc.	2.5
6.3 Word problems (airplane and wind acting on it) and review	2.5
Quiz 6.3	0.5
6.4 Dot product and angle between two vectors	2
6.5 Trig form and standard form of complex numbers	1
6.5 Complex numbers: Multiplying, dividing, raising to a power, and finding nth roots	3
Review	1
Test Chapter 6.3-6.5	1
Total	13.5

Unit 9 – Conic Sections

Topic	**Time Frame**
9.1 Circles, parabolas, some review	3
Quiz 9.1	0.5
9.2 Ellipses	2
9.3 Hyperbolas	2

Review and quiz 9.2-9.3	1
All types of conic sections and review	1
Test Chapter 9.1-9.3	1
Total	10.5

Quarter 4: Units 10-12

Starts with SGO review for 2 days then SGO test

Unit 10 – Parametric and Polar Equations

Topic	Time Frame
9.5 Parametric equations and word problem applications	2
9.5 Quiz (no word problem)	0.5
9.6 Polar coordinates and equations	1.5
9.6 Quiz	0.5
9.7 Graphing polar functions (limacons and roses; didn't do lemnsicates)	4
Review	1
Test 9.5-9.7	1
Total	10.5

Unit 11 – Rational functions, expressions, introduction to limits

Topic	Time Frame
2.6 Rational functions: identifying asymptotes, holes, x-intercepts	2
Extension: Adding/subtracting/multiplying/dividing rational expressions; working with complex fractions	1
2.7 Graphing rational functions, including slant asymptotes and discussion of limits (end behavior and approaching vertical asymptotes from each side) **This limits extension is not in Ch. 2** Supplement on your own.	2
Challenging rational functions with quadratic and cubic asymptotes (also not in the textbook but a good challenge)	1
Review	1
Test Chapter 2.6-2.7 and including limits	1
Total	8

Unit 12 – Sequences and series

Topic	Time Frame
8.1-8.2 Identifying types of sequences, arithmetic sequences and series, recursive sequences	2
8.3 Geometric sequences and series	1
Review	1
Test 8.1-8.3	1
Total	5

Unit 13 – Desmos Project (3 days)

Working in groups of 3, create an original image using Desmos that includes a variety of different functions (linear, absolute value, quadratic, trig, conics, etc), utilizing piecewise function notation through Desmos. Students must have at least 40 equations (some had 120). See the project sheet for more details.

Finals review is 3 E-days.

Functions and Their Graphs (Unit 1 & 2)

Standards: Interpreting Functions (F-IF) & Building Functions (F-BF) All students will explore functions and their representation in the Cartesian plane.
Big Ideas: *Course Objectives / Content Statement(s)* ● To introduce functions and learn to identify, categorize, describe and graph functions. ● Find slopes of lines and write equation of linear functions. ● To find inverse functions ● Explore the use of functions in modeling real-word data.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	Enduring Understandings *What will students understand about the big ideas?*
What are the physical and algebraic characteristics of functions? What is the impact of the domain and range on the characteristics of a function? How does a transformation change a function's physical and algebraic characteristics?	Students will understand that… An equation is composed of two algebraic expressions separated by an equal sign. If the two expressions happen to be polynomial expression, then the equation can be classified according to its degree. Students will recall the equations they have previously learned such as a linear, quadratic, absolute value, square root and cubic equations. Students will recall that the domain is all of the inputs of a function and the range are all of the outputs of a function. In addition, quadratics and absolute value have restrictions based on the vertex and the square root equation has a restriction based on the starting value. Students will be able to identify horizontal and vertical shifts, stretches, and shrinks.
Areas of Focus: Proficiencies	**Examples, Outcomes, Assessments**

(Cumulative Progress Indicators)	

Students will:
 	
• (F-IF-7) Sketch different types of functions
• (A-CED) Write the equation of a line given:
  ○ Two points
  ○ Slope and a point on the line
  ○ A point and parallel/perpendicular to another line
  ○ X-intercept and y-intercept
● (F-IF) Find the domain and range of a functions
● (F-IF) Determine if an equation represents a function
● (F-IF) Evaluate functions
• (F-IF-7a) Find the relative minimum/maximum of functions
• (F-BF-3) Identify horizontal and vertical translation of functions
• (F-BF-3) Reflect the graph of a function in the x- or y-axis
• (F-BF-3) Learn how to stretch graphs
• (F-BF-3) Perform arithmetic combinations of functions
• (F-BF-1c) Compositions of Functions
• (F-BF-4) Determining if a function has an inverse
• (F-BF-4) Find the inverse of functions
	Instructional Focus:
	
	1. Lines in the Plane
	2. Evaluating Functions
	3. Graphing Functions
	4. Shifting, Reflecting, and Stretching Functions
	5. Combinations of functions
	6. Inverse Functions
	
	Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112
	
	Interdisciplinary Connections
	
	Students will study
	
	Technology Integration
	
	Students will use a graphing calculator to find maximums and minimums of functions. In addition, students will use a graphing calculator to determine when a function has a vertical stretch or shrink.
	
	Media Literacy Integration
	
	Students will analyze the path of a ball of a Major league player's hit. Students will be able to approximate how high the ball will go before it starts to fall back to the ground. In addition will be able to determine how many seconds it will take for the ball to hit the ground. Lastly, students will be able to analyze the ball's flight graph.
	
	Global Perspectives
	
	Students can approximate maximum and minimum temperatures of a particular function representing a particular city.

Polynomial (Unit 2) and Rational Functions (Unit 11)

<table>
<tr><td colspan="2">Standards:

All students will analyze and graph polynomial and rational functions. (F-IF)</td></tr>
<tr><td colspan="2">Big Ideas: Course Objectives / Content Statement(s)

● Identify key characteristics and creating graphs of quadratic and other polynomial functions.
● Use polynomials division to find both real and complex roots.
● Identify intercepts, asymptotes and holes of rational functions.
● Identify limits that a function approaches both vertically and horizontally.</td></tr>
<tr><td>Essential Questions

What provocative questions will foster inquiry, understanding, and transfer of learning?</td><td>Enduring Understandings

What will students understand about the big ideas?</td></tr>
<tr><td>How does the degree of a function change the behavior?

How are quadratics an example of

non-linear change?</td><td>Students will understand that…

Graphs and equations are alternative ways for depicting and analyzing patterns of linear and non-linear change.

Quadratic equations show real life data that can be modeled by quadratic functions. Such functions are used to show projectile motion and reflective properties such as flashlight reflectors.</td></tr>
<tr><td>Areas of Focus: Proficiencies

(Cumulative Progress Indicators)</td><td>Examples, Outcomes, Assessments</td></tr>
<tr><td>Students will:

▪ (F-IF-7A) Graph quadratic functions
▪ (F-IF-8A) Identify and write the standard form of a quadratic function
▪ (F-IF-7C) Graph of higher degree polynomials</td><td>Instructional Focus:

1. Quadratic Functions
2. Polynomial Functions of Higher Degree
3. Real Zeros of Polynomial
4. Functions
5. Complex Numbers
6. The Fundamental Theorem of Algebra</td></tr>
</table>

• (F-IF-7C) Use the leading coefficient test to determine the end behavior of polynomial functions • (F-IF-7C) Find zeros of polynomial functions • (F-IF-7C) Write the polynomial function given the zeros of a function • (F-IF-7) Perform long division of polynomials • (F-IF-7) Perform synthetic division of polynomials • (F-IF-7) Apply the Remainder Theorem to evaluate a function • (F-IF-7) Apply the rational zeros of a polynomial • (F-IF-7) Apply the Fundamental Theorem of Algebra • (F-IF-7) Determine the bounds for real zeros of polynomial functions • (F-IF-7D) Find vertical, horizontal and slant asymptotes of rational functions • (F-IF-7D) Graph rational functions	7. Rational Functions and Asymptotes 8. Graph of Rational Functions Sample Assessments: Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Technology Integration Students will use a graphing calculator as an aid to find all zeros, real and non-real, of functions. Global Perspectives Students can use polynomial functions to model various aspects of nature, such as the growth of a red oak tree and the cost of a recycling plan.

Exponential and Logarithmic Functions (Unit 3)

Standard - Exploring Exponential Growth and Decay Functions **Construct and compare exponential models and solve problems (F-LE)**	
Big Ideas: *Course Objectives / Content Statement(s)* ● To write, graph and recognize the basic characteristics of exponential and logarithmic functions. ● To explore how exponential and logarithmic functions model real-world problems. ● To use properties of logarithmic and exponents to manipulate expressions and to solve equations. ● To explore the five exponential and logarithmic models in which helps to solve real-world problems from a variety contents, including logarithmic growth.	
Essential Questions	**Enduring Understandings**

<table>
<tr><th>What provocative questions will foster inquiry, understanding, and transfer of learning?</th><th>What will students understand about the big ideas?</th></tr>
<tr><td>How do you use exponents and logarithms to model a variety of situations?

How do exponential functions relate to real life situations?</td><td>Students will understand that…

There are five common mathematical models involving exponents and logarithms. These models include exponential growth and decay, Gaussian, logistic growth, and logarithmic models,

Exponential functions are useful in molding data that represent quantities that increase or decrease quickly. An example of this could be the depreciation of a new vehicle or the increasing population of an animal species.</td></tr>
<tr><th>Areas of Focus: Proficiencies

(Cumulative Progress Indicators)</th><th>Examples, Outcomes, Assessments</th></tr>
<tr><td>Students will:
· (F-LE-2, 3, 4, 5) Evaluating exponential expressions
· (F-LE- 3 & F-IF 7e) Graphing exponential functions
· (F-LE-1c, 5) Compound interest problems
· (F-LE-4) Evaluating logarithms
· (F-LE) Solving exponential equations
· (F-LE- 4) Solving logarithmic equations
· (F-LE- 3 & F-IF 7e) Graphs of logarithmic functions
· (F-LE- 4) Rewriting logarithmic expressions
· (F-LE- 4) Condensing logarithmic expressions
· (F-LE-1c, 5) Problems that deal with logarithms and exponents</td><td>Instructional Focus:

1. Exponential Functions and Their Graphs
2. Logarithmic Functions and Their Graphs
3. Properties of Logarithms
4. Solving Exponential and Logarithmic Equations
5. Exponential and Logarithmic Models

Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112

Interdisciplinary Connections

Exponential and logarithmic functions have many real-life applications. Some include radioactive decay, sound intensity and Newton’s Law of Cooling.</td></tr>
</table>

	Technology Integration Students will use their graphing calculators to run exponential and logistic regressions to see which models a set of given data about an increasing/decreasing population of animals/humans/etc. Media Literacy Integration When reading ads to purchase a car, how does a person decide when it would be better for them to buy their own car or lease their own car? Global Perspectives The population P of a city is given by P where t represents 1990. According to this model, when will the population reach 275,000?

Trigonometric Functions (Units 4-7)

Standard: Trigonometric Functions (F-TF) **To evaluate and graph trigonometric functions, their inverses and their reciprocals.**	
Big Ideas: *Course Objectives / Content Statement(s)* ● Define trigonometric functions on the unit circle ● Work with radian measurements ● Find trigonometric ratios of an acute angle by using reference angles ● Graph trigonometric functions, their reciprocals and their inverses ● Simply and solve trig equations using a variety of identities and properties ● Use the Law of Sines, Law of Cosines and trig properties to solve problems in real life situations such as biology and navigation	
Essential Questions	**Enduring Understandings** *What will students understand about the big ideas?*

What provocative questions will foster inquiry, understanding, and transfer of learning?	
How do you describe angles and angular movement? How do you use trigonometric functions to solve real-life problems?	Students will understand that… Angles are measured in radians and degrees. Students will find linear or angular speed along the circular arc. Trigonometric ratios and angles are used to solve problems with navigation and simple harmonic motion.
Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
• (F-TF-1) Measuring angles in degrees and radians • • (F-TF) Finding coterminal angles • (F-TF) Trigonometric Ratios • (F-TF-8) Trigonometric Identities • (F-TF-9) Solving word problems using trigonometric ratios • (F-TF-2) Evaluating trigonometric functions of any angles • (F-TF) Graphing sine, cosine, tangent, cotangent, cosecant and secant functions • (F-TF) Model periodic phenomena with trigonometric functions • (F-TF) Inverse trigonometric functions of sine, cosine, and tangent • (F-TF-7) Composition of inverse trigonometric functions • (F-TF) Word problems involving right triangles • (F-TF) Trigonometry and bearings	Instructional Focus: 1. Radian and Degree Measure 2. Trigonometric Functions: The Unit Circle 3. Right Triangle Trigonometry 4. Trigonometric Functions of Any Angle 5. Graphs of Sine and Cosine Functions 6. Graphs of Other Trigonometric Functions 7. Inverse Trigonometric Functions 8. Applications and Models Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Interdisciplinary Connections Students will discuss that trig is used in applications involving vibrations, sound waves, light rays, planetary orbits, vibrating strings, pendulums and orbits of atomic particles. Technology Integration Students will use the graphing calculator and Desmos to analyze the periodic nature of trig graphs.

▪ (F-TF) Prove and apply trigonometric identities	Media Literacy Integration A safety regulation states that the maximum angle of elevation for a rescue ladder is 72 degrees. A fire department's longest ladder is 110 feet. What is the maximum safe rescue height? Global Perspectives *Graphing trig functions project for the end of Quarter 2:* In small groups, students will be tasked with finding a set of data that can be modeled with a trig graph, write its equation and explain its real-world significance. They will have to do this for two sets of data, with most topics relating to temperature (this will be the set of data that is given as the example for how a set of data is periodic in nature and can be modeled with an equation), astronomy, tides, seasonal sales numbers, etc.

Vectors and Complex Numbers (Unit 8)

To evaluate and graph vectors, resultants, simplify expressions and solve word problems.	
Big Ideas: *Course Objectives / Content Statement(s)* ● Identify the magnitude and direction of a vector ● Find the angle and relationship between two vectors ● Find the resultant vector when two forces are acting upon one another, especially modeled with real-world situations such as navigation ● Simplify complex numbers when adding, subtracting, multiplying, dividing, finding the nth roots	
Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
How do you find the magnitude and direction of a vector?	Students will understand that… Vectors can be graphed on the coordinate plane, where the distance formula and inverse tangent with right triangle trigonometry can help them find magnitude and direction. Resultants are found by adding the horizontal components together; likewise for the vertical

How do you find the resultant of two vectors? _____	components. From there, magnitude and direction can be found to solve many word problems.
Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
Extension unit; No state standards.	Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Technology Integration: Students will use the graphing calculator to graph vectors and solve word problems. Global Perspectives: Flight navigation relies entirely on vectors and wind velocity and direction affect the flight path of an airplane.

Conic Sections (Unit 9)

To write the equations, identify key characteristics and graph all types of conic sections (circles, parabolas, ellipses and hyperbolas)	
Big Ideas: *Course Objectives / Content Statement(s)* ● Identify if a function is a circle, parabola, ellipse or hyperbola ● Find the equation/characteristics given a graph of any conic section ● Find the equation/graph given any characteristics (center, focus, directrix, etc) of any conic section ● Find the graph/characteristics given an equation of any conic section	
Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
	Students will understand that…

How do you know what type of conic section based on its equation? How do you graph a given conic section properly (correct eccentricity, parabola width, hyperbola asymptotes, etc)?	Completing the square, factoring and putting equations into standard form for each type of conic section will reveal all the characteristics needed to graph it. There are specific major and minor axes, along with asymptotes and focal chords that create accurate graphs of each conic section.
Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
Extension unit; No state standards.	Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Technology Integration: Students will use the graphing calculator along with Desmos to graph conic sections. Global Perspectives: Parabolic microphones, car headlights are parabolic in nature and their manufacturing relies on characteristics of the conic section: parabolas.

Parametric and Polar Functions (Unit 10)

To be able to graph parametric and polar functions given their equations, and vice versa to write equations given the graph.
Big Ideas: *Course Objectives / Content Statement(s)* ● Convert rectangular equations into parametric and vice versa ● Model the flight of any object using parametric equations to track vertical and horizontal distance ● Convert rectangular coordinates and equations into polar coordinates and equations and vice versa ● Graph polar functions such as limacons and rose curves.

Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
How do you express a rectangular equation as a set of parametric equations? How do you find the vertical distance of an object modeled with a set of parametric equations? How do you express a rectangular equation as a polar equation? How do you graph polar functions?	Students will understand that… Substitution can help convert rectangular equations into parametric equations. Given a function for velocity, students can answer a variety of questions regarding the speed, angle, horizontal and vertical distance of a situation modeled with parametric equations Given several properties rooted in the vectors/complex numbers unit, students can convert polar equations into rectangular equations and vice versa. Identifying symmetry, maximum values and zeros of a polar function help make graphing the function an easier task.
Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**
Extension unit; No state standards.	Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Technology Integration: Students will use the graphing calculator and Desmos to graph parametric and polar functions. Global Perspectives: Using Major League Baseball video and StatCast numbers and technology showing a home run, students will find out how exit velocity and launch angle provide the unknown values needed to plug into the given parametric functions to track horizontal and vertical distance of a baseball hit into the air.

Sequences and Series (Unit 12)

To find the nth term of a sequence, model it with a formula and find its sum if necessary.	
Big Ideas: *Course Objectives / Content Statement(s)* ● Identify the different types of sequences – arithmetic, geometric, recursive. ● Find the nth term using a derived formula for each type of sequence. ● Find the sums of all types of series. ● Model real-world situations with sequences and series.	
Essential Questions *What provocative questions will foster inquiry, understanding, and transfer of learning?*	**Enduring Understandings** *What will students understand about the big ideas?*
How do you identify what type of sequence it is? How do you find the formula for the nth term for an arithmetic and geometric sequence? How do you find the sum of an arithmetic and geometric sequence? How do you use sigma notation to find the sum of a sequence? How can we model a real-world situation using a formula for an arithmetic sequence?	Students will understand that… Finding a common difference or ratio is important to identify the type of sequence and its formula. Using the given formulas for the nth term, use the common difference or ratio to set up the formula. Using the formula for nth terms along with the provided formulas for arithmetic and geometric sums, the sum of a series can be found. Finding the sum of an arithmetic sequence can be done a variety of ways, such as using sigma notation in the calculator or with the provided formula derived by Gauss.
Areas of Focus: Proficiencies **(Cumulative Progress Indicators)**	**Examples, Outcomes, Assessments**

Extension unit; No state standards.	Sample Assessments: See hard copy versions of assessments in the Pre-Calculus binder in office 110/112 Technology Integration: Students will use the graphing calculator to find the sum of all types of sequences. Global Perspectives: The layout of pyramid-style rows or stacks can be modeled with arithmetic sequences, such as finding the total number of seats in an auditorium or logs stacked in a pyramid.