

Unit One: Prerequisites to Pre-Calc: Ch. 1

Big Ideas: Factoring and Solving Quadratics, Simplifying Radicals, Basic Trig Functions, Complex Numbers

-I can factor and solve quadratics and cubics

-I can solve basic real-life trig problems. (Construction, angle of elevation, depression)

-I am comfortable working with i (operations, conjugate)

Essential Questions: What should a student entering Pre-Calc know? What review topics will best prepare students for success in Pre-Calc and on the fall ACT?

| Topics | Assessments | Standards |
|---|--|--|
| 1. Factoring quadratics PSN, Split Middle, Diff of Squares GCF 2. Solving Quadratics PSN, GCF, Split Middle Diff of Squares, Quad formula, Complete Square 3. Factor special cubic Sum/Diff of cubes 4. Simplify radicals 5. Pyth theorem 6. SOHCAHTOA/Trig Ratios 7. Rationalizing Denominator 8. Complex Numbers | 1. Homework 2. Classwork 3. Test | N.CN.1 N.CN.2 N.NC.3 A.SSE A.REI.4c A. REI.4 G.SRT.8 |

Unit Two: Matrix/Basic Probability

Big Ideas: Work with matrices and solve basic probability problems

- I can perform matrix operations
- I can solve systems of equations using matrices
- I can use basic probability to solve real world situations
- I understand the use and differences between combinations and permutations
- I can use binomial theorem to expand polynomials
- I understand the use of Pascal’s triangle in both combination and binomial expansion

Essential Questions: What connections do matrices have in the real world? What connections does basic probability, permutations, and combinations have in the real-life world?

| Topics | Assessments | Standards |
|---|--|---|
| <ol style="list-style-type: none"> 1. Using operations on matrices including scalar multiplication Add, Subtract, Multiply(both long and calc), Scalar multiply 2. Explore the idea of an inverse as alternative to division 3. Use Inverse to solve a system of equations 4. Solve problems using permutations and combinations 5. Solve basic probability problems 6. Use the binomial theorem to expand polynomials and explain its relationship to combinations | <ol style="list-style-type: none"> 1. Homework 2. Classwork 3. Test | <p>N.VM 6-12 A.APR.5 A.REI.8-9 S.CP.9</p> |

Unit Three: Function Descriptions (Part 1 and Part 2)

Big Ideas: Domain/Range, Function properties, Basic Functions, Transformation of functions, Function Operations

-I can describe and graph functions and their properties

-I can perform operations on functions

-I can build an equation from a graph

Essential Questions: What is the role of functions in real-life applications?

| Topics | Assessments | Standards |
|---|--|----------------------|
| 1. Domain and range Both with and without a graph Identify asymptotes 2. Function operations Add/Subtract/Multiply/Division/Composite Functions 3. Basic function descriptions Odd/Even, Boundedness, Max/Min, Increasing/Decreasing, Continuity 4. Basic Functions 14 that most commonly appear 5. Translation of the graphs of function | 1. Homework 2. Classwork 3. Test | F.IF 1-9 F.BF.1-5 |

Unit Four: Trig functions

Big Ideas: Radians/Degrees, Reference Angles, Coterminal angles, Unit Circle

-I can find angles in degrees and radians

-I can compute exact values of angle in the unit circle

-I understand that angles can be written in multiple ways and understand the idea of coterminal angles

-I can find a reference angle

Essential Questions: What are the real-world applications of angles in degrees and in radians?

| Topics | Assessments | Standards |
|--|--|-----------|
| 1. Converting from Radians to Degrees and back and forth 2. Compute Reference angles and coterminal angles in both rad/deg 3. Compute exact unit circle values | 1. Homework 2. Classwork 3. Test | G.C.5-6 |

Unit Five: Graphing Trig

Big Ideas: Graph the 6 trig functions, translate the graphs of the six trig functions

-I can graph and translate the 6 trig functions

-I can build the equation from the graph or given 2 points

Essential Question: How does the unit circle relate to the graphs of trig function

| Topics | Assessments | Standards |
|---|--|-----------|
| <ol style="list-style-type: none"> 1. Learn the 6 basic trig functions and be able to graph these using the critical points on a graph 2. Translate the 6 basic trig functions without a calculator 3. Learn the rules and be able to graph composite trig functions(honors) | <ol style="list-style-type: none"> 1. Homework 2. Classwork 3. Test | F.TF 1-4 |

Unit Six: Trig Proof and Inverse trig

Big Ideas: Trig identities, proof of trig identities, trig equations, inverse trig values

-I can solve trig proofs

-I can solve trig equations

Essential questions: What is the role of Greek letters in real life? How can proofs lead to real world thinking?

| Topics | Assessments | Standards |
|--|--|-----------|
| <ol style="list-style-type: none"> 1. Learn and use the Pythagorean, Sum and Difference, Multiple angle identities to prove trig equations 2. Solve trig equations for values in degree and radian 3. Understand the connection between the trig function and the inverse trig function 4. Use Sum/difference formulas as well as half and double angle formulas | <ol style="list-style-type: none"> 1. Homework 2. Classwork 3. Test | F.TF.5-9 |

Unit Seven: Applications of trig

Big Ideas: Law of Sine/Cosine, Vectors, Dot products

- I can solve real-life problems using vectors
- I can solve real-life problems using Law of sines and cosines

Essential questions: How are vectors used in flight/ship courses? How can Law of Cos/Sin be used in real-life?

| Topics | Assessments | Standards |
|---|--|------------------------|
| <ol style="list-style-type: none"> 1. Learn and use the law of sines and cosines to solve triangles without right angles 2. Learn vectors and use vector operations 3. Use vectors to solve real life problems 4. Understand dot products | <ol style="list-style-type: none"> 1. Homework 2. Classwork 3. Test | N.VM 1-5 G.SRT.9-11 |

Unit Eight: Trigonometric functions and non-function problems

Big Ideas: Parametric functions, Polar functions, DeMoirve’s theorem

- I can model real-life motion problems with parametric
- I can create art and represent non-functions using polar

Essential Questions: How do sports use parametric equations to improve athletic performance? How do artists use polar equations to create art and designs?

| Topics | Assessments | Standards |
|--|--|------------------|
| <ol style="list-style-type: none"> 1. Learn how to eliminate a parameter 2. Use parametric equations to solve real life free fall and projectile problems 3. Graph a point on the polar plane 4. Graph a polar graph 5. Use polar graph to create art 6. Use DeMoirve’s theorem to expand and find the roots of complex trig functions | <ol style="list-style-type: none"> 1. Homework 2. Classwork 3. Test | N.CN.4 N.CN.5 |

Unit Nine: Polynomial and Rational Functions

Big Ideas: Fundamental theorem of Alg, Complex zeros, Real Zeros, Rational Equations

-I can factor and solve polynomials

Essential Questions: How can a higher degree polynomial be solved?

| Topics | Assessments | Standards |
|---|---|-------------------------------|
| <ol style="list-style-type: none"> Use the fundamental theorem of algebra to find real and complex roots of polynomials Simplify rational expressions Solve rational equations(honors) | <ol style="list-style-type: none"> Homework Classwork Test | N.CN.8 N.CN.9 A.APR.2-3 |

Unit Ten: Logarithmic functions

Big Ideas: Exponential and Logarithmic Functions

-I can use logs to solve real-life money problems

-I can use exponential to model real-world situations

Essential Questions: How are logs/exponential problems used in mathematical finance problems?

| Topics | Assessments | Standards |
|--|---|------------------|
| <ol style="list-style-type: none"> Use logarithmic and exponential functions to solve real life problems Condense and Expand logs using properties Convert easily from log to exponential form and vice versa Explore the idea of continually compounding interest and its use in the real world | <ol style="list-style-type: none"> Homework Classwork Test | F.LE.4 F.BF.4 |

Unit Ten: Conics

Big Ideas: Parabola, Circle, Ellipse, Hyperbola

-I can graph and create the equation of the conic sections

Essential Question: How do you use complete the square twice in the same problem to create the equations of conics? How can you flip a parabola from up/down to left/right?

| Topics | Assessments | Standards |
|---|---|-----------|
| <ol style="list-style-type: none"> Learn the basic forms and associated terminology of the four conic sections Graph and translate the conic sections Put equations into standard conic form | <ol style="list-style-type: none"> Homework Classwork Test | G.GPE 1-3 |

Unit Twelve: Sequence, Series, Stats

Big Ideas: Sequence, Series, Graphical and Numerical Stats

I can work with sequences and series

| Topics | Assessments | Standards |
|--|---|-----------|
| <ol style="list-style-type: none"> Find a certain number in a sequence using the rules Identify if a sequence converges or diverges Write a recursive rule Find the sum of a sequence or series Explore the basic ways to represent data Median, mean, mode, outlier, distribution, standard deviation | <ol style="list-style-type: none"> Homework Classwork Test | |