



# Wayland High School

*Mathematics Department  
Honors Precalculus  
Curriculum Guide*

## ***Functions:***

- Graphing
- Limits
- Composition
- Transformations
- Regression

## ***Polynomials:***

- End behavior
- Rational roots Theorem
- Long and synthetic division
- Remainder Theorem
- Factor Theorem
- Fundamental Theorem
- Multiplicity
- Use an equation to model situations and make predictions
- Imaginary numbers
  - Powers of  $i$
  - Operations with  $i$
  - Complex conjugates
- Writing an equation from given information
- Calculator use in solving equations and finding key points on a graph

## ***Rational Functions:***

- Understanding rational functions as a transformations
- Find key points in a rational function
- End behavior
- Finding horizontal and vertical asymptotes
- Finding removable discontinuities
- Graphing rational functions

### ***Trigonometry:***

- Review of triangle trigonometry
- Finding reference angles
- Finding coterminal angles
- Evaluating the six trigonometric functions on the unit circle
- Graphing the six trigonometric functions
- Inverse Trig
- Applications
- Law of Sines and Cosines
- Proving trigonometric identities
- Solving trigonometric equations
- Using double and triple angle formulas
- Using sum and difference formulas
- Using power reducing formulas

### ***Vectors:***

- state the definition of a vector
- find the magnitude of a vector
- find the direction angle of a vector
- resolve a 2D vector into its x and y components
- write a vector as a linear combination of two other vectors
- find the unit vector in the direction of a given vector
- list and define the standard unit vectors for 2D
- write a vector as a linear combination of the standard unit vectors
- add vectors by adding components
- add vectors graphically
- estimate the result of a linear combination of vectors graphically
- multiply vectors by a scalar
- use vectors to solve word problems about velocity and forces

### ***Parametrics:***

- Describe at least three differences between function mode and parametric mode
- Graph a set of parametric equations by hand
- Eliminate the parameter from a set of parametric equations
- Convert from parametric form to vector form and vice versa
- Solve algebraically and logically (i.e., using and/or statements) for the values of a parameter that place the graph in a particular quadrant
- Find several sets of parametric equations to represent a line segment
- Use the domain restriction and functions to find the output ranges for both x and y
- Explain what the different terms of the projectile motion equations represent

- Technology-Based Learning Objectives
- Use a graphing calculator to graph parametric equations
- Explain the effect of choosing a very large T-step
- Explain the effect of choosing a very small T-step
- Use the projectile motion parametric equations to model the flight of a projectile
- Use the equation editor variables and the distance formula to model distance
- Model a foot race between two contestants, one with a head start
- Optional Learning Objectives
- Model the distance (versus time) between two projectiles
- Model the distance (versus time) between one projectile and a wheel in motion
- Model a circle using parametric equations
- Eliminate the parameter using the Pythagorean trigonometric identity
- Explain the meanings of  $dy/dt$ ,  $dx/dt$  and  $dy/dx$  from the parametric menu

### ***Logarithmic and Exponential Functions:***

- Graphing
- Domain, range and end behavior
- Solving exponential equations using common bases
- Solving logarithmic equations by rewriting
- Solving equations using technology
- Properties of logs
- Application problems
- Investigation into  $e$

### ***Partial Fractions:***

- Solving equations rational functions
- Solving inequalities with rational expressions
- Finding the partial fraction decomposition of rational expressions
- Investigating the different forms of partial fraction decomposition

### ***Polar Coordinates:***

- Explore the relationship between the polar system and the rectangular coordinate system
- Plotting points in polar coordinates
- Converting between polar and rectangular coordinates
- Graphing functions in polar coordinates
- Use of technology for graphing

### ***Sequences and Series:***

- Identifying arithmetic and geometric sequences and series
- Finding terms in a sequence or series
- Finding sums of finite and infinite series
- Application problems