



## Functions

### Key Concepts:

- Intercepts symmetry
- Lines – slope
- Step functions
- Composite
- Inverse
- Direct and inverse variation

### CSOs: PC 2.1

Estimated days to complete: 9

### Enduring Understanding:

The graph of a function is a visual aid to understanding the function

### Essential Question(s):

- What is the relationship between even and odd functions and symmetry?
- How do vertical and horizontal line tests relate to inverse functions?

### Key Vocabulary:

- Intercept
- Symmetry
- Even and odd
- Parallel lines
- Perpendicular lines
- Vertical line test
- Horizontal line test
- End behavior
- Zeros

### **Key Concepts:**

- Descartes Rule of Signs
- Rational Root theorem
- Polynomial and Synthetic Division
- Rational Zero Test
- Complex Numbers
- Rational Functions

## **Higher Order** **Polynomials**

**CSOs: PC 2.1, 2.2**

Estimated days to complete: 11

### **Enduring Understanding:**

Use the Descartes rule of signs and the leading coefficient test to determine the number of zeros.

### **Essential Question(s):**

- Why is synthetic division used instead of polynomial long division?

### **Key Vocabulary:**

- Quadratic function
- Descartes rule of signs
- Conjugates
- Fundamental theorem of Algebra
- Asymptotes
- Leading coefficient test
- Intermediate value theorem
- Domain, range
- Maximum, minimum
- Zeros/roots

## Key Concepts:

- Exponential function  $Y=ax^N$
- $\text{Log}_a b=x \Rightarrow A^x=b$   
Logarithmic function
- Formulas for compound interest
- Logarithmic properties
- Natural logarithms
- Laws of exponents

## Exponential and Logarithmic Functions

**CSOs: PC 2.4, 2.5, 2.11**

Estimated days to complete: 9

### **Enduring Understanding:**

Exponential and logarithmic functions are closely related.

### **Essential Question(s):**

- How are exponential and logarithmic functions related?
- How do you apply the compound interest formulas and when?

## **Key Vocabulary:**

- Exponent
- Logarithmic
- Inverse function
- Natural base
- Natural/common logarithms

### **Key Concepts:**

- Substitution
- Elimination
- Back substitution
- Solving a system of inequalities
- Linear programming

## **Systems of Equations and Inequalities**

**CSOs: A2.2.6, 2.8, 2.10, PC.3.1**

Estimated days to complete: 9

### **Key Vocabulary:**

- Back substitution
- Linear programming
- Objective function

### **Enduring Understanding:**

The intersections of systems of equations can be found graphically and algebraically.

### **Essential Question(s):**

- What must be true about equations in order for elimination to be used in finding the solution?
- What determines the number of solutions?

### **Key Concepts:**

- Sequences and summation notation
- Arithmetic sequence
- Geometric sequence
- Mathematical induction
- Binomial theorem
- Pascal's triangle

## **Sequences and Series**

**CSOs: PC 2.3, 2.6, 2.9**

Estimated days to complete: 11

### **Enduring Understanding:**

There is a difference between arithmetic and geometric sequences.

### **Essential Question(s):**

- What do sequences and series have in common?
- How do you determine the  $n$ th term in a sequence?

### **Key Vocabulary:**

- Infinite sequence
- Arithmetic sequence
- Geometric sequence
- Binomial theorem
- Pascal's triangle
- Summation
- $\Sigma$

## Key Concepts:

- Parabolas
- Ellipses
- Hyperbolas

## Conic Sections

**CSOs: PC 3.1, 3.2**

Estimated days to complete: 13

### **Enduring Understanding:**

The four curves that are derived from cones are graphically and algebraically different from each other.

### **Essential Question(s):**

- What is the relationship between the focus and the vertex of a parabola?
- What is the difference between the eccentricity of the conics?

## **Key Vocabulary:**

- Focus of parabolas
- Directrix of parabolas
- Vertex of parabolas
- Axis of parabolas
- Foci of ellipse
- Vertex of ellipse
- Center of ellipse
- Axis of ellipse
- Eccentricity of ellipse
- Vertex of hyperbola
- Center of hyperbola
- Transverse axis of hyperbola
- Asymptotes of hyperbola

### **Key Concepts:**

- Find limits graphically
- Find limits analytically
- Properties of limits
- Continuity and one-sided limits
- Infinite limits

## **Limits and Continuity**

### **CSOs: PC 2.7**

Estimated days to complete: 14

### **Enduring Understanding:**

Limits are used to help understand the nature of a curve and its approach to a point.

### **Essential Question(s):**

- Why are one-sided limits necessary?
- What determines if a function is continuous?

### **Key Vocabulary:**

- Limit of a function
- Continuous
- One-sided limit
- Intermediate value theorem