

## Topics Covered in Math 115

### Basic Concepts

#### Integer Exponents

- Use bases and exponents.
- Evaluate exponential expressions.
- Apply the product, quotient, and power rules.

#### Polynomial Expressions

- Perform addition and subtraction on monomials.
- Identify the degree and leading coefficient of a polynomial.
- Perform addition and subtraction on polynomials.
- Find the opposite of a polynomial.
- Apply the distributive property.
- Perform multiplication on polynomials.
- Find the product of a sum and difference.
- Square a binomial.

#### Factoring Polynomials

- Factor out the greatest common factor.
- Factor by grouping.
- Factor trinomials with a leading coefficient of 1.
- Factor trinomials by grouping (AC method).
- Factor trinomials using FOIL (trial-and-error).
- Factor trinomials with a greatest common factor.
- Factor the difference of two squares.
- Factor perfect square trinomials.
- Factor an expression completely.

#### Radical Notation / Radical Expressions

- Instruction/exercises sufficient to enable student to simplify square roots in quadratic formula and perform necessary operations in exponential and logarithmic equations.

### Introduction to Functions and Graphs

#### Numbers, Data, and Problem Solving

- Recognize common sets of numbers.
- Evaluate expressions by applying the order of operations.
- Learn scientific notation and use it in applications.\*
- Apply problem-solving strategies.

#### Visualizing and Graphing Data

- Analyze one-variable data.
- Find the domain and range of a relation.
- Graph in the  $xy$ -plane.

- Calculate distance.
- Use the midpoint formula.
- Learn to graph with a calculator.

### **Functions and Their Representations**

- Learn function notation.
- Graph functions by plotting points.
- Identify the domain and range of a function.
- Use a calculator to represent functions.
- Represent a function four different ways.
- Determine if a relation is a function.
- Solve applications.\*

### **Types of Functions**

- Find the slope and b for a linear function.
- Find and interpret slope as a rate of change.
- Determine if a function is linear or nonlinear and graph.
- Determine if data is linear or nonlinear and graph or identify the slope.
- Sketch a curve that satisfies a verbal description.

### **Functions and Their Rates of Change**

- Identify where a function is increasing or decreasing.
- Use interval notation.
- Use and interpret average rate of change.

## **Linear Functions and Equations**

### **Linear Functions and Models**

- Find the average rate of change.
- Determine whether a function models the data exactly or approximately.
- Analyze and graph linear functions.
- Model data with a linear function.
- Evaluate and graph piecewise-defined functions.
- Use linear regression to model data.

### **Equations of Lines**

- Find the point-slope form of a line.
- Find the slope-intercept form of a line.
- Write equations for horizontal, vertical, parallel, and perpendicular lines.
- Find the intercepts of a line.
- Apply interpolation and extrapolation.
- Solve applications.\*
- Use direct variation to solve problems.

### **Linear Equations**

- Use concepts about linear equations.
- Identify linear and nonlinear equations.
- Solve linear equations symbolically.
- Solve linear equations graphically.
- Solve linear equations numerically.
- Solve equations for a variable.
- Solve applications.\*
- Find a linear function that models the data.

### **Linear Inequalities**

- Express an inequality in interval notation.
- Solve linear inequalities symbolically.
- Solve linear inequalities graphically.
- Solve linear inequalities numerically.
- Solve compound inequalities.
- Solve applications.\*

### **Absolute Value Equations and Inequalities**

- Evaluate and graph the absolute value function.
- Solve absolute value equations.
- Solve absolute value inequalities.
- Solve applications.\*

## **Quadratic Functions and Equations**

### **Quadratic Functions and Models**

- Learn basic concepts about quadratic functions and their graphs.
- Apply the vertex formula.
- Graph a quadratic equation by hand.
- Solve applications and model data.
- Use quadratic regression to model data.

### **Quadratic Equations and Problem Solving**

- Find the domain of a function.
- Solve quadratic equations.
- Solve problems involving quadratic equations.
- Solve an equation for a variable.

### **Quadratic Inequalities**

- Solve quadratic inequalities graphically.
- Solve quadratic inequalities symbolically.
- Solve applications.\*

## **Exponential and Logarithmic Functions**

### **Combining Functions**

- Perform arithmetic operations on functions.
- Review function notation.
- Perform composition of functions.
- Solve applications.\*

### **Inverse Functions and Their Representations**

- Calculate inverse operations.
- Identify one-to-one functions.
- Find inverse functions symbolically.
- Use other representations to find inverse functions.
- Solve applications.\*

### **Exponential Functions and Models**

- Evaluate exponential expressions.
- Distinguish between linear and exponential growth.
- Calculate compound interest.
- Graph and model data with exponential functions.
- Solve applications.\*

### **Logarithmic Functions and Models**

- Evaluate the common logarithm function.
- Find the domain of a logarithmic function.
- Evaluate logarithms with other bases.
- Solve exponential equations.
- Solve logarithmic equations.
- Graph logarithmic functions.
- Convert between exponential and logarithmic forms.
- Solve applications.\*

### **Properties of Logarithms**

- Apply basic properties of logarithms.
- Expand and combine logarithmic expressions.
- Graph logarithmic functions.
- Use the change of base formula.
- Solve applications.\*

### **Exponential and Logarithmic Equations**

- Solve exponential equations.
- Solve logarithmic equations.
- Solve applications.\*

### **Constructing Nonlinear Models**

- Select and find an appropriate model.
- Use exponential and logarithmic regression to model data.
- Solve applications.\*

### **Systems of Equations and Inequalities**

#### **Functions and Systems of Equations in Two Variables**

- Evaluate functions of two variables.
- Understand basic concepts about systems of equations.
- Recognize types of linear systems.
- Apply the method of substitution.
- Apply the elimination method.
- Apply graphical and numerical methods.
- Solve applications.\*

**\* Applications chosen should be non-STEM to the maximum extent possible.**