



Lakeshore Technical College

## 10-804-118 Intermediate Algebra with Applications

### Course Outcome Summary

#### Course Information

**Alternate Title** Interm Algebra w Apps

**Description** This course offers algebra content with applications. Topics include properties of real numbers, order of operations, algebraic solution for linear equations and inequalities, operations with polynomial and rational expressions, operations with rational exponents and radicals, algebra of inverse, logarithmic and exponential functions.

**Total Credits** 4

**Total Hours** 72

#### Pre/Corequisites

**Prerequisite** Accuplacer basic math score of 100 and beginning algebra score of 55 or successful completion of 10-834-110 Elementary Algebra with Apps or equivalent

#### Course Competencies

##### 1. Apply properties of real number systems

###### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

###### Assessment Strategies

- 1.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 1.2. by active participation in class discussion and activities

###### Criteria

*Performance will be successful when:*

- 1.1. you identify the different sets of real numbers
- 1.2. you use set notations
- 1.3. you find intersections and unions of sets
- 1.4. you graph real numbers on the number line
- 1.5. you compare real numbers

###### Learning Objectives

- 1.a. Identify natural numbers, whole numbers, integers and rational and irrational real numbers.
- 1.b. Determine the identities and inverses.
- 1.c. Use set notations
- 1.d. Determine subsets, intersections and unions of sets

- 1.e. Use appropriate mathematical terminology (variables, algebraic expressions evaluate, natural numbers, whole numbers, integers, real numbers, element, set builder notation, rational numbers, irrational numbers, subset, intersection, union, reciprocal, and commutative, associative and distributive properties).
- 1.f. Graph real numbers on the number line
- 1.g. Compare real numbers
- 1.h. Use operation and order symbols to write mathematical sentences
- 1.i. Identify commutative, associative and distributive, closure, identity, and inverse properties.
- 1.j. Use commutative, associative, and distributive properties.
- 1.k. Write algebraic expressions.
- 1.l. Simplify algebraic expressions.

## 2. Evaluate expressions

### Linked Core Abilities

Demonstrate critical thinking

Use mathematics effectively

### Assessment Strategies

- 2.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 2.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 2.1. you identify additive inverse, absolute values, and reciprocals
- 2.2. you add, subtract, multiply, and divide real numbers
- 2.3. you substitute values for variables
- 2.4. you find powers and roots of real numbers
- 2.5. you apply the order of operation
- 2.6. you evaluate absolute value expressions

### Learning Objectives

- 2.a. Identify additive inverse, absolute values, and reciprocals
- 2.b. Add, subtract, multiply, and divide real numbers
- 2.c. Substitute values for variables
- 2.d. Find powers and roots of real numbers
- 2.e. Apply the order of operation
- 2.f. Evaluate absolute value expressions
- 2.g. Evaluate expressions containing exponents
- 2.h. Evaluate algebraic expressions
- 2.i. Write word phrases as algebraic expressions
- 2.j. Use a calculator properly and efficiently for computations.

## 3. Solve linear equations

### Linked Core Abilities

Demonstrate critical thinking

Use mathematics effectively

### Assessment Strategies

- 3.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 3.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 3.1. you evaluate formulas
- 3.2. you solve equations and formulas for a specific variable
- 3.3. you write and solve equations from given information
- 3.4. you solve application problems using formulas and linear equations

### Learning Objectives

- 3.a. Define linear equations, first degree equations, solution, solution set, equivalent equations
- 3.b. Simplify linear equations by using the distributive property.
- 3.c. Simplify linear equations by combining like terms.
- 3.d. Solve linear equations using the Addition Property of Equality and the Multiplicative Property of Equality.
- 3.e. Solve linear equations containing fractions and decimals.
- 3.f. Classify equations as conditional, contradiction, or identity.
- 3.g. Recognize equations with no solution.
- 3.h. Write linear equations to model application problems.
- 3.i. Solve application problems that are modelled by linear equations.
- 3.j. Solve a formula for a specified variable.
- 3.k. Solve application problems using formulas.
- 3.l. Solve absolute value equations.

#### 4. Solve linear inequalities

##### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

##### Assessment Strategies

- 4.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 4.2. by active participation in class discussion and activities

##### Criteria

*Performance will be successful when:*

- 4.1. you solve simple and compound linear and compound linear inequalities
- 4.2. you solve absolute value equations and inequalities
- 4.3. you solve word problems involving equations, absolute value, and inequalities
- 4.4. you use interval notation and set builder notations
- 4.5. you graph inequalities
- 4.6. you graph absolute value inequalities

##### Learning Objectives

- 4.a. Write solution sets in interval notation.
- 4.b. Write solution sets for inequalities in set builder notation.
- 4.c. Solve linear inequalities using the Addition Property of Inequalities.
- 4.d. Solve linear inequalities using the Multiplication Property of Inequalities.
- 4.e. Solve linear inequalities that require using both the Addition Property of Inequalities and the Multiplication Property of Equality.
- 4.f. Solve application problems that can be modeled by linear inequalities.
- 4.g. Find the intersection of two sets.
- 4.h. Find the union of two sets.
- 4.i. Solve compound inequalities containing the word "and".
- 4.j. Solve compound inequalities containing the word "or".
- 4.k. Solve absolute value inequalities containing the less than symbol.
- 4.l. Solve absolute value inequalities containing the greater than symbol.
- 4.m. Graph absolute value inequalities.

#### 5. Use the Cartesian coordinate system

##### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

##### Assessment Strategies

- 5.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 5.2. by active participation in class discussion and activities

##### Criteria

*Performance will be successful when:*

- 5.1. you find the distance between two points
- 5.2. you find the midpoint of two points
- 5.3. you find the slope given two points or the equation of the line

#### **Learning Objectives**

- 5.a. Calculate the slope of a line given two point.
- 5.b. Determine the slope of a line given the equation of a line.
- 5.c. Determine the slopes of horizontal and vertical lines.
- 5.d. Compare the slopes of parallel and perpendicular lines.
- 5.e. Calculate the midpoint of a line segment given the ordered pairs of the endpoints.
- 5.f. Calculate the distance between any two point on the rectangular coordinate system (Cartesian Coordinate system)

### **6. Demonstrate graphing skills on the Cartesian coordinate plane**

#### **Linked Core Abilities**

Demonstrate critical thinking  
Use mathematics effectively

#### **Assessment Strategies**

- 6.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 6.2. by active participation in class discussion and activities

#### **Criteria**

*Performance will be successful when:*

- 6.1. you plot ordered pairs, read coordinates, and identify x- and y- intercepts
- 6.2. you graph a line, given its slope and point on the line
- 6.3. you graph linear function
- 6.4. you graph linear equations

#### **Learning Objectives**

- 6.a. Plot ordered pairs on the rectangular coordinate system.
- 6.b. Determine whether an ordered pair is a solution to an equation in two variables.
- 6.c. Graph linear functions using a table of values.
- 6.d. Graph linear functions using the x and y intercepts.
- 6.e. Graph horizontal and vertical lines.
- 6.f. Graph a line using the slope and y-intercept.
- 6.g. Graph nonlinear functions (quadratic, absolute value, square root functions).
- 6.h. Graph linear inequalities.
- 6.i. Graph the intersection or union of two linear inequalities.
- 6.j. Interpret linear functions for vertical and horizontal shifts.

### **7. Analyze linear equations**

#### **Linked Core Abilities**

Demonstrate critical thinking  
Use mathematics effectively

#### **Assessment Strategies**

- 7.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 7.2. by active participation in class discussion and activities

#### **Criteria**

*Performance will be successful when:*

- 7.1. you use slope to determine if two lines are parallel, perpendicular, or neither
- 7.2. you find the equation of a line, given two points of the line
- 7.3. you write the equation of a line in standard, slope-intercept, or point-slope form

#### **Learning Objectives**

- 7.a. Write the equation of a line in standard form.
- 7.b. Write the equation of a line in slope intercept form.

- 7.c. Determine the slope and y-intercept from the equation of a line.
- 7.d. Write equations of horizontal and vertical lines.
- 7.e. Interpret the slope intercept form of an equation.
- 7.f. Use the point-slope form of an equation to write the equation of a line given one point and the slope.
- 7.g. Use the slope-intercept form of an equation to write an equation of a line.
- 7.h. Write the equation of a line given two points.
- 7.i. Analyze slopes to determine if lines are parallel or perpendicular.
- 7.j. Find the equation of a line that is parallel to another given line.
- 7.k. Find the equation of a line that is perpendicular to another given line.

## 8. Apply properties of functions and relations

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 8.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 8.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 8.1. you distinguish the differences between relations and functions
- 8.2. you find the domain and range of a relation or function
- 8.3. you use function notation
- 8.4. you solve applications involving functions

### Learning Objectives

- 8.a. Define relation, domain and range.
- 8.b. Identify functions.
- 8.c. Use the vertical line test to identify functions.
- 8.d. Determine the domain and range of a function.
- 8.e. Identify dependent and independent variables.
- 8.f. Use function notation.

## 9. Solve systems of equations and inequalities

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 9.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 9.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 9.1. you solve systems of two linear equation by graphing, elimination, and substitution methods
- 9.2. you solve systems of three linear equations using elimination and /or substitution methods
- 9.3. you classify systems as consistent/inconsistent or dependent/ independent
- 9.4. you solve application problems involving systems or equations
- 9.5. you solve applications of systems of equations

### Learning Objectives

- 9.a. Determine whether an ordered pair is a solution to a system of equations.
- 9.b. Determine if a system of equations is consistent or inconsistent.
- 9.c. Determine if the graph of a system of equations is dependent or independent.
- 9.d. Solve a system of equations by graphing.
- 9.e. Solve a system of equations by substitution.
- 9.f. Solve a system of equations by elimination.
- 9.g. Solve a system of 3 equations in 3 variables by elimination.

- 9.h. Solve a system of 3 equations in 3 variable by substitution.
- 9.i. Solve application problems that can be modeled by a system of two linear equations.
- 9.j. Solve application problems that involve cost and revenue functions.
- 9.k. Solve application problems that can be modeled by a system of three equations in three linear equations.

## 10. Apply properties of exponents

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 10.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 10.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 10.1. you apply product, quotient, negative, and zero exponent rules
- 10.2. you apply the power rule for exponents
- 10.3. you change numbers to scientific notation and vice versa
- 10.4. you use scientific notation in calculations

### Learning Objectives

- 10.a. Simplify expression using the product rule for exponents.
- 10.b. Simplify expressions using the quotient rule for exponents.
- 10.c. Evaluate expressions raised to the 0 power.
- 10.d. Evaluate expressions raised to the negative nth power.
- 10.e. Convert between scientific notation and standard notation.
- 10.f. Convert between engineering notation and standard notation.
- 10.g. Convert between scientific notation and engineering notation.
- 10.h. Compute using scientific notation.
- 10.i. Use a calculator properly and efficiently for conversions between standard notation, scientific notation and engineering notation.
- 10.j. Convert negative exponents to positive exponents.
- 10.k. Simplify exponential expressions using the rules of exponents.

## 11. Perform basic operations with polynomials

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 11.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 11.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 11.1. you identify the degree of a polynomial
- 11.2. you add, subtract, multiply, and divide polynomials
- 11.3. you solve application problems involving polynomials

### Learning Objectives

- 11.a. Define term, constant, like terms, polynomial, monomial, binomial, trinomial.
- 11.b. Identify terms in a polynomial.
- 11.c. Identify the degree of a term.
- 11.d. Identify the degree of a polynomial.
- 11.e. Define polynomial function.
- 11.f. Add polynomials.
- 11.g. Subtract polynomials
- 11.h. Recognize the graph of a polynomial function based on the degree of the polynomial.

- 11.i. Multiply two or monomials.
- 11.j. Multiply a monomial by polynomial using the distributive property.
- 11.k. Multiply two binomials using the distributive property.
- 11.l. Multiply two binomials using the FOIL method.
- 11.m. Multiply two polynomials.
- 11.n. Define conjugates.
- 11.o. Multiply the sum and difference of two terms.
- 11.p. Square a binomial.
- 11.q. Evaluate polynomial functions.
- 11.r. Multiply three or more polynomials.
- 11.s. Divide a polynomial by a monomial.
- 11.t. Divide a polynomial by a binomial using long division.

## 12. Graph functions and relations

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 12.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 12.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 12.1. you graph quadratic, radical, absolute value, and cubic functions
- 12.2. you interpret rigid transformations of functions
- 12.3. you recognize equations of circle in standard form
- 12.4. you recognize circles in non-standard form
- 12.5. you graph circles

### Learning Objectives

- 12.a. Graph quadratic equations in two variables (quadratic, absolute value, square root functions).
- 12.b. Graph linear functions.
- 12.c. Graph absolute value equations
- 12.d. Graph radical and cubic equations.
- 12.e. Graph piece-wise-defined functions.
- 12.f. Analyze equations to determine vertical and horizontal shifting.
- 12.g. Sketch graphs of functions that involve vertical and horizontal shifting.
- 12.h. Graph a reflection of the graph of a function.
- 12.i. Analyze the difference in equations that have graphs that are reflections of each other.

## 13. Factor polynomials

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 13.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 13.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 13.1. you calculate the greatest common factors
- 13.2. you factor trinomials
- 13.3. you factor by grouping and by substitution
- 13.4. you factor the difference of two squares, two cubes, and the sum of two cubes

### Learning Objectives

- 13.a. Identify the greatest common factor in a list of monomials

- 13.b. Factor out the greatest common factor of a polynomials terms.
- 13.c. Factor out the greatest common binomial factor.
- 13.d. Factor polynomials with 4 by grouping.
- 13.e. Factor trinomials with a leading coefficient of 1.
- 13.f. Factor trinomials with a leading coefficient that is not one.
- 13.g. Factor out -1 from a polynomial.
- 13.h. Factor trinomials using substitution.
- 13.i. Factor perfect square trinomials
- 13.j. Factor the difference of two perfect squares.
- 13.k. Factor the difference of two perfect cubes.
- 13.l. Factor the sum of two perfect cubes.

## 14. Solve equations using factoring

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 14.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 14.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 14.1. you use the zero factor property
- 14.2. you solve quadratic and cubic equations using factoring

### Learning Objectives

- 14.a. Write polynomial equations in standard form.
- 14.b. Identify the degree of a polynomial equation.
- 14.c. Use the zero-factor property to solve quadratic and cubic equations
- 14.d. Solve application problems that can be modeled by polynomial equations.
- 14.e. Solve application problems using Pythagorean Theorem.
- 14.f. Find the x-intercepts of a polynomial function.
- 14.g. Match a graph of a polynomial function to its equation.
- 14.h. Interpret the relationship of the x-intercepts of the graph of a quadratic equations with the roots of the equation.

## 15. Evaluate rational expressions

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 15.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 15.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 15.1. you identify and simplify rational expressions
- 15.2. you find domain of rational expressions
- 15.3. you add, subtract, multiply, and divide rational expressions
- 15.4. you simplify complex fractions

### Learning Objectives

- 15.a. Define rational expression, and complex fraction.
- 15.b. Factor rational expressions.
- 15.c. Find the domain of a rational expression.
- 15.d. Write rational expressions in lowest terms.
- 15.e. Simplify rational expressions.



- 15.f. Multiply rational expressions
- 15.g. Factor out a -1 to reverse subtraction.
- 15.h. Solve application problems modeled by rational functions.
- 15.i. Add or subtract rational expressions with common denominators.
- 15.j. Identify the least common denominator of two or more rational expressions.
- 15.k. Add or subtract rational expressions with unlike denominators.
- 15.l. Simplify complex fractions by simplifying the numerator and denominator and then dividing.
- 15.m. Simplify complex fractions by multiplying by a common denominator.
- 15.n. Simplify expressions with negative exponents.
- 15.o. Divide a polynomial by a monomial.
- 15.p. Divide a polynomial by a binomial.

## 16. Solve equations involving rational expressions

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 16.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 16.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 16.1. you solve application equations using proportions
- 16.2. you solve application problems using variation.
- 16.3. you solve equations by clearing the equation of fractions.
- 16.4. you check solution for extraneous roots

### Learning Objectives

- 16.a. Differentiate between rational equations and rational expressions.
- 16.b. Determine the least common denominator of rational expressions.
- 16.c. Solve equations containing rational expressions by clearing out fractions.
- 16.d. Solve formula containing rational expressions for a specified variable
- 16.e. Solve application problems modeled by equations with rational expressions.
- 16.f. Solve problems involving direct variation.
- 16.g. Solve problems involving inverse variation.
- 16.h. Solve problems involving joint variation.
- 16.i. Solve problems involving combined variation.

## 17. Evaluate radical expressions

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 17.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 17.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 17.1. you convert radical notations to exponential expressions and vice-versa
- 17.2. you simplify radicals
- 17.3. you apply rules of exponents with positive and negative rational exponents
- 17.4. you add, subtract, multiply, and divide radicals

### Learning Objectives

- 17.a. Calculate square roots.
- 17.b. Approximate square roots using a calculate.
- 17.c. Calculate cube roots.

- 17.d. Find  $n$ th roots.
- 17.e. Find the  $n$ th root of  $a^n$  when  $n$  is a positive number.
- 17.f. Find the  $n$ th root of  $a^n$  when  $n$  is a negative number.
- 17.g. Graph square and cube root functions.
- 17.h. Explain the meaning of the exponent  $1/n$ .
- 17.i. Explain the meaning of the expression  $a^{(m/n)}$ .
- 17.j. Explain the meaning of the expression  $a^{(-m/n)}$ .
- 17.k. Write expressions that contain variables with negative rational exponents as positive rational exponents.
- 17.l. Simplify expressions containing rational exponents using the rules of exponents.
- 17.m. Simplify radical expressions using rational exponents.
- 17.n. Multiply expressions containing variables with rational exponents.
- 17.o. Factor out common factors that have variables with rational exponents from a polynomial containing rational exponents.
- 17.p. Use the product rule to multiply radicals.
- 17.q. Use the quotient rule to divide radicals.
- 17.r. Use the product rule and quotient rule to simplify radicals.
- 17.s. Identify like radicals
- 17.t. Add or subtract radical expressions.
- 17.u. Multiply radical expressions in polynomials.
- 17.v. Rationalize denominators containing one term.
- 17.w. Write conjugates of binomials containing radicals.
- 17.x. Multiply conjugates of binomials containing radicals.
- 17.y. Rationalize denominators containing two terms.
- 17.z. Rationalize numerators.

## 18. Solve radical equations

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 18.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 18.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 18.1. you simplify radicals with numerical values
- 18.2. you simplify radical with algebraic terms
- 18.3. you interpret a graph of a radical equation

### Learning Objectives

- 18.a. Isolate radical in an equation.
- 18.b. Solve equations containing 1 root using the power rule.
- 18.c. Solve equations that contain 2 or more radicals.
- 18.d. Find the length of the unknown side of right triangles using the Pythagorean Theorem.
- 18.e. Solve application problems using the Pythagorean theorem.
- 18.f. Solve application problems that are modeled by a radical equation.

## 19. Operate within the complex number system

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 19.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 19.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 19.1. you identify complex numbers
- 19.2. you simplify radicals that include complex numbers
- 19.3. you add, subtract, multiply, and divide complex numbers

#### **Learning Objectives**

- 19.a. Define complex numbers.
- 19.b. Differentiate between complex number, real numbers and pure imaginary numbers.
- 19.c. Write square roots of negative numbers in the form  $bi$
- 19.d. Simplify roots with negative radicands.
- 19.e. Add or subtract complex numbers.
- 19.f. Multiply complex numbers.
- 19.g. Define complex conjugates.
- 19.h. Divide complex numbers.
- 19.i. Raise  $i$  to powers.

## **20. Solve quadratic equations**

#### **Linked Core Abilities**

Demonstrate critical thinking  
Use mathematics effectively

#### **Assessment Strategies**

- 20.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 20.2. by active participation in class discussion and activities

#### **Criteria**

*Performance will be successful when:*

- 20.1. you use square root principle and quadratic formula
- 20.2. you use the Pythagorean Theorem to solve problems involving right triangles
- 20.3. you solve application problems involving quadratic equations

#### **Learning Objectives**

- 20.a. Solve quadratic equations using the square root property.
- 20.b. Arrange a quadratic equation into standard form.
- 20.c. Solve quadratic equations using completing the square.
- 20.d. Solve application problems involving modeled by quadratic functions.
- 20.e. Solve quadratic equations using the quadratic formula.
- 20.f. Determine the number and type of solutions of a quadratic equation by using the discriminant.
- 20.g. Determine the legs and hypotenuse of a right triangle.
- 20.h. Solve application problems using right triangles and the pythagorean theorem.
- 20.i. Solve right triangle application problems modeled by quadratic equations.

## **21. Use Algebra functions**

#### **Linked Core Abilities**

Demonstrate critical thinking  
Use mathematics effectively

#### **Assessment Strategies**

- 21.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 21.2. by active participation in class discussion and activities

#### **Criteria**

*Performance will be successful when:*

- 21.1. you add, subtract, multiply, and divide functions
- 21.2. you find composites of functions
- 21.3. you identify one-to-one functions
- 21.4. you find and graph inverse functions

### Learning Objectives

- 21.a. Add functions
- 21.b. Subtract functions
- 21.c. Multiply functions.
- 21.d. Divide functions.
- 21.e. Construct composite functions.
- 21.f. Determine whether a function is a one-to-one function.
- 21.g. Use the horizontal line test to decide whether a function is a one-to-one function.
- 21.h. Find the inverse of a function.
- 21.i. Graph functions and their inverses.
- 21.j. Determine whether two functions are inverses of each other.

## 22. Apply properties of exponential and logarithmic functions

### Linked Core Abilities

Demonstrate critical thinking  
Use mathematics effectively

### Assessment Strategies

- 22.1. by completing assignments, quizzes, lab work, and tests with a satisfactory score as detailed in the grading scale
- 22.2. by active participation in class discussion and activities

### Criteria

*Performance will be successful when:*

- 22.1. you identify, graph and evaluate exponential functions.
- 22.2. you rewrite exponential equations as logarithmic and vice-versa
- 22.3. you use properties of logarithmic equations
- 22.4. you solve exponential and logarithmic equations
- 22.5. you solve applied problems involving exponential and logarithmic equations

### Learning Objectives

- 22.a. Graph exponential functions
- 22.b. Compute exponential and logarithmic expressions using a calculator.
- 22.c. Solve equations of the form  $b^x = b^y$
- 22.d. Solve application problems modeled by exponential functions (compound interest, radioactive decay, exponential growth).
- 22.e. Write exponential equations with the logarithmic notation.
- 22.f. Write logarithmic equations with exponential notation.
- 22.g. Solve logarithmic equations by using exponential notation.
- 22.h. Identify logarithmic equations.
- 22.i. Graph logarithmic equations.
- 22.j. Use the properties of logarithms to simplify logarithms.
- 22.k. Find the domain and range of a logarithmic function.
- 22.l. Use the product property of logarithms.
- 22.m. Use the quotient property of logarithms.
- 22.n. Use the power property of logarithms.
- 22.o. Use the properties of logarithms together.
- 22.p. Identify common logarithms.
- 22.q. Approximate common logarithms by calculator.
- 22.r. Identify natural logarithms.
- 22.s. Approximate natural logarithms by calculator.
- 22.t. Evaluate natural logarithms of powers of e.
- 22.u. Use the change in base formula.
- 22.v. Solve application problems involving compound interest.
- 22.w. Solve exponential equations.
- 22.x. Solve logarithmic equations.
- 22.y. Solve problems that can be modeled by exponential and logarithmic equations.