# Introductory Algebra

## Course Text

Dugopolski, Mark. Elementary Algebra, 6th edition. McGraw-Hill, 2009. ISBN 9780077224790 [This text is available as an etextbook at purchase or students may find used, new, or rental copies at this link]

## Course Description

Introductory Algebra takes the learner through topics that teach the basics of algebra. Real-life scenarios students can relate to are used to teach difficult concepts and topics. After a pre-algebra review, this course focuses on the basics of algebra and includes math vocabulary and notation, operations with numbers, fractions, decimals, percentages, and quadratic equations. Students also learn to read and interpret graphs.

## Course Objectives

After completing this course, students will be able to:

- Communicate using the appropriate mathematical vocabulary and notation.
- Perform operations with real numbers, fractions, decimals, and percentages.
- Evaluate arithmetic and exponential expressions, algebraic expressions, and equations.
- Translate word problems into algebraic expressions and vice versa.
- Use the order of operations and the properties of real numbers to simplify algebraic expressions.
- Solve and graph linear equations and linear inequalities.
- Solve word problems involving formulas and linear equations.
- Graph lines in the coordinate plane and determine the slope and intercepts of a linear equation.
- Solve a system of linear equations by using the graphing method, substitution method, and the addition method.
- Perform operations including factoring techniques with polynomials.
- Use various factoring techniques.
- Solve equations with rational expressions.
- Perform operations including solving equations with radicals and exponents.
- Solve quadratic equations.
- Define the Pythagorean theorem and apply it by solving quadratic equations.
- Evaluate functions and use function notation.
- Read and interpret graphs.

## Course Prerequisites

There are no prerequisites to take Introduction to Algebra.

## Important Terms

In this course, different terms are used to designate tasks:

- **Practice Exercise**: A non-graded assignment to assist you in practicing the skills discussed in a topic.
- **Graded Exam**: A graded online test.

## Course Evaluation Criteria

StraighterLine provides a percentage score and letter grade for each course. See Academic Questions section in FAQ for further details on percentage scores and grading scale. A passing percentage is **70%** or higher.

If you have chosen a Partner College to award credit for this course, your final grade will be based upon that college's grading scale. Only passing scores will be considered by Partner Colleges for an award of credit.

There are a total of 1000 points in the course:

| Topic | Assessment | Points Available |
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| 2 | Graded Exam #1 | 100 |
| 4 | Graded Exam #2 | 100 |
| 6 | Graded Exam #3 | 100 |
| 8 | Graded Exam #4 | 100 |
| 10 | Graded Exam #5 | 100 |
| 12 | Graded Exam #6 | 100 |
| 14 | Graded Exam #7 | 100 |
| 15 | Final Comprehensive Graded Exam | 300 |

## Course Topics and Objectives

| Topic | Lesson | Subtopics | Objectives |
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| 1 | Pre-Algebra Review | • Classifying Numbers<br>• Fractions<br>• Operations with Fraction | • Classify numbers as natural, whole, or integer.<br>• Define rational and irrational numbers.<br>• Write an integer as a fraction.<br>• Find the prime factorization for a number. |

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| | | | • Find the GCF for two or more numbers.<br>• Find the LCM for two or more numbers.<br>• Reduce fractions to lowest terms.<br>• Add and subtract fractions.<br>• Multiply fractions.<br>• Divide fractions. |
| 2 | The Real Numbers | • Decimals and Percents<br>• Real Numbers and Number Lines<br>• Orders on Real Numbers | • Write a decimal in expanded form.<br>• Write a decimal as a fraction.<br>• Write a fraction as a decimal.<br>• Add, subtract, multiply, and divide decimals.<br>• Convert decimals to percents and percents to decimals.<br>• Convert fractions to percents and percents to fractions.<br>• Identify real numbers.<br>• Represent integers and real numbers on the number line.<br>• Find the absolute value of a number.<br>• Represent |

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| | | | intervals on the number line. |
| 3 | Operations with Real Numbers | • Operations with Real Numbers<br>• Exponential Expressions<br>• Order of Operations | • Add two real numbers.<br>• Subtract one real number from another.<br>• Add and subtract several real numbers.<br>• Multiply two real numbers.<br>• Divide one real number by another.<br>• Evaluate expressions with exponents.<br>• Evaluate expressions using the correct order of operations.<br>• Evaluate expressions with more than one grouping symbol.<br>• Solve applications.<br>• Identify algebraic expressions. |
| 4 | Properties of Real Numbers | • Algebraic Expressions<br>• Properties of Real Numbers<br>• Simplifying Expressions | • Translate verbal expressions to algebraic expressions.<br>• Translate algebraic expressions to verbal expressions.<br>• Evaluate algebraic expressions. |

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| | | | • Determine whether a given number satisfies an algebraic equation.<br>• Identify properties of real numbers.<br>• Find the additive and/or subtractive inverse of a real number.<br>• Add, subtract, and combine like terms.<br>• Use the properties of real numbers to simplify expressions.<br>• Solve applications. |
| 5 | Solving Linear Equations in One Variable | • Addition and Multiplication Properties of Equality<br>• Solving Linear Equations<br>• Solving Literal Equations (Formulae) | • Determine whether a number satisfies an equation.<br>• Use the addition and subtraction properties of equality to solve equations.<br>• Use the multiplication and division properties of equality to solve equations.<br>• Multiply by reciprocals to solve equations.<br>• Multiply by least common multiples to |

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| | | | solve equations.<br>• Solve applications involving percents.<br>• Solve linear equations by using all properties of equality and the rules.<br>• Use a formula to solve an application.<br>• Translate verbal expressions into algebraic expressions in more detail.<br>• Solve word problems using linear. |
| 6 | Applications of Linear Equations and Linear Inequalities in One Variable | • Applications of Linear Equations<br>• Solving Linear Inequalities<br>• Applications of Linear Inequalities | • Applications of Linear equations.<br>• Solve applications involving numbers and mixture problems.<br>• Determine which of two numbers is greater.<br>• Use the notation of inequalities.<br>• Solve and graph linear inequalities.<br>• Use the addition and subtraction properties of inequalities.<br>• Use the multiplication |

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| | | | and division properties of inequalities with positive numbers.<br>• Use the multiplication and division properties of inequalities with negative numbers.<br>• Write, solve, and graph compound inequalities.<br>• Solve an application using inequalities. |
| 7 | Linear Equations in Two Variables | • Solutions of Equations in Two Variables<br>• Graphing Lines in the coordinate Plane<br>• Slope of a Line<br>• Three Forms for the Equation of a Line | • Find solutions of equations in two variables.<br>• Graph ordered pairs of numbers.<br>• Determine the coordinates of a point in the plane.<br>• Graph a linear equation.<br>• Graph a line using intercepts.<br>• Solve applications involving linear equations.<br>• Find the slope of a line given two points.<br>• Find the slope of a line given the equation of the line.<br>• Determine whether two lines are parallel, |

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| | | | perpendicular, or neither.<br>• Write the equation of a line in three forms. |
| 8 | Polynomials | • Exponents and Polynomials<br>• Addition and Subtraction of Polynomials<br>• Multiplication of Polynomials<br>• Division of Polynomials | • Use properties of exponents.<br>• Classify polynomials.<br>• Find the degree of a polynomial.<br>• Add and subtract polynomials.<br>• Multiply a binomial by a binomial.<br>• Multiply any two polynomials.<br>• Find the product of two binomials that differ only by the sign between terms.<br>• Divide a polynomial by a monomial.<br>• Divide a polynomial by a binomial.<br>• Divide one polynomial by another polynomial. |
| 9 | Factoring | • The Greatest Common Factor and the Factorization of Polynomials<br>• Factoring ax^2+bx+c<br>• Factoring Strategy<br>• Solving | • Find the greatest common factor of numbers and terms.<br>• Write polynomials in factored form.<br>• Factor by grouping. |

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| | | Quadratic Equations by Factoring and Applications | • Factor trinomials.<br>• Factor a polynomial by using a trial and error process.<br>• Factor squares of binomials.<br>• Use "ac method" to factor.<br>• Factor the sum or difference of two cubes.<br>• Factor a polynomial by using general factoring strategy.<br>• Solve quadratic equations by factoring.<br>• Solve applications of quadratic equations. |
| 10 | Rational Expressions | • Working with Rational Expressions-I<br>• Working with Rational Expressions-II<br>• Solving Equations with Rational Expressions<br>• Applications | • Determine the values that make a rational expression undefined.<br>• Simplify a rational expression to lowest terms.<br>• Multiply two rational expressions.<br>• Divide one rational expression by another.<br>• Add and subtract rational expressions.<br>• Use cross-multiplyin |

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| | | | g to solve equations.<br>• Solve equations involving rational expressions.<br>• Solve applications with ratios and proportions. |
| 11 | Powers and Roots | • Roots and Radicals<br>• Operations with Rational Exponents and Radicals<br>• Solving Equations with Radicals and Exponents | • Square roots, cube roots and nth roots of numbers.<br>• Find principal roots of numbers.<br>• Recognize and write a root using the radical notation.<br>• Evaluate radicals.<br>• Find the conjugate of a sum or difference of radicals.<br>• Simplify radicals using properties of radicals.<br>• Find the approximate value of radicals using a graphing calculator.<br>• Write radicals as a rational exponent and rational exponents as a radical.<br>• Evaluate and simplify rational exponents.<br>• Solve |

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| | | | equations involving radicals and rational exponents. |
| 12 | Quadratic Equations | • Using the Square Root Property and Factoring<br>• Completing the Square<br>• The Quadratic Formula<br>• Applications | • Solve quadratic equations by square root property.<br>• Solve quadratic equations by factoring.<br>• Complete the square for a trinomial expression.<br>• Solve quadratic equations by completing the square.<br>• Write quadratic equations in standard form.<br>• Solve quadratic equations by the quadratic formula.<br>• Use the Pythagorean Theorem to solve right triangle.<br>• Solve word problems involving quadratic equations. |
| 13 | Systems of Linear Equations | • The Graphing Method<br>• The Substitution Method<br>• The addition (Elimination) Method<br>• Applications | • Solve a system of two equations in two variables by graphing.<br>• Solve a system of two equations in two variables by adding.<br>• Solve a system of two |

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| | | | equations in two variables by substitution.<br>● Determine whether a system of equations is consistent, inconsistent, or dependent.<br>● Solve applications involving coin, general, motion, and investment problems.<br>● Find domain and ranges. |
| 14 | Functions and Interpreting Graphs | ● Introduction to Functions<br>● Applications of Functions<br>● Interpreting Graphs | ● Determine whether a relation is a function.<br>● Use function notation.<br>● Solve an application.<br>● Add, subtract, multiply, and divide functions.<br>● Read and interpret graphs.<br>● Solve applications involving graphs. |
| 15 | Course Review | ● Course Review | ● Review of the course topics |