



Beginning Algebra (Algebra 1) – Part II

Michigan State Algebra Content Expectations

Course Description

Students enrolled in Beginning Algebra will study characteristics of our number system and how those characteristics are applicable to problem situations, which may arise in the real world or in disciplines other than mathematics. This class emphasizes the use of technology, problem solving, critical thinking, and reasoning. Topics include integers, equations, inequalities, polynomials, factoring, linear functions and graphs, number patterns, systems of equations, quadratics equations and graphs, among others.

Text Book

Martin-Gay, K. Elayn. *Beginning Algebra, Fourth Edition*. Pearson Prentice Hall.

Unit 1 Description

This unit will focus on graphing.

Essential Content and Skills

The learner will:

- Define the rectangular coordinate system and plot ordered pairs of numbers.
- Graph paired data to create a scatter diagram.
- Determine whether an ordered pair is a solution of an equation in two variables.
- Find the missing coordinate of an ordered pair solution, given one coordinate of the pair.
- Identify linear equations.
- Graph a linear equation by finding and plotting ordered pair solutions.
- Identify intercepts of a graph.
- Graph a linear equation by finding and plotting intercepts.
- Find the slope of a line given two points of the line.
- Find the slopes of horizontal and vertical lines.
- Compare the slopes of parallel and perpendicular lines.
- Solve applications of slope.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

- Use slope-intercept form to find the slope and the y-intercepts of a line.
 - Use slope-intercept form to determine whether two lines are parallel, perpendicular, or neither.
 - Use the slope-intercept form to write an equation of a line.
 - Use the slope intercept form to graph a linear equation.
 - Use the point-slope form to find an equation of a line given its slope and a point of the line.
 - Use the point-slope form to find an equation of a line given two point of the line.
 - Find equations of vertical and horizontal lines.
 - Use the point-slope form to solve problems.
 - Identify relations, domains, and ranges.
 - Identify functions.
 - Use the vertical line test.
 - Use function notation.
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Unit 1 Michigan State Algebra Content Expectations

[Click here to view the Michigan DOE Curriculum Content Standards.](#)

Unit 1 Lesson 1: The Rectangular Coordinate System

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).

Unit 1 Lesson 2: Graphing Linear Equations

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 1 Lesson 3: Intercepts

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.
S2.1.1	Construct a scatterplot for a bivariate data set with appropriate labels and scales.
S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.
S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.

Unit 1 Lesson 4: Slope and Rate of Change

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.
S2.1.1	Construct a scatterplot for a bivariate data set with appropriate labels and scales.
S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.
S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set. Recognize that correlation measures the strength of linear association.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 1 Lesson 5: Slope and Rate of Change

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.

Unit 1 Lesson 6: Slope-Intercept Form

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.

Unit 1 Lesson 7: Point-Slope Form

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 1 Lesson 8: Point-Slope Form

State Standard	Description
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).
A3.1.1	Write the symbolic forms of linear functions(standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.3	Relate the coefficients in a linear function to the slope and x - and y -intercepts of its graph.

Unit 1 Lesson 9: Functions

State Standard	Description
A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.
A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.
A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).

Unit 1 Lesson 10: Functions

State Standard	Description
A2.1.1	Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.
A2.1.2	Read, interpret, and use function notation and evaluate a function at a value in its domain.
A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g., slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, and average rate of change over an interval).

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 2 Description

This unit will focus on solving systems of linear equations and inequalities.

Essential Content and Skills

The learner will:

- Determine if an ordered pair is a solution.
 - Solve a system of linear equations by graphing.
 - Without graphing, determine the number of solutions of a system.
 - Use the substitution method to solve a system of linear equations.
 - Use the addition method to solve a system of linear equations.
 - Use a system of equations to solve problems.
 - Graph a linear inequality in two variables.
 - Solve a system of linear inequalities.
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Unit 2 Michigan State Algebra Content Expectations

Unit 2 Lesson 1: Solving Systems of Linear Equations by Graphing

State Standard	Description
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.
A2.4.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.

Unit 2 Lesson 2: Solving Systems of Linear Equations by Graphing

State Standard	Description
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.
A3.1.2	Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.

Unit 2 Lesson 3: Solving Systems of Linear Equations by Substitution

State Standard	Description
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 2 Lesson 4: Solving Systems of Linear Equations by Substitution

State Standard	Description
A1.2.1	Write and solve equations and inequalities with one or two variables to represent mathematical or applied situations. Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.
A1.2.8	

Unit 2 Lesson 5: Solving Systems of Linear Equations by Addition

State Standard	Description
A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations and solve. Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution. Combine functions by addition, subtraction, multiplication, and division.
A1.2.8	
A2.2.1	

Unit 2 Lesson 6: Systems of Linear Equations and Problem Solving

State Standard	Description
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.

Unit 2 Lesson 7: Systems of Linear Equations and Problem Solving

State Standard	Description
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.

Unit 2 Lesson 8: Graphing Linear Inequalities

State Standard	Description
A1.2.4	Solve absolute value equations and inequalities (e.g., solve $ x - 3 \leq 6$) and justify steps in the solutions. Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.2	

Unit 2 Lesson 9: Graphing Linear Inequalities

State Standard	Description
A1.2.4	Solve absolute value equations and inequalities (e.g., solve $ x - 3 \leq 6$) and justify steps in the solutions. Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.2	

Unit 2 Lesson 10: Systems of Linear Inequalities

State Standard	Description
A1.2.4	Solve absolute value equations and inequalities (e.g., solve $ x - 3 \leq 6$) and justify steps in the solutions. Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.
A3.1.2	

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 3 Description

This unit will focus on roots and radicals.

Essential Content and Skills

The learner will:

- Find square roots of perfect squares.
- Approximate irrational square roots.
- Simplify square roots containing variables.
- Find higher roots.
- Use the product rule to simplify square roots.
- Use the quotient rule to simplify square roots.
- Simplify radicals containing variables.
- Simplify higher roots.
- Add or subtract like radicals.
- Simplify radical expressions, and then add or subtract any like radicals.
- Multiply radicals.
- Divide radicals.
- Rationalize denominators.
- Rationalize using conjugates.
- Solve radical equations by using the squaring property of equality.
- Use the Pythagorean formula to solve problems.
- Use the distance formula.
- Solve problems using formulas containing radicals.
- Evaluate exponential expressions
- Use rules for exponents to simplify expressions containing fractional exponents.

Unit 3 Michigan State Algebra Content Expectations

Unit 3 Lesson 1: Introduction to Radicals

State Standard	Description
A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 3 Lesson 2: Simplifying Radicals

State Standard	Description
A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.

Unit 3 Lesson 3: Adding and Subtracting Radicals

State Standard	Description
A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.

Unit 3 Lesson 4: Multiplying and Dividing Radicals

State Standard	Description
A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions (e.g., $f(0) = 5$, and $f(n) = f(n-1) + 2$).

Unit 3 Lesson 5: Multiplying and Dividing Radicals

State Standard	Description
A1.1.2	Know the properties of exponents and roots and apply them in algebraic expressions.
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.
A2.1.5	Recognize that functions may be defined recursively. Compute values of and graph simple recursively defined functions (e.g., $f(0) = 5$, and $f(n) = f(n-1) + 2$).

Unit 3 Lesson 6: Solving Equations Including Radicals

State Standard	Description
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 3 Lesson 7: Radical Equations and Problem Solving

State Standard	Description
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise. Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution. Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles.
A1.2.8	
G1.3.1	

Unit 3 Lesson 8: Radical Equations and Problem Solving

State Standard	Description
A1.2.6	Solve power equations (e.g., $(x + 1)^3 = 8$) and equations including radical expressions (e.g., $\sqrt{3x - 7} = 7$), justify steps in the solution, and explain how extraneous solutions may arise. Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution. Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles.
A1.2.8	
G1.3.1	

Unit 3 Lesson 9: Rational Exponents

State Standard	Description
L2.1.2	Calculate fluently with numerical expressions involving exponents. Use the rules of exponents, and evaluate numerical expressions involving rational and negative exponents, and transition easily between roots and exponents. Know the properties of exponents and roots and apply them in algebraic expressions.
A1.1.2	

Unit 3 Lesson 10: Rational Exponents

State Standard	Description
L2.1.2	Calculate fluently with numerical expressions involving exponents. Use the rules of exponents, and evaluate numerical expressions involving rational and negative exponents, and transition easily between roots and exponents. Know the definitions and properties of exponents and roots and apply them in algebraic expressions.
A1.1.2	

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 4 Description

This unit will focus on solving quadratic equations.

Essential Content and Skills

The learner will:

- Use the square root property to solve quadratic equations.
 - Solve problems modeled by quadratic equations.
 - Find perfect square trinomials.
 - Solve quadratic equation by completing the square.
 - Use the quadratic formula to solve quadratic equations.
 - Determine the number of solutions of a quadratic equation by using the discriminant.
 - Write complex numbers using i notation.
 - Add and subtract complex numbers.
 - Multiply complex numbers.
 - Divide complex numbers.
 - Solve quadratic equations that have complex solutions.
 - Graph quadratic equations.
 - Find the intercepts of a parabola.
 - Determine the vertex of a parabola.
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Unit 4 Michigan State Algebra Content Expectations

Unit 4 Lesson 1: Solving Quadratic Equations by the Square Root Method

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.

Unit 4 Lesson 2: Solving Quadratic Equations by the Square Root Method

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 4 Lesson 3: Solving Quadratic Equations by Completing the Square

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately. Convert quadratic functions from standard to vertex form by completing the square.
A3.3.3	

Unit 4 Lesson 4: Solving Quadratic Equations by Completing the Square

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately. Convert quadratic functions from standard to vertex form by completing the square.
A3.3.3	

Unit 4 Lesson 5: Solving Quadratic Equations by the Quadratic Formula

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately. Convert quadratic functions from standard to vertex form by completing the square. Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.
A3.3.3	
A3.3.4	

Unit 4 Lesson 6: Solving Quadratic Equations by the Quadratic Formula

State Standard	Description
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately. Convert quadratic functions from standard to vertex form by completing the square. Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.
A3.3.3	
A3.3.4	

Unit 4 Lesson 7: Complex Solutions of Quadratic Equations

State Standard	Description
L2.1.4	Know that the imaginary number i is one of two solutions to $x^2 = -1$. Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.
A1.2.3	

Unit 4 Lesson 8: Complex Solutions of Quadratic Equations

State Standard	Description
L2.1.4	Know that the imaginary number i is one of two solutions to $x^2 = -1$. Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.
A1.2.3	

Course Name - Part

Michigan State Curriculum Content Standards (continued)

Unit 4 Lesson 9: Graphing Quadratic Equations

State Standard	Description
A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.). Identify the elements of a parabola (vertex, axis of symmetry, and direction of opening) given its symbolic form or its graph and relate these elements to the coefficient(s) of the symbolic form of the function. Convert quadratic functions from standard to vertex form by completing the square.
A3.3.2	
A3.3.3	

Unit 4 Lesson 10: Graphing Quadratic Equations

State Standard	Description
A3.3.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.). Identify the elements of a parabola (vertex, axis of symmetry, and direction of opening) given its symbolic form or its graph and relate these elements to the coefficient(s) of the symbolic form of the function. Convert quadratic functions from standard to vertex form by completing the square.
A3.3.2	
A3.3.3	