

# **Cedar Grove School District**

## **Cedar Grove, NJ**

**2016** | **Grades**  
**8-9**

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# **Algebra I**

*Approved by the Cedar Grove Board of Education*

Superintendent of Schools

Mr. Michael J. Fetherman

Board of Education

Mr. Joseph Cicala, President

Mrs. Christine Dye, Vice-President

Mrs. Pam Burke

Mr. Frank Mandala

Mr. Peter Prvulovic

# Mathematics- Grades 8-9: Algebra I

## Course Description

*Algebra I* is offered either at Grade Eight or as a beginning course of college preparatory mathematics study at the secondary level. The course is designed to provide students with a foundation in the operations of signed numbers, solving and graphing equations, and simplifying and evaluating rational expressions and polynomials. Emphasis is also placed on creating algebraic models to represent real-life phenomena. Mathematical vocabulary and notation will be strengthened and extended and opportunities will be given to apply these concepts and patterns in the solution of problems.

**Prerequisite:** None

# Mathematics- Grades 8-9: Algebra I

## Course Calendar

	Sep			Oct			Nov			Dec			Jan			Feb			Mar			Apr			May			Jun																																																
Unit:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																				
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<u>Solving Linear Equations</u>																																																																												
<u>Graphing Linear Equations and Functions</u>																																																																												
<u>Writing Linear Equations</u>																																																																												
<u>Solving and Graphing Linear Inequalities</u>																																																																												
<u>Systems of Equations and Inequalities</u>																																																																												
<u>Exponents and Exponential Functions</u>																																																																												
<u>Polynomials and Factoring</u>																																																																												
<u>Quadratic Equations</u>																																																																												



# Unit Planner: Expressions, Equations, and Functions Algebra I

Wednesday, August 31, 2016, 3:24PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 1 - Week 4

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### Quantities

**HSN-Q.A. Reason quantitatively and use units to solve problems.**

HSN-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

HSN-Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

### Mathematical Practice

**MP. The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.**

MP.1. Make sense of problems and persevere in solving them.

MP.3. Construct viable arguments and critique the reasoning of others.

MP.6. Attend to precision.

**NJ: HS: Algebra**

### Seeing Structure in Expressions

**HSA-SSE.A. Interpret the structure of expressions.**

HSA-SSE.A.1. Interpret expressions that represent a quantity in terms of its context.

### Creating Equations

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HSA-CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

### Reasoning with Equations & Inequalities

**HSA-REI.B. Solve equations and inequalities in one variable.**

HSA-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

**NJ: HS: Functions**

## Interpreting Functions

### HSF-IF.A. Understand the concept of a function and use function notation.

HSF-IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .

### HSF-IF.B. Interpret functions that arise in applications in terms of the context.

HSF-IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

HSF-IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

### HSF-IF.C. Analyze functions using different representations.

HSF-IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

## Linear, Quadratic, and Exponential Models

### HSF-LE.A. Construct and compare linear and exponential models and solve problems.

HSF-LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

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### Enduring Understandings

All relationships can be written as algebraic expressions. Data can be represented in multiple ways. there is a relationship between patterns, tables, equations, and graphs.

### Essential Questions

Why do we need to use algebra in our lives?  
How can we use algebraic expressions to understand the world around us?  
What is the relationship between a table, a pattern, a rule and a graph?  
What are the different approaches to solving algebraic problems?

### Content

1. Evaluate algebraic expressions and use exponents.
2. Use order of operations to evaluate expressions.
3. Translate verbal phrases into expressions.
4. Translate verbal sentences into equations or inequalities
5. Use a problem solving plan to solve problems.
6. Compare measurements for precision.
7. Represent functions as rules and tables.
8. Represent functions as graphs.

### Skills

1. Evaluate algebraic expressions.  
Read and write powers.  
Evaluate powers.
2. Evaluate expressions without grouping symbols.  
Evaluate expressions with grouping symbols.
3. write an expression.  
Use a verbal model to write an expression.  
Find a unit rate.  
Solve multi-step problems.
4. Write equations and inequalities.  
Check possible solutions.  
Use mental math to solve equations.  
Write and check a solution of an inequality.
5. Read a problem and make a plan.  
Solve a problem and look back.
- 6.

Compare precision of measurements.  
 Identify significant digits.  
 Calculate with significant digits.  
 7.  
 Identify the domain and range of a function.  
 Identify a function.  
 Make a table for a function.  
 Write a function rule.  
 8.  
 Graph a function.  
 Write a function rule for graph.  
 Analyze a graph

### Stage 2: Assessment Evidence

#### Assessments

##### **Formative: Other Visual Assessments**

Class Participation Teacher Observation

##### **Summative: Written Test**

Tests/Quizzes Midterms

##### **Formative: Other written assessments**

Homework/Projects

### Stage 3: Learning Plan

#### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

#### Resources

- **Textbook:** *Algebra 1 Common Core Standard*

Larson, Boswell, Kanold, Stiff  
 Holt McDougal , 2012

- **Supplementary Materials**

##### § **Websites**

www.classzone.com includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

##### § **Calculators**

Graphing calculator (TI-83 Plus, or TI-84)

##### § **Equipment**

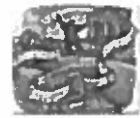
Video tutor with Practice, using Overhead projector and/or Smart Board technology

 <http://www.classzone.com>



# Unit Planner: Solving Linear Equations Algebra I

Wednesday, August 31, 2016, 3:24PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 5 - Week 9

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### The Real Number System

**HSN-RN.B. Use properties of rational and irrational numbers.**

HSN-RN.B.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

### Quantities

**HSN-Q.A. Reason quantitatively and use units to solve problems.**

HSN-Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HSN-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

### Mathematical Practice

**MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.**

MP.1. Make sense of problems and persevere in solving them.

MP.2. Reason abstractly and quantitatively.

MP.5. Use appropriate tools strategically.

**NJ: HS: Algebra**

### Creating Equations

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HSA-CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

### Reasoning with Equations & Inequalities

**HSA-REI.A. Understand solving equations as a process of reasoning and explain the reasoning.**

HSA-REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

**HSA-REI.B. Solve equations and inequalities in one variable.**

HSA-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

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**Enduring Understandings**

Real world situations can be modeled by equations and graphs.  
Numeric and algebraic procedures are interconnected and build on one another.  
When mathematical procedures are integrated, they build a stronger base to find solutions.

**Essential Questions**

How can functions model real life situations?  
Why do you need math after high school?  
When graphing a function, why is important to "see" the slope of the line and understand it? How does this apply to everyday life?  
Why is it important to understand how to use math with respect to the Internet? What can accomplish using the Internet that is not easily done with just the textbooks?

**Content**

1. Find square roots and compare real numbers.
2. Solve one-step, two-step and multiple step equations.
3. Solve equations with variables on both sides.
4. Find ratios. Write and solve proportions.
5. Solve proportions using cross products.
6. Rewrite equations and formulas, solving for various variables.

**Skills**

1. Evaluate square roots.  
Approximate a square root.  
Classify numbers.  
Graph and order real numbers.
2. Solve an equation using subtraction, addition, multiplication and/or division  
Solve an equation by multiplying by a reciprocal.  
Solve a two-step equation.  
Solve a two-step equation by combining like terms.  
Find an input of a function.  
Solve an equation by combining like terms.  
Solve an equation using the distributive property.  
Multiply by a reciprocal to solve an equation.  
Write and solve equations.
3. Solve an equation with variables on both sides.  
Solve an equation with grouping symbols.  
Identify the number of solutions of an equation.
4. Write a ratio.  
Solve a proportion.
5. Use the cross products property.  
Write and solve a proportion.  
Use and understand scale drawings and scale models.
8. Solve literal equations.  
Rewrite an equation to solve for a different variable.  
Isolate a variable to solve and use a geometric formula.

**Stage 2: Assessment Evidence**

**Assessments**

**Formative: Other Visual Assessments**  
Class Participation Teacher Observation  
**Summative: Written Test**  
Tests Quizzes  
**Formative: Other written assessments**  
Homework Projects

**Stage 3: Learning Plan**



## Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

## Resources

- **Textbook:** *Algebra 1 Common Core Standard*

Larson, Boswell, Kanold, Stiff  
Holt McDougal , 2012

- **Supplementary Materials**

### § **Websites**

[www.classzone.com](http://www.classzone.com)

includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

### § **Calculators**

Graphing calculator (TI-83 Plus, or TI-84)

### § **Equipment**

Video tutor with Practice, using Overhead projector and/or Smart Board technology

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# Unit Planner: Graphing Linear Equations and Functions Algebra I

Wednesday, August 31, 2016, 3:24PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 10 - Week 14

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### Quantities

**HSN-Q.A. Reason quantitatively and use units to solve problems.**

HSN-Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HSN-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

### Mathematical Practice

**MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.**

MP.2. Reason abstractly and quantitatively.

MP.3. Construct viable arguments and critique the reasoning of others.

MP.5. Use appropriate tools strategically.

MP.8. Look for and express regularity in repeated reasoning.

**NJ: HS: Algebra**

### Creating Equations

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

### Reasoning with Equations & Inequalities

**HSA-REI.D. Represent and solve equations and inequalities graphically.**

HSA-REI.D.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

HSA-REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

**NJ: HS: Functions**

### Interpreting Functions

**HSF-IF.A. Understand the concept of a function and use function notation.**

HSF-IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .

HSF-IF.A.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

**HSF-IF.B. Interpret functions that arise in applications in terms of the context.**

HSF-IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

HSF-IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

HSF-IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

**HSF-IF.C. Analyze functions using different representations.**

HSF-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

HSF-IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

**Building Functions**

**HSF-BF.B. Build new functions from existing functions.**

HSF-BF.B.3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

**NJ: HS: Stats/Prob**

**Interpreting Categorical & Quantitative Data**

**HSS-ID.C. Interpret linear models**

HSS-ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.

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<p><b>Enduring Understandings</b></p> <p>A quantity can be represented numerically in various ways. Problem solving depends upon choosing wise ways.</p> <p>What we measure affects how we measure it.</p> <p>Measurements can be used to describe, compare, and make sense of phenomena.</p> <p>Relationships between quantities can be represented by rates of change.</p>	<p><b>Essential Questions</b></p> <p>How can patterns, relations and functions be used as tools to best describe and help explain relations between quantities?</p> <p>How does learning how to solve linear equations help you find the time it takes a person to travel a given distance at a given rate?</p>
<p><b>Content</b></p> <ol style="list-style-type: none"> <li>1. Identify and plot points in a coordinate plane.</li> <li>2. Graph linear equations in a coordinate planes.</li> <li>3. Graph a linear equation using intercepts.</li> <li>4. Find the slope of a line and interpret slope as a</li> </ol>	<p><b>Skills</b></p> <ol style="list-style-type: none"> <li>1. Name the points in a coordinate plane. Plot points in a coordinate plane. Graph a function. Graph a function represented by a table.</li> </ol>

- rate of change.
5. Graph linear equations using slope-intercept form.
  6. Write and graph direct variation equations.
  7. Use function notation to model situations.

2. Graph an equation.  
Graph horizontal and vertical lines.  
Graph linear functions, identifying the domain and range.
3. Find the intercepts of the graph of an equation.  
Use intercepts to graph an equation.  
Use a graph to find intercepts.
4. Find a positive slope.  
Find a negative slope.  
Find the slope of a horizontal line.  
Find the slope of a vertical line.  
Find a rate of change and compare to slope.  
Use a graph to find and compare rates of change.  
Interpret a graph.
5. Identify slope and y-intercept.  
Graph an equation using slope-intercept form.  
Change slopes of lines and compare results.  
Change intercepts of lines and compare results.  
Identify parallel lines.
6. Identify direct variation equations.  
Graph direct variation equations.  
Write and use direct variation equations.  
Solve multi-step problems.  
Use a direct variation model.
7. Find an x-value using functional notation.  
Graph a function, using functional notation.  
Compare graphs with the parent graph  $f(x)=x$ .  
Graph real-world functions.

### Stage 2: Assessment Evidence

#### Assessments

- Formative: Other Visual Assessments**  
Class Participation Teacher Observation  
**Summative: Written Test**  
Tests and Quizzes  
**Formative: Other written assessments**  
Homework Projects

### Stage 3: Learning Plan

#### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

#### Resources

- **Textbook:** *Algebra 1 Common Core Standard*  
Larson, Boswell, Kanold, Stiff  
Holt McDougal, 2012
- **Supplementary Materials**
- § **Websites**  
[www.classzone.com](http://www.classzone.com)  
includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

**§ Calculators**

Graphing calculator (TI-83 Plus, or TI-84)

**§ Equipment**

Video tutor with Practice, using Overhead projector and/or Smart Board technology

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# Unit Planner: Solving and Graphing Linear Inequalities Algebra I

Wednesday, August 31, 2016, 3:25PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 21 - Week 25

Oehm, Joan

## Stage 1: Desired Results

### NJ Standards

#### **NJ: 2016 SLS: Mathematics**

#### **NJ: HS: Num/Quantity**

##### **Mathematical Practice**

**MP.**The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

MP.1. Make sense of problems and persevere in solving them.

MP.2. Reason abstractly and quantitatively.

MP.5. Use appropriate tools strategically.

MP.8. Look for and express regularity in repeated reasoning.

#### **NJ: HS: Algebra**

##### **Creating Equations**

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

##### **Reasoning with Equations & Inequalities**

**HSA-REI.B. Solve equations and inequalities in one variable.**

HSA-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

**HSA-REI.D. Represent and solve equations and inequalities graphically.**

HSA-REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

#### **NJ: HS: Functions**

##### **Interpreting Functions**

**HSF-IF.C. Analyze functions using different representations.**

HSF-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

## Building Functions

### HSF-BF.B. Build new functions from existing functions.

HSF-BF.B.3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

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#### Enduring Understandings

There are multiple ways to find mathematical solutions. Problem solving depends upon choosing appropriate methods. Patterns, functions, and relationships can be represented graphically, numerically, symbolically or verbally. The functions and relationship concepts are fundamental ideas in mathematics. Real world situations can be modeled by graphs and equations.

#### Essential Questions

How are patterns of change related to the behavior of functions?  
How can the collection, organization, interpretation and display of data be used to answer questions?  
How can these functions model real life situations?  
What do inequalities show on a graph that equations do not?

#### Content

1. Solve inequalities using addition and subtraction.
2. Solve inequalities using multiplication and division.
3. Solve multi-step inequalities.
4. Solve compound inequalities.
5. Solve absolute value equations.
6. Solve absolute value inequalities.
7. Graph linear inequalities in two variables.

#### Skills

1. Write and graph an inequality.  
Write inequalities from graphs.  
Solve an inequality using addition and subtraction.  
Solve a real world problem.
2. Solve an inequality using multiplication and division.  
Solve a real world problem.
3. Solve a two-step inequality.  
Solve a multi-step inequality.  
Identify the number of solutions of an inequality.
4. Write and graph compound inequalities.  
Write and graph a real-world compound inequality.  
Solve a compound inequality with "and".  
Solve a compound inequality with "or".
5. Solve an absolute value equation.  
Rewrite an absolute value equation.  
Decide if an equation has not solutions.  
Use absolute deviation.
6. Solve an absolute value inequality (multi-step and compound).
7. Check whether ordered pairs are solutions of an equation.  
Graph linear inequalities in two variables.  
Graph linear inequalities in one variable.  
Solve a multi-step problem.

### Stage 2: Assessment Evidence

#### Assessments

##### Formative: Other Visual Assessments

Class Participation Teacher Observation

##### Summative: Written Test

Tests and Quizzes

##### Formative: Other written assessments

Homework

### Stage 3: Learning Plan

#### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

#### Resources

- **Textbook:** *Algebra 1 Common Core Standard*

Larson, Boswell, Kanold, Stiff  
Holt McDougal , 2012

- **Supplementary Materials**

#### § Websites

[www.classzone.com](http://www.classzone.com)

includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

#### § Calculators

Graphing calculator (TI-83 Plus, or TI-84)

#### § Equipment

Video tutor with Practice, using Overhead projector and/or Smart Board technology

 [online textbook](#)





# Unit Planner: Systems of Equations and Inequalities Algebra I

Wednesday, August 31, 2016, 3:30PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 26 - Week 29

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### Mathematical Practice

**MP.**The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

MP.1. Make sense of problems and persevere in solving them.

MP.4. Model with mathematics.

MP.5. Use appropriate tools strategically.

MP.6. Attend to precision.

**NJ: HS: Algebra**

### Creating Equations

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

### Reasoning with Equations & Inequalities

**HSA-REI.C. Solve systems of equations.**

HSA-REI.C.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

HSA-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

**HSA-REI.D. Represent and solve equations and inequalities graphically.**

HSA-REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**NJ: HS: Functions**

### Interpreting Functions

**HSF-IF.C. Analyze functions using different representations.**

HSF-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

### Enduring Understandings

There is a connection between algebraic and numeric procedures, and they build on each other.  
A stronger foundation is built for finding solutions when there is an integration of various mathematical procedures.

### Essential Questions

What do the boundaries of the plane signify in a real-world problem?  
How can modeling a system of equations apply to manufacturing and event planning?  
What do the constraints mean in an inequality?

### Content

1. Graph and solve systems of linear equations.
2. Solve linear systems of equations by using substitution.
3. Solve linear systems using elimination.
4. Solve linear systems by multiplying first.
5. Identify the number of solutions of a linear system.
6. Understand piecewise functions.
7. Solve systems of linear inequalities in two variables.

### Skills

1. Check intersection of two linear systems. Use the graph-and-check method.
2. Solve one of the equations for one of its variables. Substitute the expression into the other equation. Solve for the second variable, by substitution.
3. Use addition or subtraction to eliminate a variable. Arrange like terms to solve linear systems. Write and solve linear systems.
4. Multiply one linear equation by a constant, and solve. Multiply both linear equations by a constant, and solve.
5. Identify linear systems with no solutions.  
  
Identify linear systems with infinitely many solutions. Identify the number of solutions. Write and solve a system of linear equations.
6. Graph piecewise functions. Write piecewise functions. Compare step functions.
7. Graph a system of two linear inequalities. Graph a system of three linear inequalities. Determine dotted/solid lines and shading rules.

## Stage 2: Assessment Evidence

### Assessments

**Formative: Other Visual Assessments**  
Class Participation Teacher Observation  
**Summative: Written Test**  
Tests and Quizzes  
**Formative: Other written assessments**  
Homework

## Stage 3: Learning Plan

### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion

### Resources

- **Textbook:** *Algebra 1 Common Core Standard*  
Larson, Boswell, Kanold, Stiff  
Holt McDougal, 2012
- **Supplementary Materials**
- § **Websites**

- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

www.classzone.com includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

§ **Calculators**

Graphing calculator (TI-83 Plus, or TI-84)

§ **Equipment**

Video tutor with Practice, using Overhead projector and/or Smart Board technology

 online textbook



# Unit Planner: Exponents and Exponential Functions Algebra I

Wednesday, August 31, 2016, 3:30PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 30 - Week 32

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### The Real Number System

**HSN-RN.A. Extend the properties of exponents to rational exponents.**

HSN-RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

HSN-RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

**NJ: HS: Algebra**

### Seeing Structure in Expressions

**HSA-SSE.B. Write expressions in equivalent forms to solve problems.**

HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

HSA-SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions.

### Creating Equations

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HSA-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

### Mathematical Practice

**MP. The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.**

MP.1. Make sense of problems and persevere in solving them.

MP.4. Model with mathematics.

MP.5. Use appropriate tools strategically.

MP.6. Attend to precision.

MP.7. Look for and make use of structure.

## NJ: HS: Functions

### Interpreting Functions

#### HSF-IF.A. Understand the concept of a function and use function notation.

HSF-IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

#### HSF-IF.B. Interpret functions that arise in applications in terms of the context.

HSF-IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

#### HSF-IF.C. Analyze functions using different representations.

HSF-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

HSF-IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

### Building Functions

#### HSF-BF.A. Build a function that models a relationship between two quantities.

HSF-BF.A.1. Write a function that describes a relationship between two quantities.

HSF-BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

#### HSF-BF.B. Build new functions from existing functions.

HSF-BF.B.3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

### Linear, Quadratic, and Exponential Models

#### HSF-LE.A. Construct and compare linear and exponential models and solve problems.

HSF-LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

HSF-LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

#### HSF-LE.B. Interpret expressions for functions in terms of the situation they model.

HSF-LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context.

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#### Enduring Understandings

Functions, patterns and relationships can be represented numerically, graphically, symbolically or verbally. The function and relationship concepts are fundamental ideas in Mathematics. Real world situations can be modeled by graphs, equations, and notation.

#### Essential Questions

How are patterns of change related to the behavior of functions?  
How do these functions apply to real-world situations?  
Why do we use scientific notation? Is there a purpose in the context of math and science?  
How are exponential growth/decay models used in business?

## Content

1. Use properties of exponents involving products.
2. Use properties of exponents involving quotients.
3. Use zero and negative exponents.
4. Define and use fractional exponents.
5. Write and graph exponential growth models.
6. Write and graph exponential decay models.

## Skills

1. Use the product of powers property.  
Use the power of a power property.  
Use the power of a product property.  
Use all three properties to simplify an expression using whole numbers, except zero, as exponents.
2. Use the quotient of powers property.  
Use the power of a quotient property.  
Use properties of exponents.  
Solve a multi-step problem using exponents.
3. Use definition of zero and negative exponents.  
Evaluate exponential expressions.  
Use properties of exponents to simplify an expression using zero and negative exponents.
4. Evaluate expressions involving square roots.  
Evaluate expressions involving cube roots.  
Use properties of exponents to simplify an expression using fractional exponents.
5. Write a functional rule for exponential growth.  
Graph an exponential growth function.  
Compare graphs of exponential growth.  
Use an exponential growth model.  
Calculate compound interest using exponential growth.
6. Write a functional rule for exponential decay.  
Graph an exponential decay function.  
Compare graphs of exponential decay.  
Use an exponential decay model.  
Calculate depreciation using exponential decay.

## Stage 2: Assessment Evidence

### Assessments

#### **Formative: Other Visual Assessments**

Class Participation Teacher Observation

#### **Summative: Written Test**

Tests and Quizzes

#### **Formative: Other written assessments**

Homework

## Stage 3: Learning Plan

### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review

### Resources

#### • **Textbook: *Algebra 1 Common Core Standard***

Larson, Boswell, Kanold, Stiff  
Holt McDougal , 2012

#### • **Supplementary Materials**

#### § **Websites**

[www.classzone.com](http://www.classzone.com)

includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the

- Test review
- Research


textbook

§ **Calculators**

Graphing calculator (TI-83 Plus, or TI-84)

§ **Equipment**

Video tutor with Practice, using Overhead projector and/or Smart Board technology

 online textbook



# Unit Planner: Polynomials and Factoring Algebra I

Wednesday, August 31, 2016, 3:30PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 33 - Week 38

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### Mathematical Practice

**MP.** The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

MP.1. Make sense of problems and persevere in solving them.

MP.2. Reason abstractly and quantitatively.

MP.4. Model with mathematics.

MP.5. Use appropriate tools strategically.

MP.7. Look for and make use of structure.

**NJ: HS: Algebra**

### Seeing Structure in Expressions

**HSA-SSE.A. Interpret the structure of expressions.**

HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it.

**HSA-SSE.B. Write expressions in equivalent forms to solve problems.**

HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

HSA-SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines.

HSA-SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions.

### Arithmetic with Polynomials & Rational Functions

**HSA-APR.A. Perform arithmetic operations on polynomials.**

HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

**HSA-APR.B. Understand the relationship between zeros and factors of polynomials.**

HSA-APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to



construct a rough graph of the function defined by the polynomial.

**HSA-APR.C. Use polynomial identities to solve problems.**

HSA-APR.C.4. Prove polynomial identities and use them to describe numerical relationships.

**Creating Equations**

**HSA-CED.A. Create equations that describe numbers or relationships.**

HSA-CED.A.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

**Reasoning with Equations & Inequalities**

**HSA-REI.B. Solve equations and inequalities in one variable.**

HSA-REI.B.4. Solve quadratic equations in one variable.

**NJ: HS: Functions**

**Interpreting Functions**

**HSF-IF.C. Analyze functions using different representations.**

HSF-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

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**Enduring Understandings**

The function and relationship concepts are fundamental mathematical ideas. Tools should be used to enhance the understanding of mathematics, not be used to replace mental math and paper and pencil computation.

**Essential Questions**

How does the successful completion of the mastery of factoring enhance a student's ability to use logic?  
Why are there multiply ways to factor, and why are some more efficient/practical in specific situations?  
How can the collection, organization, interpretation, and display of data be used to answer questions?  
how can a student's communication skills be enhanced by the ability to explain a math problem?

**Content**

1. Add and subtract polynomials.
2. Multiply polynomials.
3. Use special product patterns to multiply polynomials.
4. Solve polynomial equations.
5. Factor trinomials.
6. Factor special products.
7. Factor polynomials completely.

**Skills**

1. Rewrite a polynomial in standard form.  
Identify and classify polynomials.  
Add polynomials.  
Subtract polynomials.  
Solve multi-step problems involving polynomials.
2. Multiply a monomial and a polynomial.  
Multiply polynomials using a table.  
Multiply polynomials vertically.  
Multiply polynomials horizontally.  
Multiply binomials using the FOIL pattern.
3. Use the square of a binomial pattern.  
Use the sum and difference pattern.  
Use special products and mental math.
4. Solve polynomials using the zero product property.  
Find the greatest common monomial factor.  
Solve an equation by factoring.
5. Factor when "b" and "c" are positive.  
Factor when "b" is negative and "c" is positive.  
Factor when "b" is positive and "c" is negative.  
Solve a polynomial equation.

- 6. Factor the difference of two squares.  
Factor perfect square trinomials.  
Solve vertical motion problems.
- 7. Factor out a common binomial.  
Factor by grouping.  
Factor completely, checking to see if what was factored can be factored further.  
Solve more difficult polynomial equations.

### Stage 2: Assessment Evidence

#### Assessments

- Formative: Other Visual Assessments**
- Class Participation Teacher Observation
- Summative: Written Test**
- Tests and Quizzes
- Formative: Other written assessments**
- Homework

### Stage 3: Learning Plan

#### Learning Activities

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

#### Resources

- **Textbook:** *Algebra 1 Common Core Standard*

Larson, Boswell, Kanold, Stiff  
Holt McDougal , 2012

- **Supplementary Materials**

#### § Websites

www.classzone.com  
includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

#### § Calculators

Graphing calculator (TI-83 Plus, or TI-84)

#### § Equipment

Video tutor with Practice, using Overhead projector and/or Smart Board technology

 [online textbook](#)



# Unit Planner: Quadratic Equations Algebra I

Wednesday, August 31, 2016, 3:30PM



Cedar Grove District > 2016-2017 > High School > Mathematics > Algebra I (D) > Week 39 - Week 40

Oehm, Joan

## Stage 1: Desired Results

NJ Standards

**NJ: 2016 SLS: Mathematics**

**NJ: HS: Num/Quantity**

### Mathematical Practice

**MP.**The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

MP.1. Make sense of problems and persevere in solving them.

MP.3. Construct viable arguments and critique the reasoning of others.

MP.4. Model with mathematics.

MP.5. Use appropriate tools strategically.

MP.7. Look for and make use of structure.

**NJ: HS: Algebra**

### Reasoning with Equations & Inequalities

**HSA-REI.B.** Solve equations and inequalities in one variable.

HSA-REI.B.4b. Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as  $a \pm bi$  for real numbers  $a$  and  $b$ .

**NJ: HS: Functions**

### Interpreting Functions

**HSF-IF.C.** Analyze functions using different representations.

HSF-IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

### Building Functions

**HSF-BF.B.** Build new functions from existing functions.

HSF-BF.B.3. Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

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### Enduring Understandings

The message conveyed by the data depends on how the data is collected, represented, and summarized.

### Essential Questions

How can you use trinomials to model the height of a projectile (throwing a ball into the air)?

<p>Algebraic representation can be used to generalize patterns and relationships.</p>	<p>What is the purpose of using the graphing calculator to draw several polynomials? Is it better to draw by hand? What is the advantage of the calculator? When grouping common factors, why might it be important to notice when two things have a common link? Why is it important to identify patterns before factoring? How does a parabola model help us to understand jumping and velocity?</p>
<p>Content</p> <ol style="list-style-type: none"> <li>1. Graph simple quadratic functions</li> <li>2. Solve quadratic equations by graphing</li> </ol>	<p>Skills</p> <ol style="list-style-type: none"> <li>1. Identify the vertex and axis of symmetry of a parabola Use the parent function to estimate the shape and direction of the parabola Compare graphs where <math> a  &gt; 1</math> or the <math> a  &lt; 1</math> Compare widths of parabolas List properties of the graphs of a quadratic function Find the axis of symmetry Find maximums and minimums of a parabola Graph quadratic functions in intercept form</li> <li>2. Identify equations with one solution, two solutions and no solution Find the zeros of a quadratic function</li> </ol>

**Stage 2: Assessment Evidence**

**Assessments**

**Summative: Written Test**

Quizzes and Tests

**Summative: Written Test**

Midterms/Final Exams

**Formative: Other Visual Assessments**

Class Participation Teacher Observation

**Formative: Other written assessments**

Homework/Projects

**Stage 3: Learning Plan**

**Learning Activities**

- Lecture
- Class discussions
- Multiple Intelligences Activities
- Cooperative Learning Structures
- Guided Practice
- Performance Assessments
- Projects
- Simulation activities
- Technology infusion
- Differentiated Instruction
- State and standardized test preparation
- Homework review
- Test review
- Research

**Resources**

· **Textbook:** *Algebra 1 Common Core Standard*

Larson, Boswell, Kanold, Stiff  
Holt McDougal , 2012

· **Supplementary Materials**

§ **Websites**

www.classzone.com

includes @HomeTutor, eWorkbook, in addition to the Animated Math Activities and the online version of the textbook

§ **Calculators**

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§ **Equipment**

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and/or Smart Board technology