The Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on the following two sets of important “processes and proficiencies,” each of which has longstanding importance in mathematics education:

- **The NCTM process standards**
  - problem solving
  - reasoning and proof
  - communication
  - representation
  - connections

- **The strands of mathematical proficiency specified in the National Research Council’s report “Adding It Up”**
  - adaptive reasoning
  - strategic competence
  - conceptual understanding (comprehension of mathematical concepts, operations, and relations)
  - procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently, and appropriately)
  - productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy)

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

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. **Reason abstractly and quantitatively.**

Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically, and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meanings of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

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

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
4. **Model with mathematics.**
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. **Use appropriate tools strategically.**
Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. **Attend to precision.**
Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7. **Look for and make use of structure.**
Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see $7 \times 8$ equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the $14$ as $2 \times 7$ and the $9$ as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(y - x)^2$ as $5$ minus a positive number times a square, and use that to realize that its value cannot be more than $5$ for any real numbers $x$ and $y$.

8. **Look for and express regularity in repeated reasoning.**
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing $25$ by $11$ that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope $3$, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction.

The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.

In this respect, those content standards which set an expectation of understanding are potential “points of intersection” between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

Foreword

This Curriculum Map outlines all of the topics and standards expected of an Algebra 2 class. These concepts should be introduced, studied, and assessed at a level that matches each student’s abilities. The level of academic rigor should match both the course level and the students’ ability levels. The standards have been outlined based on the Massachusetts Curriculum Framework for Mathematics that incorporated the Common Core State Standards for Mathematics. The Honors level class will address advanced concepts. These concepts will be denoted by an asterisk or part of supplementary units located at the end of each term.
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<td><em>The students will:</em></td>
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<tr>
<td><strong>F.BF.1</strong> Write a function that describes a relationship between two quantities.</td>
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<td><strong>F.BF.1a</strong> Determine an explicit expression, a recursive process, or steps for calculation from a context.</td>
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<td>• Properties of Exponents <em>(F.BF.1)</em></td>
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<td>• Relations and Functions <em>(F.BF.1)</em></td>
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<td>The students will be able to…</td>
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<tr>
<td>• <strong>classify</strong> and <strong>order</strong> numbers.</td>
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<td>• <strong>identify</strong> and <strong>use</strong> properties of real numbers.</td>
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<tr>
<td>• <strong>simplify</strong>, <strong>add</strong>, <strong>subtract</strong>, <strong>multiply</strong>, and <strong>divide</strong> square roots.</td>
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<tr>
<td>• <strong>simplify</strong> and <strong>evaluate</strong> algebraic expressions.</td>
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<td>• <strong>simplify</strong> expressions involving exponents.</td>
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<tr>
<td>• <strong>identify</strong> domain and range of relations and functions.</td>
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<tr>
<td>• <strong>determine</strong> if a relation is a function.</td>
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<tr>
<td>• <strong>write</strong> functions using function notation.</td>
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<tr>
<td>• <strong>evaluate</strong> and <strong>graph</strong> functions.</td>
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<tr>
<td>• <strong>apply</strong> transformations to points and sets of points.</td>
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<tr>
<td>• <strong>identify</strong> parent functions from graphs and equations.</td>
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<tr>
<td>• <strong>use</strong> parent functions to model real world data and make estimates for unknown values.</td>
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<tr>
<th><strong>Essential Question</strong></th>
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<tr>
<td>How do you use laws of exponents to simplify an algebraic expression involving monomials?</td>
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<td>How do you determine whether a relation is a function, both algebraically and graphically?</td>
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<th><strong>Assessments</strong></th>
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<td><strong>Summer Packet:</strong> To be given prior to summer vacation. This will be collected during the 2nd or 3rd day of classes and selected problems will be graded as a Quiz.</td>
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<tr>
<td><strong>Review:</strong> All concepts from the Summer Packet will be reviewed during the first 3 days of school.</td>
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<tr>
<td><strong>Test:</strong> <strong>Prerequisites</strong> Test will be given to assess students’ understanding from prior courses.</td>
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| **Suggested Instructional Practices** |          |
### Common Core State Standards

**The students will:**

- **A.CED.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.

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

- **F.IF.7a** Graph linear and quadratic functions and show intercepts, maxima, and minima.

- **A.REI.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).

### Unit One

**Linear Functions**

- **Solving Linear Equations and Inequalities** (**A.REI.3**)
- **Graphing Linear Functions** (**A.REI.10** and **F.IF.7a**)

### Objectives

The students will be able to...

- **solve** linear equations and inequalities.
- **graph** a linear function using slope and a point, intercepts, and slope intercept form.

### Essential Question

What are the similarity and differences between solving a linear equation compared to a linear inequality?

### Teacher Resources

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- Chapter Two Lessons
- Chapter Two Practice Worksheets
- Chapter Two Pre-Made Assessments *Holt Algebra 2 ©2004*
- Chapter Three Lessons
- Chapter Three Practice Worksheets
- Chapter Three Pre-Made Assessments

### Media and Technology Resources

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- Test ExamPro Generator

Kuta Software Algebra 2 Worksheet/Test Generator

Smart Exchange Lessons

### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Baseline Assessment:** The Baseline Assessment focused on Algebraic Concepts will be given the 1st week of classes.

**Suggested Instructional Practices**

- **Linear Function Activity** AII.2012.1 (see MathShared Resources)
- **Graphing Linear Equations Activity** AII.2012.2 (see MathShared Resources)
The students will:

F.IF.7a  Graph linear and quadratic functions and show intercepts, maxima, and minima.

A.REI.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).

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

F.IF.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.

Unit One
Linear Functions

- Graphing Linear Functions (F.IF.7a, A.REI.10)
- Writing Linear Functions (A.CED.2, F.IF.6)
- Linear Inequalities in two variables (F.IF.7a, A.REI.10)

Objectives
The students will be able to…

- graph a linear function using slope and a point, intercepts, and slope intercept form.
- write a linear equations given one point, two points and a graph.
- solve and graph linear inequalities in two variables.

Essential Question
What are the similarity and differences between solving a linear equation compared to a linear inequality?

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Assessments
Homework: To be given daily on each introduced topic.
Class Discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
Quiz: on concepts involving Solving Linear Equations, Graphing and Writing Linear Functions.

Suggested Instructional Practices
- LTF Equations of Lines Activity AII.2012.3 (see MathShared Resources)
- Graphing Calculator Lab AII.2012.4 (textbook pg. 113,114)
The students will:

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

### Unit One
**Linear Functions**

- Linear Inequalities in two variables (A.CED.2)

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<td>What are the similarity and differences between solving a linear equation compared to a linear inequality?</td>
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<tr>
<td>• solve and graph linear inequalities in two variables.</td>
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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Test:** on concepts involving Linear Functions.
### Algebra II (332 and 333)  
#### Term One  
#### Week 3B

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<td><strong>The students will:</strong></td>
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<tr>
<td><strong>A.CED.3</strong> Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.</td>
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<tr>
<td><strong>A.REI.11</strong> 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.</td>
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### Unit Two  
#### Linear Systems

- Solving Systems of Equations by Graphing ( **A.CED.3**, **A.REI.11** )

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<tr>
<td><strong>The students will be able to...</strong></td>
<td>How do you decide which is the appropriate method of solution to a given system of linear equations?</td>
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<tr>
<td>- find the solution to a linear system by graphing on paper.</td>
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<tr>
<td>- find the solution to a linear system by graphing using a graphing calculator.</td>
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<tr>
<td><strong>Solving Systems of Equations by Graphing Investigation AII.2012.5</strong> (see MathShared Resources)</td>
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### Homework: To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
### Common Core State Standards

**The students will:**

A.REI.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.

### Unit Two

**Linear Systems**

- Solving Systems of Equations by Substitution (A.REI.11)
- Solving Systems of Equations by Elimination (A.REI.11)

### Objectives

The students will be able to...

- **solve** a system of linear equations by the algebraic method of substitution.
- **solve** a system of linear equations by the algebraic method of elimination (linear combination).

### Essential Question

How do you decide which is the appropriate method of solution to a given system of linear equations?

### Teacher Resources

- Chapter Three Lessons
- Chapter Three Practice Worksheets
- Chapter Three Pre-Made Assessments

### Media and Technology Resources

- Textbook On-Line
- Power Point Presentations
- Test ExamPro Generator

### Assessments

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Quiz:** on concepts involving **Systems by Graphing and Substitution.**

### Suggested Instructional Practices

- **Graphing Linear Equations Activity**
  AII.2012.2 (see MathShared Resources)
### Algebra II (332 and 333)  
#### Term One  
#### Week 5

**Common Core State Standards**

*The students will:*

**A.REI.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.

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### Unit Two  
**Linear Systems**

- Solving Systems of Equations by Elimination (A.REI.11)
- Solving Systems of Linear Inequalities (A.REI.11)
- Linear Programming* (A.REI.11)

**Objectives**

The students will be able to…

- **solve** a system of linear equations by the algebraic method of elimination (linear combination).
- **select** the appropriate method to solve a linear system.
- **solve** a system of linear inequalities by graphing.
- **find** a feasible region of solution to a problem.*

**Essential Question**

How do you decide which is the appropriate method of solution to a given system of linear equations?  
How do you determine the feasible region of solution to a given problem and how do you optimize the objective function?*

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### Teacher Resources

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- Chapter Three Pre-Made Assessments

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- Chapter Three Lessons
- Chapter Three Practice Worksheets
- Chapter Three Pre-Made Assessments

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Kuta Software Algebra 2 Worksheet/Test Generator  
Smart Exchange Lessons

### Assessments

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

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### Suggested Instructional Practices

- **Linear Inequality Project**  
  AII.2012.6 (see MathShared Resources)
### Algebra II (332 and 333)  
**Term One**  
**Week 6A**

#### Common Core State Standards

The students will:

**A.REI.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.

#### Unit Two

**Linear Systems**

- Solving Systems of Linear Inequalities (A.REI.11)
- Linear Equations in Three Dimensions* (A.REI.11)

#### Objectives

The students will be able to...

- **solve** a system of linear inequalities by graphing.
- **solve** a system of linear equations that contains three variables.*

#### Essential Question

How do you decide which is the appropriate method of solution to a given system of linear equations?

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- Chapter Three Lessons
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#### Assessments

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Test:** On concepts involving Linear Systems.
## Common Core State Standards

The students will:

**N.VM.6** Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

**N.VM.8** Add, subtract, and multiply matrices of appropriate dimensions.

### Unit Three

**Matrices**

- Properties of Matrices (**N.VM.6**)
- Operations with Matrices (addition, subtraction, scalar multiplication) (**N.VM.8**)

### Objectives

The students will be able to...

- **identify** properties of a matrix.
- **calculate** the sum, difference, scalar product, and product of matrices.

### Essential Question

How do you determine whether two matrices can be added, subtracted, or multiplied?

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### Suggested Instructional Practices

**Homework**: To be given daily on each introduced topic.

**Class Discussion**: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
### Algebra II (332 and 333)  
**Term One**  
**Week 7**

#### Common Core State Standards

**The students will:**

- **N.VM.8** Add, subtract, and multiply matrices of appropriate dimensions.

### Unit Three  
**Matrices**

- Operations with Matrices (addition, subtraction, scalar multiplication) (N.VM.8)
- Operations with Matrices (multiply 2x2, 3x3 matrices) (N.VM.8)

### Objectives

**The students will be able to…**

- **calculate** the sum, difference, scalar product, and product of matrices.
- **multiply** 2x2 and 3x3 matrices.*

### Essential Question

How do you determine whether two matrices can be added, subtracted, or multiplied?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving **Properties of Matrices and Operations with Matrices.**

### Suggested Instructional Practices

- **Matrix Multiplication (2x2) Exploration**\(^*\)
  
  AII.2012.7 (see MathShared Resources)
## Algebra II (332 and 333)  
### Term One  
#### Week 8

### Common Core State Standards

**The students will:**

**N.VM.6** Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

**A.REI.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.

### Unit Three  
**Matrices**

- Solving Systems of Equations using matrices (N.VM.6, A.REI.11)

### Objectives

**The students will be able to…**

- solve problems involving matrices.
- solve a systems of linear equations using matrix concepts.

### Essential Question

How does the solution to a systems of linear equations represents?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Test:** On concepts involving Matrices.

### Suggested Instructional Practices

- **Solving Systems using Inverse Matrices Exploration** AII.2012.8 (see MathShared Resources)
- **Matrices Calculator Lab** AII.2012.9 (see MathShared Resources)
### Algebra II (332 and 333) Term Two Week 1

#### Common Core State Standards

**The students will:**

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

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

#### Unit Four

**Factoring**

- Factoring using Common Factors (A.SSE.1, A.SSE.2)
- Factoring Quadratic Trinomials \(a=1\) (A.SSE.1, A.SSE.2)

#### Objectives

**The students will be able to…**

- **factor** an expression by factoring a common factor from each term.
- **factor** quadratic trinomials with the quadratic coefficient of one.

#### Essential Question

How are the concepts of factoring quadratic trinomials and FOIL method related to each other mathematically?

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#### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving GCF and Factoring Trinomials.

**Suggested Instructional Practices**

- **Factor Matching Activity** AII.2012.10 (see MathShared Resources)
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<td>• <strong>factor</strong> quadratic trinomials with the quadratic coefficient not equal to one and prime.</td>
<td>How are the concepts of factoring quadratic trinomials and FOIL method related to each other mathematically?</td>
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<tr>
<td>• <strong>factor</strong> quadratic trinomials with the quadratic coefficient not equal to one by grouping.</td>
<td>How do you use the concept of factoring by grouping to factor a quadratic trinomial?</td>
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<td>• <strong>factor</strong> the difference of two squares.</td>
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<td><strong>Class Discussion:</strong> Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.</td>
<td></td>
</tr>
</tbody>
</table>
**Common Core State Standards**

*The students will:*

**F.IF.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. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

**F.IF.7c** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

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

**F.IF.8c** Translate among different representations of functions and relations: graphs, equations, point sets, and tables.

**F.IF.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

---

**Unit Five**
**Quadratic Functions**

- Graphing Quadratic Functions (**F.IF.4, F.IF.8, F.IF.8c, F.IF.9**)
- Solving Quadratic Functions by Graphing (**F.IF.7c**)

### Objectives

**The students will be able to…**

- **identify** properties of given quadratic functions.
- **graph** quadratic functions.
- **solve** a quadratic equation by graphing and determining the zeros.

### Essential Question

How do you determine the maximum and minimum value of a quadratic function from the equation?

---

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**Suggested Instructional Practices**

- **Graphing Parabolas – Graphic Organizer**
  AII.2012.11 (see MathShared Resources)

**Assessments**

*Homework:* To be given daily on each introduced topic.

*Class Discussion:* Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

*Quiz:* on concepts involving **Factoring Special Cases and Graphing Quadratic Functions**.
The students will:

A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.

A.REI.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 $b$.

### Unit Five
**Quadratic Functions**
- Solving Quadratic Functions by the Square Root Method (A.REI.4b)
- Solving Quadratic Functions by Factoring (A.SSE.3a)

### Objectives
The students will be able to...
- solve quadratic equations using the square root method.
- solve quadratic equations by factoring and using the zero product property.

### Essential Question
How does the concept of the zero product property allow you to find the roots of a quadratic function?

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### Assessments
**Homework:** To be given daily on each introduced topic.
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Benchmark Assessment 1:** The Benchmark Assessment will focus on all Algebra II Concepts covered to date.

### Suggested Instructional Practices
### Algebra II (332 and 333)  
#### Term Two  
#### Week 5

**Common Core State Standards**

The students will:

- **A.REI.4a** Use the method of completing the square to transform any quadratic equation in \( x \) into an equation of the form \((x - p)^2 = q\) that has the same solutions. Derive the quadratic formula from this form.

- **A.REI.4c** Demonstrate an understanding of the equivalence of factoring, completing the square, or using the quadratic formula to solve quadratic equations.

### Unit Five  
**Quadratic Functions**

- Completing the Square* (A.REI.4a, A.REI.4c)
- The Discriminant (A.REI.4c)

### Objectives

The students will be able to…

- **complete** the procedure of completing the square.*
- **use** the concept of completing the square to solve a quadratic equation.*
- **use** the discriminant to determine the number and nature of the roots.

### Essential Question

Why does the discriminant determine the number and nature of the roots to a quadratic equation and how does it relate to the Quadratic Formula?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** on concepts involving Solving Quadratic Functions and Completing the Square.

### Suggested Instructional Practices

- Completing the Square Algebra Tile Activity AII.2012.12 (see MathShared Resources)
### Algebra II (332 and 333)  
Term Two  
Week 6

**Common Core State Standards**

*The students will:*

**A.REI.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 $b$.

**A.CED.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.

---

**Unit Five**  
**Quadratic Functions**

- Solving Quadratic Functions by the Quadratic Formula (*A.REI.4b, A.CED.1*)
- Solving Quadratic Inequalities* (*A.REI.4b, A.CED.1*)

---

**Objectives**

- The students will be able to…
  - solve quadratic equations using the Quadratic Formula.
  - solve quadratic inequalities by graphing and using algebra.*

---

**Essential Question**

- How can the quadratic formula be used to find solutions to quadratic functions?
- When would you use the quadratic formula to find the roots of a quadratic function?

---

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**Assessments**

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Test:** On concepts involving **Quadratic Functions.**

---

**Suggested Instructional Practices**
The students will:

N.CN.1 Know there is a complex number $i$ such that $i^2 = -1$, and every complex number has the form $a + bi$ with $a$ and $b$ real.

N.CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

### Unit Six
**Complex Numbers**
- Graphing Complex Numbers (N.CN.1)
- Operations with Complex Numbers (N.CN.2)

### Objectives
**The students will be able to…**
- plot and identify complex numbers on the complex plane.
- perform operations with complex numbers (add, subtract, multiply).
- perform operations with complex numbers (divide).*

### Essential Question
- How are the powers of $i$ derived and how are they cyclic?
- Why is it when simplifying imaginary and complex numbers that the highest power of $i$ is one?

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### Assessments
**Homework:** To be given daily on each introduced topic.
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
**Quiz:** on concepts involving Operations with Complex Numbers.

### Suggested Instructional Practices
The students will:

N.CN.1 Know there is a complex number $i$ such that $i^2 = -1$, and every complex number has the form $a + bi$ with $a$ and $b$ real.

N.CN.7 Solve quadratic equations with real coefficients that have complex solutions.

### Unit Six

**Complex Numbers**

- Evaluate powers of $i$ (N.CN.1)
- Solve Quadratic Equations with Complex Solutions (N.CN.7)

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<td><strong>The students will be able to…</strong></td>
<td>How are the powers of $i$ derived and how are they cyclic?</td>
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<tr>
<td>• evaluate powers of $i$.</td>
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<tr>
<td>• solve quadratic equations with complex solutions.</td>
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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Test:** On concepts involving Complex Numbers.

**Mid-Year Exam:** This will cover all of the concepts from semester one.

### Suggested Instructional Practices
The students will:

A.APR.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.

A.APR.1a Divide polynomials.

### Unit Seven

**Polynomial Functions**

- Classification of Polynomials (A.APR.1)
- Operations with Polynomials (A.APR.1, A.APR.1a)

### Objectives

The students will be able to...

- **identify** and classify polynomials.
- **perform** operations with polynomials (add, subtract, multiply, divide by a monomial).

### Essential Question

How is multiplying any two polynomials just an expansion of the distributive property?

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### Suggested Instructional Practices

- **Pascal’s Triangle Project** AII.2012.13 (see MathShared Resources)

### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
Algebra II (332 and 333)  Term Three  Week 2

Common Core State Standards

The students will:

A.APR.1a  Divide polynomials.

Unit Seven
Polynomial Functions

- Operations with Polynomials (Long Division) (A.APR.1a)
- Operations with Polynomials (Synthetic Division) (A.APR.1a)

Objectives
The students will be able to…

- **perform** operations with polynomials (long division and synthetic division).

Essential Question
What are the similarities and differences between long division and synthetic division?

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Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving **Operations with Polynomials**.

Suggested Instructional Practices

- **Synthetic Division Exploration**
  AII.2012.14 (see MathShared Resources)
Algebra II (332 and 333)  Term Three  Week 3

Common Core State Standards

The students will:

A.APR.2 Know and apply the Remainder Theorem: For a polynomial \(p(x)\) and a number \(a\), the remainder on division by \(x - a\) is \(p(a)\), so \(p(a) = 0\) if and only if \((x - a)\) is a factor of \(p(x)\).

A.APR.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.

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<td>• Finding Real Roots of Polynomial Equations* (A.APR.2, A.APR.3)</td>
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Objectives

The students will be able to…

- **determine** the factors of a polynomial.
- **factor** the sum and difference of two cubes.
- **use** rational root theorem and the irrational root theorem to solve polynomial theorems. *

Essential Question

Why is it important to supply a zero for a coefficient of any missing term, when you are dividing polynomials?

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Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving *Division of Polynomials and Factoring Polynomials.*

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Suggested Instructional Practices
**Common Core State Standards**

The students will:

- **A.APR.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.

- **F.IF.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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

- **F.IF.7c** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

- **F.BF.3** Identify the effect on the graph of replacing \( f(x) \) by \( f(x) + k \), \( kf(x) \), \( f(kx) \), 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.

---

**Unit Seven**  
**Polynomial Functions**

- Fundamental Theorem of Algebra* (A.APR.3)
- Investigating Graphs of Polynomial Functions (A.APR.3, F.IF.4, F.IF.7c)
- Transforming Polynomial Functions* (F.BF.3)

**Objectives**

The students will be able to…

- **use** the Fundamental Theorem of Algebra and its corollary to write a polynomial equation of least degree with given roots.*
- **identify** all of the roots of a polynomial equation.*
- **use** properties of end behavior to analyze, describe and graph polynomial functions.
- **transform** polynomial functions.

**Essential Question**

- How do you find the real roots of a polynomial equation?
- How do you describe a transformation of a given polynomial function?*

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**Assessments**

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Test:** On concepts involving Polynomial Functions.  
**Benchmark Assessment 2:** The Benchmark Assessment will focus on all Algebra II Concepts covered to date.
The students will:

**F.IF.7e** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

**F.BF.1b** Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

### Unit Eight

**Exponential and Logarithmic Functions**

- Exponential Growth and Decay Functions (F.IF.7e, F.BF.1b)
- Graphing Exponential Growth and Decay Functions (F.IF.7e, F.BF.1b)

### Objectives

The students will be able to...

- **write** and **evaluate** exponential expressions to model growth and decay situations.
- **graph** exponential growth and decay functions.

### Essential Question

How do you use the concept of exponential growth to work with the principle of compound interest?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

### Suggested Instructional Practices

- **Calculator Exploration Exponential Functions AII.2012.16** (see MathShared Resources)
The students will:

**F.BF.4a** Solve an equation of the form \( f(x) = c \) for a simple function \( f \) that has an inverse and write an expression for the inverse. For example, \( f(x) = 2x^3 \) or \( f(x) = \frac{x + 1}{(x - 1)} \) for \( x \neq 1 \).

**F.LE.4** For exponential models, express as a logarithm the solution to \( ab^{ct} = d \) where \( a, c, \) and \( d \) are numbers and the base \( b \) is 2, 10, or \( e \); evaluate the logarithm using technology.

### Unit Eight
**Exponential and Logarithmic Functions**

- Inverse of relations and functions (**F.BF.4a**)
- Logarithmic Functions (**F.LE.4**)

### Objectives
**The students will be able to…**

- **graph** and **recognize** inverses of relations and functions.
- **find** inverses of functions.
- **write** equivalent forms for exponential and logarithmic functions.
- **write, evaluate, and graph** logarithmic functions.

### Essential Question
How do you convert between exponential and logarithmic form?

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### Assessments
**Homework:** To be given daily on each introduced topic.
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.
**Quiz:** on concepts involving **Exponential and Inverse Functions.**

### Suggested Instructional Practices
- **Rule of 4 Inverse Function** AII.2012.17
  (see MathShared Resources)
Common Core State Standards

The students will:

F.LE.4 For exponential models, express as a logarithm the solution to \( ab^{ct} = d \) where \( a, c, \) and \( d \) are numbers and the base \( b \) is 2, 10, or \( e \); evaluate the logarithm using technology.

Unit Eight
Exponential and Logarithmic Functions

- Properties of Logarithms (expand and condense) (F.LE.4)

Objectives
The students will be able to…

- use properties to simplify logarithmic expressions.
- expand and condense logarithmic expressions.
- translate between logarithms in any base.

Essential Question

How do you use the inverse relationship between exponential and logarithmic functions to solve equations?

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Homework: To be given daily on each introduced topic.
Class Discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

Suggested Instructional Practices

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Algebra II (332 and 333)  
Term Three  
Week 8

Common Core State Standards

The students will:

A.REI.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.

Unit Eight  
Exponential and Logarithmic Functions

- Solving Exponential and Logarithmic Equations (**A.REI.11**)
- The Natural Base e* (**A.REI.11**)

Objectives

The students will be able to…

- **solve** exponential and logarithmic equations.
- **use** the number e to write and graph exponential functions representing real world situations.*
- **solve** equations and problems involving e or natural logarithms.

Essential Question

How do you use the inverse relationship between exponential and logarithmic functions to solve equations?

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Assessments

**Homework:** To be given daily on each introduced topic.  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Test:** On concepts involving **Exponential and Logarithmic Functions.**

Suggested Instructional Practices
### Common Core State Standards

**The students will:**

**A.APR.7** Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

### Unit Nine

**Rational and Radical Functions**

- Simplify Rational Expressions (**A.APR.7**)
- Multiplying Rational Expressions (**A.APR.7**)
- Dividing Rational Expressions (**A.APR.7**)

### Objectives

**The students will be able to…**

- **simplify** rational expressions.
- **multiply** and **divide** rational expressions.

### Essential Question

Why is it important to state the restricted values before simplifying a rational expression?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving Operations with rational Expressions.

### Suggested Instructional Practices

- **Adding/Subtracting Radicals Exploration**
  
**AII.2012.18** (see MathShared Resources)
### Common Core State Standards

**The students will:**

**A.APR.7** Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

**A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

### Unit Nine

**Rational and Radical Functions**

- Adding and Subtracting Rational Expressions (**A.APR.7**)
- Solving Rational Equations (**A.REI.2**)

### Objectives

**The students will be able to…**

- **add** and **subtract** rational expressions.
- **simplify** complex fractions.

### Essential Question

How do you know when a rational expression can be simplified?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

### Suggested Instructional Practices
**Common Core State Standards**

*The students will:*

N.RN.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. *For example, we define* $\sqrt[3]{5}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*

N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

F.IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

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<td>• simplify and evaluate radical expressions and expressions with rational exponents.</td>
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<td>• graph radical functions.</td>
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### Algebra II (332 and 333)  |  Term Four  |  Week 4
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#### Common Core State Standards

**The students will:**

**A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

**F.IF.7b** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

#### Unit Nine

**Rational and Radical Functions**

- Graphing Radical Functions (F.IF.7b)
- Solving Radical Equations (A.REI.2)

#### Objectives

The students will be able to…

- **graph** radical functions.
- **solve** radical equations.

#### Essential Question

Why is it necessary to check the possible solutions for extraneous roots when solving a radical equation?

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#### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Test:** On concepts involving **Rational and Radical Functions**.

**Benchmark Assessment 3:** The Benchmark Assessment will focus on all **Algebra II Concepts** covered to date.
Algebra II (332 and 333)  Term Four  Week 5

Common Core State Standards

The students will:

F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F.TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Unit Ten

Trigonometry Basics

- Right Triangle Trigonometry (G.SRT.6, G.SRT.8)
- Angles of Rotation (F.TF.1, F.TF.2)

Objectives

The students will be able to…

- understand and use trigonometric relationships of acute angles in triangles.
- determine the side lengths of right triangles by using trigonometric functions.
- draw angles in standard position.
- determine values of the trigonometric functions for an angle in standard position.

Essential Question

How do you use right triangle trigonometric ratios to find missing sides of right triangles?

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Homework: To be given daily on each introduced topic.

Class Discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

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Suggested Instructional Practices

- Angles of Rotation Exploration
  AII.2012.19 (see MathShared Resources)
**Common Core State Standards**

**The students will:**

**F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

**F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

### Unit Ten
**Trigonometry Basics**

- The Unit Circle (F.TF.1, F.TF.2)

### Objectives

The students will be able to…

- **convert** angles measures between degrees and radians.
- **find** the values of trigonometric functions on the unit circle.

### Essential Question

How do you convert angle measures between degrees and radians and why would this conversion be necessary?

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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Quiz:** on concepts involving **Right Triangle Trigonometry and Angles of Rotation.**

### Suggested Instructional Practices
### Common Core State Standards

*The students will:*

**F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

**F.TF.8** Prove the Pythagorean identity \( \sin^2(\theta) + \cos^2(\theta) = 1 \) and use it to find \( \sin(\theta) \), \( \cos(\theta) \), or \( \tan(\theta) \) given \( \sin(\theta), \cos(\theta) \), or \( \tan(\theta) \) and the quadrant.

### Unit Ten  
**Trigonometry Basics**

- The Unit Circle *(F.TF.1, F.TF.2)*
- Trigonometric Identities* *(F.TF.8)*
- Graphs of Sine and Cosine Functions* *(F.TF.5)*

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<td>The students will be able to…</td>
<td>How are special right triangles used to find the values of trigonometric functions on the unit circle?</td>
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<tr>
<td><strong>find</strong> the values of trigonometric functions on the unit circle.</td>
<td>How do you determine which trigonometric function is graphed on a plane?*</td>
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<td><strong>prove</strong> trigonometric identities.*</td>
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<td><strong>recognize</strong> and <strong>graph</strong> trigonometric functions.*</td>
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### Assessments

**Homework:** To be given daily on each introduced topic.

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

**Test:** On concepts involving **Trigonometry Basics.**
## Common Core State Standards

The students will:

- **S.IC.1** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.

- **S.IC.2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*

- **S.IC.3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

- **S.IC.4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

- **S.IC.5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

- **S.IC.6** Evaluate reports based on data.

## Unit Eleven

### Statistics And Probability

- **Probability** (S.IC.1, S.IC.2, S.IC.3, S.IC.4, S.IC.5, S.IC.6)
- **Data Analysis and Statistics** (S.IC.1, S.IC.2, S.IC.3, S.IC.4, S.IC.5, S.IC.6)

### Objectives

The students will be able to...

- **summarize**, **represent**, and **interpret** data.
- **make inferences** and **justify** conclusions from sample surveys and experiments.

### Essential Question

What are the different ways in which data can be organized and analyzed?

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### Assessments

#### Homework:
To be given daily on each introduced topic.

#### Class Discussion:
Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.

#### Quiz:
On concepts involving **Probability and Statistics**.

#### Final Exam:
This will cover all of the concepts from semester one and two.