Course Overview

This course provides all the required content to address the Common Core State Standards for Algebra. Course content engages students through real-world examples, images, manipulatives, animations, videos, guided practice, and targeted feedback. Students continue to develop problem-solving, critical thinking, and reasoning skills while working through course content.

Common Core State Standards

Standards alignments are available for each lesson (from the Teacher Edition bar). The Common Core State Standards in mathematics also provide Standards for Mathematical Practice that guide teachers in developing students’ skills in reasoning, problem solving, procedural fluency, and communication.

Examples of how this course can help teachers implement the mathematical practices are provided below.

1. Make sense of problems and persevere in solving them.
   Mathematically proficient students make conjectures about a form and consider special cases and simpler forms of an original problem in order to gain insight into finding a solution. Throughout the course, perseverance is encouraged by giving students immediate feedback.

   Example: In Unit 7, students factor expressions such as \((3x + 2)^2 - 81\) in multiple ways. Ask students to discuss the pros and cons of each method.

2. Reason abstractly and quantitatively.
   Mathematically proficient students make sense of quantities and their relationships in problem situations.

   Example: In Unit 3, students use linear equations and inequalities written in standard form to identify possible combinations for numerous problems, such as the number of items that can be purchased with a predetermined amount of money. Encourage students to reason logically when choosing possible combinations. Discuss why answers must be integers.

3. Construct viable arguments and critique the reasoning or others.
   Mathematically proficient students use stated assumptions and use previously established results to make conjectures and justify their conclusions. Throughout the course, students are given opportunities to explain how to approach a problem or evaluate how another student has made sense of a problem.

   Example: In Unit 5, students use an understanding of correlation to argue whether two variables have a causal relationship. Point out to students the importance of considering other factors when determining causation.

4. Model with mathematics.
   Mathematically proficient students apply mathematical concepts to solve problems that occur in everyday life. Students consistently and with confidence interpret their results and reflect on whether their results make sense in the context of the situation. Throughout the course, students work through real-world examples and use modeling to represent these situations.

   Example: In Unit 8, students create and solve quadratic equations using multiple methods that represent formulas and mathematical problems. Discuss with students the importance of checking the reasonableness of their solutions.

5. Use appropriate tools strategically.
   Mathematically proficient students are sufficiently familiar with tools appropriate for their course and are able to use technological tools to explore and deepen their understanding of concepts.

   Examples: Units 3, 4, 9, and 10 provide tools students use to explore the effect a value has on the key features of linear, exponential, quadratic, and other special functions. Unit 5 provides tools students use
to create multiple representations of data, and graphing calculator instructions to find linear regression models and use them to explore and compare predictions. Point out to students how to further analyze solutions generated from a graphing calculator.

6. **Attend to precision.**
Mathematically proficient students use clear definitions in discussions with others and in their own reasoning and make explicit use of definitions. The explanations provided throughout the course serve to model and encourage attention to precision.

*Example:* In Unit 1, students use the properties of equality to justify methods for solving linear equations. Foster the development of mathematical language by encouraging students to use the full property name for justifications.

7. **Look for and make use of structure.**
Mathematically proficient students look closely at structure and observe how structure can be used to expand on mathematical concepts. Throughout the course, students use the structure of numbers, expressions, and equations to extend mathematical knowledge.

*Example:* In Unit 6, students simplify radical expressions and expressions with rational exponents. Point out to students how understanding the relationship between these types of expressions can be useful in simplifying seemingly complicated expressions.

8. **Look for and express regularity in repeated reasoning.**
Mathematically proficient students notice if calculations are repeated and use those calculations to obtain insight in a process. Throughout the course, students use repetition and regularity to expand understanding.

*Examples:* In Units 2 and 4, students use patterns to discover arithmetic and geometric sequences and use these observations to create rules and formulas for sequences. Encourage students to look for these patterns before revealing the explicit and recursive formulas.

The course also addresses publisher requirements for curricular materials recently announced by the lead writers of Common Core State Standards in mathematics, including an emphasis on mathematical reasoning, focusing on major work, and attention to rigor and balance.

**Teacher Procedures**

Teachers can integrate individual components or use the entire course as the foundation for their Algebra 1 curriculum. Teachers may choose to use

- Entire lessons or units to review prerequisite skills, to differentiate instruction, or to support struggling students
- Lessons to provide instruction for the flipped classroom model or absent students
- Animations for whole-class instruction and discussions
- Practice problems for additional in-class or out-of-class assignments

Teachers are encouraged to interact with students as they work through the course:

- **Providing guidance on an appropriate pace**
  When assigning lessons, teachers should encourage students to complete all sections, including all learn pages, practice exercises, and homework problems (forthcoming) in order to gain in-depth understanding of the mathematical concepts. Unit tests (forthcoming) will serve to identify those areas where the instructional content or approach should be adjusted or where individual students need additional support.
• **Monitoring students’ mathematical development**
  Effective questioning strategies, targeted instructional feedback, and opportunities to explain, justify, and critique mathematical concepts are used throughout the course to develop mathematical reasoning, understanding, and fluency. Furthermore, the course incorporates frequent examples and problems that weave 21st-century themes, such as global awareness and literacy in areas such as finance, civics, health, and the environment. Teachers should monitor students’ mathematical development by providing additional assessments and extending concepts as needed with provided enrichment activities, collaborative exercises, or other supplemental materials.

• **Supporting different types of learners**
  The course targets auditory, visual, and linguistic learners and supports English language learners and other special populations. Throughout the course, students and teachers will notice
  - Animations illustrating concepts with effective use of color and movement
  - Diagrams, flowcharts, and other visual aids that instruct in manageable portions
  - Videos and exercises that promote science, technology, engineering, and mathematics (STEM) education
  - Audio clips that facilitate reflection
  - Rollover definitions and a course glossary to assist with word comprehension
  - Interactive components that engage and challenge all students

**Pacing Guide**

This guide assumes that class periods are either 45 minutes (traditional schedule) or 90 minutes (block schedule). Pacing allows for full integration of course components into classroom instruction, flexibility for assessments, and additional standards coverage that may vary from state to state.

<table>
<thead>
<tr>
<th></th>
<th>Days Traditional Schedule</th>
<th>Days Block Schedule</th>
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</thead>
<tbody>
<tr>
<td><strong>Unit 1: Solving Equations and Inequalities</strong></td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td><strong>Unit 2: Functions</strong></td>
<td>9</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Unit 3: Linear Equations and Systems of Linear Equations</strong></td>
<td>34</td>
<td>17</td>
</tr>
<tr>
<td><strong>Unit 4: Exponents and Exponential Functions</strong></td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td><strong>Unit 5: Data Analysis</strong></td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Unit 6: Radicals and Rational Exponents</strong></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>Unit 7: Polynomials and Factoring</strong></td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>Unit 8: Solving Quadratic Equations</strong></td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td><strong>Unit 9: Graphing Quadratic Functions</strong></td>
<td>19</td>
<td>9.5</td>
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<tr>
<td><strong>Unit 10: Special Functions</strong></td>
<td>11</td>
<td>5.5</td>
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<tr>
<td></td>
<td><strong>160 days</strong></td>
<td><strong>80 days</strong></td>
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Sample Integration Plan

The following lesson plan demonstrates how a teacher might choose to integrate components of this Algebra 1 course (along with another SAS Curriculum Pathways resource) into a day of instruction during a unit on radicals and rational exponents.

### Day 1 (45 minutes)

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Resources</th>
<th>Procedures</th>
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<tbody>
<tr>
<td>Introduce radical expressions</td>
<td><strong>QL #5081</strong>, Algebra Lesson 6-1: Simplifying (Learn pages 1–2)</td>
<td>– Discuss radical expressions and prime factorization.</td>
</tr>
<tr>
<td>Practice simplifying radical expressions</td>
<td><strong>QL #1446</strong>, Interactive Tool: Simplifying Radical Expressions</td>
<td>– Assign Learn pages 1 and 2 of QL #5081.  <em>Students work individually or in pairs.</em></td>
</tr>
<tr>
<td></td>
<td>Projection system and screen</td>
<td>– Discuss rules for when a radical is in simplest form.</td>
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<tr>
<td>Prior to class:</td>
<td>✓ confirm reservation for laptop cart for 3 days (Monday, Tuesday, and Friday)</td>
<td>– Project Learn 3 (QL #5081).  <em>As a class, discuss why the 3 expressions are not considered simplified; then click each expression to display the reasons why.</em>  *Project animation simplifying $\sqrt{300}$.</td>
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<tr>
<td></td>
<td>✓ get cart and set up computers in a.m.</td>
<td>– Discuss additional examples.  <em>(Optional: Assign remainder of Learn 3 for student pairs to complete in class.)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>– HW: Use Quiz (QL#1446) to complete problems 1, 2, 5, 6, 11, and 12.  <em>Students complete assignment in media center or at home.</em>  <em>Students e-mail the Student Answer Page to the teacher.</em></td>
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### Additional Features

All content for the course is already available; we'll add these features during the coming school year:

- Additional content will address concepts not directly addressed by the standards, but essential to student understanding. In the unit on solving equations and inequalities, for example, we will address solving absolute value equations.
- Enrichment activities will present real-world problems, questions, or situations that require critical thinking and problem-solving skills; students can work collaboratively or individually.
- Lesson quizzes and unit tests will assess student understanding. Student work appears in a marked PDF that can be saved, printed, or sent to the teacher.
- Accessibility enhancements will provide text versions of visual elements.