Orchard Gold Star

Math 7-9 Curriculum Bundle

Teacher’s Guide

MATH 7-9
Version 4.5 or Newer
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Introduction

Orchard Gold Star’s 7-9 Math Bundle provides mathematics instruction, practice, and review of important computational and conceptual elements stressed in the National Council of Teachers of Mathematics (NCTM) Standards for School Mathematics. Students are presented ample opportunities to explore mathematical concepts including number relationships, computation, estimation, statistics, probability, algebra, geometry, and measurement in everyday situations. Through various instructional techniques, students are taught how to apply reasoning skills and mathematical thinking in meaningful contexts. Students are encouraged to extend their thinking and communicate ideas through on-screen journals. Orchard Gold Star’s 7-9 Math Bundle can serve as a powerful tool for fostering confident, mathematically literate students.

Orchard Gold Star’s 7-9 Math Bundle can be used in educational settings and in a variety of ways to help students gain proficiency and attain long-term success in math. Because the Orchard Gold Star programs are so diverse, they can be used in single-computer classrooms or learning labs. In the classroom, teachers can use Orchard Gold Star as the catalyst for lesson introductions and discussions with the entire class or with smaller groups of students. Orchard Gold Star allows individual students to focus on specific skills with which they may need additional help. The students also may use Orchard Gold Star as a tool to reinforce math skills or as an extension opportunity for a topic already taught. In full lab settings, Orchard Gold Star is structured enough to be used independently by students and flexible enough to be used by the teacher or lab coordinator for a group lesson.

The 7-9 Math Skill Trees can be used as an alternate means of presenting new or hard-to-teach material. For example, use the Math Concepts programs to provide visual aids when introducing and ordering integers. Take your students step-by-step through the process while viewing the numeric and symbolic progression from negative to positive numbers. Since the program demonstrates real-life uses for integers, students have the chance to see the practical application of the mathematical concept. This and other programs include valuable introductions and feedback, so your students can learn what to do, how to do it, and why it is important. Meanwhile, teachers are empowered with an additional, useful resource tool that can be extended easily using everyday classroom activities including journals and experiments.

Visit our Web site at www.orchardtreeofknowledge.com to see how other educators successfully integrate and use Orchard Gold Star’s 7-9 math programs to help their students.

Note: The Orchard Tree of Knowledge Web site is available only to Orchard customers. If you do not have a login ID or access code, contact your local Orchard Gold Star representative.

The Skill Trees found in the 7-9 Math Bundle include:

**Math Concepts**
- Patterning and Algebra Concepts 74MC
- Geometry Concepts 75MC
- Graphing Concepts 76MC
- Percent Concepts 77MC
- Whole Numbers and Integer Concepts 78MC
- Data Management and Probability Concepts 182MC A/B
- Rate, Ratio, and Proportion Concepts 183MC
- Measurement Concepts 184MC
- Fraction Concepts 185MC
- Decimal Concepts 186MC
- Algebra
  - Algebraic Foundations 187MC
  - Functional, Geometric, and Statistical Relationships 188MC
  - Linear Relations 189MC
  - Quadratic Relations 190MC

**Learning Games**
- Percents: Mixed Practice 12LG
- Math Word Problems: Advanced 18LG
- Perimeter, Area, and Volume: Mixed Practice 66LG

**SkillBuilders**
- Fractions: Advanced 9SB
- Perimeter, Area, and Volume 15SB
- Decimals: Beginning and Advanced 92SB A/B
- High School Math Exit Skills 139SB
- Algebra I Exit Skills 140SB
- Math Strategies 7-8 150SB
National organizations such as the National Council of Teachers of Mathematics (NCTM) advocate that technology, specifically the calculator and computer, should be part of the school mathematics curriculum. The Math Concepts Skill Trees were created in response to this challenge. They provide numerous benefits as well as a means for incorporating technology as specified in the NCTM standards. Listed below are just a few of the benefits.

- Develop/reinforce skills and knowledge
- Develop problem-solving skills
- Develop thinking skills, both critical and creative
- Facilitate manipulation of data
- Engage and retain student interest
- Develop/support skills required for future education and employment
- Include an online calculator
- Include an online journal for recording thoughts and strategies
- Provide immediate feedback when solving problems

**Math Concepts**

Each Skill Tree in this Math Concepts series is a comprehensive curriculum-based program presented in a motivating format, including a variety of animations and graphics. They provide both guided instruction and practice.

**Patterning and Algebra Concepts 74MC**

Students extend their knowledge of basic operations and number sense into solving algebraic expressions, using the order of operations, and solving simple formulas. Students also graph linear equations and inequalities on a number line and manipulate various polynomials.

**Geometry Concepts 75MC**

This Skill Tree focuses on exploring details and properties about specific shapes. Students investigate lines and angles as well as properties and formulas regarding triangles, quadrilaterals, and circles. Advanced transformations including reflections and rotations are presented.

**Graphing Concepts 76MC**

Students investigate how data, shapes, and the slope of a line are plotted and displayed on a coordinate grid. They gain practical experience manipulating a figure and its image through reflections, rotations, and translations.

**Percent Concepts 77MC**

The relationships between percents, fractions, and decimals are key mathematical concepts. In this Skill Tree, students are given strategies for finding percentages. Real-world situations such as calculating interest, sales tax, commissions, and discounts are also covered.

**Whole Numbers and Integer Concepts 78MC**

Basic operations are applied using an expanded number set as students solve addition, subtraction, multiplication, and division problems and explore the relationships between positive and negative numbers.

**Data Management and Probability Concepts 182MC-A**

Students organize and interpret data and understand and compute probability. Students learn data-collecting strategies including collecting, organizing, and displaying data and further their skills by analyzing and interpreting the data.

**Rate, Ratio, and Proportion Concepts 183MC**

Students understand and estimate rate, ratio, and proportion. They also learn how to set up a proportion to estimate a variable and recognize real-life scenarios in which using rate, ratio, and proportion may be useful (i.e., reading a map, understanding blueprints, predicting information from a survey, measuring speed, etc.).

**Measurement Concepts 184MC**

Students calculate length, area, surface area, and the volume of various shapes. Students also learn that measuring is often used in nearly every aspect of life: carpeting or painting a room, wrapping a gift, etc.

**Fraction Concepts 185MC**

Students learn how to simplify, compare, add, subtract, multiply, and divide fractions. Students also learn about proper, improper, and mixed fractions; equivalent fractions; reducing fractions to their lowest terms; and comparing and ordering fractions.

**Decimal Concepts 186MC**

Students learn to order, add, subtract, multiply, and divide decimals and also learn that decimals can be used to represent proper, improper, and mixed fractions. Visual examples are used to promote understanding of key concepts.

**Algebraic Foundations 187MC**

Students explore polynomials, factoring, rational expressions, equations, and inequalities. Among other skills, students will learn to represent verbal quantitative situations algebraically and to evaluate these expressions and also to use the commutative, associative, and distributive properties to simplify algebraic expressions.

**Functional, Geometric, and Statistical Relationships 188MC**

Students investigate and apply functions and geometric and statistical relationships. Students will determine whether a relationship defined by a graph, set of ordered pairs, or a symbolic expression is a function; describe independent and dependent quantities in functional relationships; explore angles, triangles, polygons, and calculate surface area and volume; and learn how to collect, organize, and analyze data.

**Linear Relations 189MC**

Students understand and use linear functions, systems, and inequalities including slope and intercepts, interpolation and extrapolation, substitution and elimination, and others.
**Bundle Overview (cont.)**

**Quadratic Relations 190MC**
Students solve quadratic equations and functions. Students also will determine the value of one or more unknowns from a variety of quadratic graphs, determine realistic values for the domain and range of a quadratic function, and extrapolate using a curve of best fit.

**Learning Games**

**Percents: Mixed Practice 12LG**
Students quarterback their way to victory by working through a wide range of problem types. Students find a percent when a number is known or unknown, calculate decimal/percent equivalents, rewrite percent problems as equations and solve them, and rewrite fractions or decimals as percents.

**Math Word Problems: Advanced 18LG**
Students solve one-step and multi-step problems that involve whole numbers and decimals, choose the appropriate operation or combination of operations, and identify when they have too much or too little information to solve a problem.

**Perimeter, Area, and Volume: Mixed Practice 66LG**
Students search through a pyramid to find an antidote to a nefarious queen’s concoction. Correct answers to perimeter, area, volume, and surface area questions provide bits and pieces of the clues to the formula.

**SkillBuilders**

**Fractions: Advanced 95B**
A step-by-step approach leads students through the problems, checking each response in sequence. Tutorial, practice, and test modes are included. Students who achieve the mastery level set by the teacher play a reward game. Students find the least common denominator, write fractions in lowest terms, multiply and divide fractions and mixed numbers with and without common factors, and simplify proper and improper fractions and mixed numbers.

**Perimeter, Area, and Volume 15SB**
Students master a variety of geometry skills and are rewarded for good performance with a choice of a game. Students calculate perimeter, area, volume, surface area, and circumference of polygons, squares, rectangles, triangles, parallelograms, trapezoids, hexagons, circles, prisms, cylinders, cones, and pyramids in addition to solving word problems.

**Decimals: Beginning and Advanced 92SB A/B**
A step-by-step approach leads students through the problems. Tutorial, practice, and test modes are included. Students who achieve the mastery level set by the teacher play a reward game. Students add and subtract decimals with up to three decimal places, add and subtract money, multiply and divide decimals, multiply whole numbers with decimals, and divide decimals by decimals, whole numbers by whole numbers, and decimals by whole numbers.

**High School Math Exit Skills 139SB**
Students practice key skills involving scientific notation; the relationships between fractions, decimals, and percents; algebraic and geometric concepts; metric and customary units; probability and statistics; and effective problem-solving techniques.

**Algebra 1 Exit Skills 140SB**
Students practice key algebraic concepts including domains and ranges, linear inequalities, quadratic equations, factoring polynomials, solving rational expressions, and much more.

**Math Strategies 7-8 150SB**
Students practice key math skills and receive helpful feedback, as needed. Topics include estimation and problem solving, probability and statistics, data analysis, number and algebraic concepts, and geometry and measurement concepts.
<table>
<thead>
<tr>
<th>Skill Trees</th>
<th>Objectives</th>
<th>Implementation Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patterning and Algebra Concepts 74MC</td>
<td>Investigate, experiment with, learn to identify, write, and evaluate variables, expressions, linear equations, and inequalities; and add, subtract, multiply, and factor polynomials.</td>
<td>The Math Concepts programs are ideal for use as whole-class introductions to new or difficult concepts. View on a projection screen and scroll through the interactive lessons together.</td>
</tr>
<tr>
<td>Geometry Concepts 75MC</td>
<td>Investigate, experiment with, and learn to identify and classify geometric shapes and their properties; and solve problems involving perimeter, area, and volume of dimensional shapes.</td>
<td>Have students make weekly entries into the math journal in this or any Math Concepts program. Provide a topic related to the assignment or allow them to write about what was easy or difficult for them. Use their entries as discussion material during conferences with each student.</td>
</tr>
<tr>
<td>Graphing Concepts 76MC</td>
<td>Explore the X, Y coordinate grid system; name coordinate points as ordered pairs; plot points on a coordinate grid; investigate relationships between a figure and its translated, reflected, and rotated image; identify the slope of a line; and more.</td>
<td>Pass out graph paper and work through several of the problems together before students work independently. Explain how to represent ordered pairs on an X, Y coordinate grid.</td>
</tr>
<tr>
<td>Percent Concepts 77MC</td>
<td>Investigate, experiment with, and learn how to express fractions as decimals and percents or the reverse and how to solve standard and real-life percentage problems.</td>
<td>Set a class goal to pass a given number of key concepts at 85 percent or above.</td>
</tr>
<tr>
<td>Whole Numbers and Integer Concepts 78MC</td>
<td>Investigate, experiment with, and learn how to interpret, understand, and use integers in the everyday world and on coordinate grids.</td>
<td>Have students create their own problems involving integers. Discuss their problems and develop processes to solve them.</td>
</tr>
<tr>
<td>Data Management and Probability Concepts 182MC-A</td>
<td>Learn how to collect, display, and analyze a variety of data types. Describe data using calculations of mean, median, and mode. Explore graphs, tables, plots, and charts as a means of representing data.</td>
<td>Conduct in-class probability experiments by having students draw marbles of different colors out of a bag. Have students predict outcomes and chart the results.</td>
</tr>
<tr>
<td>Rate, Ratio, and Proportion Concepts 183MC</td>
<td>Express rates and solve problems that involve converting between fractions, decimals, percents, and unit rates. Distinguish between rate and ratio and use estimation strategies to justify calculations.</td>
<td>Use real-world examples to show students the use of ratio to compare distances on a map or blueprint to real distance. Show how the ratio of the map distance to the real distance is the scale shown on a map.</td>
</tr>
<tr>
<td>Measurement Concepts 184MC</td>
<td>Use formulas to calculate the area, surface area, volume, diameter, circumference, and perimeter of objects.</td>
<td>Survey students about why they think measurement is useful in the following careers: chef, interior decorator, chemist, medical professional, and architect. What other professions rely on accurate measurements?</td>
</tr>
<tr>
<td>Fraction Concepts 185MC</td>
<td>Compare and order fractions and find their approximate locations on a number line. Add, subtract, multiply, and divide fractions. Convert among fractions and decimals.</td>
<td>Explain the concepts of fractions and decimals using everyday items: a pizza, a score on a quiz, a clearance item at a store, and sports averages. Experiment with folding sheets of paper to demonstrate fractions of a whole.</td>
</tr>
<tr>
<td>Decimal Concepts 186MC</td>
<td>Compare and order decimals and find their approximate locations on a number line. Compare, order, and represent integers, decimals, and square roots. Represent any number in scientific notation.</td>
<td>Draw a number line on posterboard or on the black board and provide a list of decimals. Have students take turns placing the decimals on the number line. Begin with 0.5 and work to the left and to the right.</td>
</tr>
<tr>
<td>Algebraic Foundations 187MC</td>
<td>Explore polynomials, factoring, rational expressions, equations, and inequalities. Learn to represent verbal quantitative situations algebraically. Use the commutative, associative, and distributive properties to simplify algebraic expressions.</td>
<td>Have students make weekly entries into the math journal in this or any Math Concepts program. Provide a topic related to the assignment or allow them to write about what was easy or difficult for them. Use their entries as discussion material during conferences with each student.</td>
</tr>
</tbody>
</table>
### Implementation Ideas (cont.)

<table>
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<th>Implementation Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional, Geometric, and Statistical Relationships 188MC</td>
<td>Apply functions and geometric and statistical relationships. Determine whether a relationship defined by a graph, set of ordered pairs, or a symbolic expression is a function.</td>
<td>Have each student pick five terms he or she is unfamiliar with from the Glossary. Instruct them to write the terms and their definitions and present them to the rest of the class.</td>
</tr>
<tr>
<td>Linear Relations 189MC</td>
<td>Understand and use linear functions, systems, and inequalities including slope and intercepts, interpolation and extrapolation, substitution and elimination, and others.</td>
<td>Have students convert from degrees Celsius to degrees Fahrenheit. Explain inverse and direct relationships using graphs, and show that a straight line represents a linear function. Have students predict how relationships between car value vs. time, pizza cost vs. number of toppings, etc. may be shown graphically.</td>
</tr>
<tr>
<td>Quadratic Relations 190MC</td>
<td>Solve quadratic equations and functions. Determine the value of one or more unknowns from a variety of quadratic graphs. Determine realistic values for the domain and range of a quadratic function, and extrapolate using a curve of best fit.</td>
<td>Allow students to work independently in these Completion Skill Trees, and then compare student and class records to identify weak skill areas. Reassign those skills to the class. Re-evaluate quarterly and chart progress. Assign the questionable skills at the end of term as an evaluative tool.</td>
</tr>
<tr>
<td>Percents: Mixed Practice 12LG</td>
<td>Practice and reinforce computation and estimation skills using percents.</td>
<td>Motivate students to hone basic skills by setting up a Mixed Practice program tournament during the football season. Create a tree diagram and list teams, partners, or individuals. Use the scores to complete the diagram and to prepare students for the Mixed Practice Championship Bowl.</td>
</tr>
<tr>
<td>Math Word Problems: Advanced 18LG</td>
<td>Practice and reinforce solving one- and two-step addition and subtraction word problems. Perimeter, area, and money application questions are included.</td>
<td>Teach the concepts using other proven classroom techniques, and then follow up with this program to reinforce skills.</td>
</tr>
<tr>
<td>Perimeter, Area, and Volume: Mixed Practice 66LG</td>
<td>Practice and reinforce learning numeric and geometric relationships and apply algebraic concepts and logic skills to solve real-world problems.</td>
<td>Explore how patterns found in the program are extensions of those found in nature and our everyday world. Have students create their own patterns using the program questions as models. Share students’ patterns and ideas.</td>
</tr>
<tr>
<td>Fractions: Advanced 9SB</td>
<td>Practice and reinforce multiplication and division of fractions and mixed numbers.</td>
<td>Teach the concepts using other proven classroom techniques, and then follow up with this program to reinforce skills.</td>
</tr>
<tr>
<td>Perimeter, Area, and Volume 15SB</td>
<td>Practice and reinforce measurement (i.e., perimeter, area, volume, and surface area) of two- and three-dimensional objects.</td>
<td>Demonstrate the aids that are available in the program such as how to access formulas and use the step-by-step tutorial.</td>
</tr>
<tr>
<td>Decimals: Beginning 92SB-B</td>
<td>Learn, practice, and reinforce adding and subtracting money and other decimal problems of varied lengths and values.</td>
<td>Reteach small groups using this program. Have students create a checklist of important steps or questions to ask themselves as you work through the step-by-step tutorial together. Encourage them to use their checklists when working on problems independently.</td>
</tr>
<tr>
<td>Decimals: Advanced 92SB-A</td>
<td>Learn, practice, and reinforce multiplying and dividing money and other decimal problems of varied lengths and values.</td>
<td>Walk students through the thinking processes involved in multiplication or division of decimals by viewing the step-by-step practice mode for a particular skill.</td>
</tr>
<tr>
<td>High School Math Exit Skills 139SB</td>
<td>Learn, practice, and reinforce essential math skills including estimation, reasoning, computation, problem-solving strategies, and algebraic concepts in routine and non-routine math problems.</td>
<td>Allow students to work independently in these completion Skill Trees. Then compare student and class records to identify weak skill areas. Reassign those skills to the class. Re-evaluate quarterly and chart progress. Assign the questionable skills at the end of term as an evaluative tool.</td>
</tr>
</tbody>
</table>
**Accessing Assignments**

For information on management system functions, such as adding students and assigning students to classes, see your *Orchard Gold Star Teacher’s Guide*.

**Entering Orchard as a Pre-Enrolled Student**

Having students enter Orchard using a specific username not only allows you to monitor student progress through the variety of records that are kept on each student, but it also allows students to access individualized assignments tailored to their specific needs.

*Note: A student must be enrolled in at least one class within the Orchard Manager to use this option.*

1. Double-click on the Orchard icon to open the login screen.*
2. Enter your username and password, if required, and click OK.
3. If you are enrolled in more than one class, you will be asked to select a class. Click OK.
   
   A screen showing your available programs for that class appears. (If only one program was assigned, it will automatically launch.)

4. Click on a program name, and then click OK to launch it.

**Entering Orchard as a Guest**

By entering Orchard as a Guest, students can quickly access all available Orchard programs. This method requires little teacher involvement. However, keep in mind that when students use Orchard in the Guest mode, no names, records, or bookmarks are kept. Therefore, it is not recommended that students frequently use this option.†

1. Double-click on the Orchard icon to open the login screen.*
2. Click the Guest button.
3. Enter the name by which you would like to be called.
4. Click OK.

A screen showing the available programs appears.

5. Click on a program name, and then click OK to launch it.

**Accessing Information on Assigned Programs**

Instructors can access information on assigned Skill Trees and tests.

1. Have the student log in and select a class.
2. Right-click (Windows) or Control+click (Mac OS X) on any of the Skill Trees or tests.
   
   A Details screen appears with the program name, subject, grade level, type, completion time, exhausts, portfolio, and OS X Native (Mac), as well as any correlated standards, if available.

3. Click OK to return to the list of programs.

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*Guest mode may be disabled or assigned a password by your Orchard administrator. If your Orchard license is limited to a specific number of users, the Guest button will be inaccessible.

†Guest mode may be disabled or assigned a password by your Orchard administrator. If your Orchard license is limited to a specific number of users, the Guest button will be inaccessible.

*The Orchard icon is located by default in the OrchGS folder. For Windows users, the Orchard icon is also located by default in the Start Menu. For Mac OS X users, the Orchard icon is also located by default in the Dock when the Manager is launched.
Patterning and Algebra Concepts

**SKILLS**

- Identify variables as placeholders
- Evaluate numerical expressions
- Translate work phrases and statements into algebraic expressions
- Evaluate simple algebraic expressions using substitution
- Solve linear equations using inspection and systematic trial methods
- Solve linear equations with one variable using the algebraic method
- Solve and graph inequalities
- Add and subtract polynomials
- Multiply monomials, binomials, and trinomials by monomials
- Factor polynomials
- Divide monomials, binomials, and trinomials by monomials

Geometry Concepts

**SKILLS**

- Classify angles: acute, obtuse, right, and straight
- Label geometric figures: angles, rays, lines, line segments, etc.
- Measure angles with a protractor
- Identify properties of intersecting, perpendicular, and parallel lines
- Identify transversals and opposite, alternate, co-interior, and supplementary angles
- Identify properties of triangles and quadrilaterals
- Calculate an interior angle measurement in triangles and quadrilaterals
- Learn properties of transformations: translations, reflections, rotations, enlargements, and reductions
- Apply formulas and concepts for the perimeter and area of basic polygons
- Apply formulas and concepts for the circumference and area of a circle
- Apply the Pythagorean theorem
- Apply formulas and concepts for the volume of rectangular prisms and cylinders
**Percent Concepts**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Express whole number percents as decimals and fractions</td>
<td>•</td>
</tr>
<tr>
<td>Express fractions (ratios) as percents</td>
<td>•</td>
</tr>
<tr>
<td>Express decimals as percents</td>
<td>•</td>
</tr>
<tr>
<td>Calculate a percentage of a number</td>
<td>•</td>
</tr>
<tr>
<td>Calculate a percent from a fraction</td>
<td>•</td>
</tr>
<tr>
<td>Express percents greater than 100 or less than 1 as decimals and fractions</td>
<td>•</td>
</tr>
<tr>
<td>Solve problems with percents: sales tax, simple interest, discounts, and commission</td>
<td>•</td>
</tr>
</tbody>
</table>

**Whole Numbers and Integer Concepts**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locate integers on a number line</td>
<td>•</td>
</tr>
<tr>
<td>Order integers</td>
<td>•</td>
</tr>
<tr>
<td>Add integers</td>
<td>•</td>
</tr>
<tr>
<td>Subtract integers</td>
<td>•</td>
</tr>
<tr>
<td>Multiply integers</td>
<td>•</td>
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<tr>
<td>Divide integers</td>
<td>•</td>
</tr>
<tr>
<td>Locate ordered pairs of integers on a plane</td>
<td>•</td>
</tr>
</tbody>
</table>

**Data Management Concepts**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze bias in data-collection methods</td>
<td>•</td>
</tr>
<tr>
<td>Collect and organize data on tally charts and stem-and-leaf plots, and display data on frequency tables</td>
<td>•</td>
</tr>
<tr>
<td>Collect primary data using both a whole population (census) and a sample of classmates, organize the data on tally charts and stem-and-leaf plots, and display the data on frequency tables</td>
<td>•</td>
</tr>
<tr>
<td>Construct line graphs, comparative bar graphs, circle graphs, and histograms, and use the information to solve problems</td>
<td>•</td>
</tr>
<tr>
<td>Describe data using calculations of mean, median, and mode</td>
<td>•</td>
</tr>
<tr>
<td>Describe verbally the information presented in tally charts, stem-and-leaf plots, and frequency tables</td>
<td>•</td>
</tr>
<tr>
<td>Describe the variability of data sets using such techniques as range and box and whisker plots</td>
<td>•</td>
</tr>
<tr>
<td>Determine the effect on a measure of central tendency of adding or removing a value</td>
<td>•</td>
</tr>
<tr>
<td>Display data on bar graphs, pictographs, and circle graphs, with and without the help of technology</td>
<td>•</td>
</tr>
<tr>
<td>Explore with technology to find the best presentation of data</td>
<td>•</td>
</tr>
<tr>
<td>Find, use, and interpret measures of center and spread, including mean and interquartile range</td>
<td>•</td>
</tr>
<tr>
<td>Formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population</td>
<td>•</td>
</tr>
<tr>
<td>Interpret displays of data and present the information using mathematical terms</td>
<td>•</td>
</tr>
<tr>
<td>Make conjectures about possible relationships between two characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit</td>
<td>•</td>
</tr>
<tr>
<td>Predict population characteristics from sample data</td>
<td>•</td>
</tr>
</tbody>
</table>
## Probability Concepts

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply a knowledge of probability in sports and games, weather predictions, and political polling</td>
<td>•</td>
</tr>
<tr>
<td>Appreciate the power of using a probability model by comparing experimental results with theoretical results</td>
<td>•</td>
</tr>
<tr>
<td>Compare predicted and experimental results</td>
<td>•</td>
</tr>
<tr>
<td>Compute probabilities for simple compound events using such methods as organized lists, tree diagrams, and area models</td>
<td>•</td>
</tr>
<tr>
<td>Create and solve problems using the numerical definition of probability as favorable outcomes divided by possible outcomes</td>
<td>•</td>
</tr>
<tr>
<td>Determine the probability of two independent events where the combined sample space has 52 or fewer elements</td>
<td>•</td>
</tr>
<tr>
<td>Identify 0 to 1 as a range from “never happens” (impossibility) to “always happens” (certainty) when investigating probability</td>
<td>•</td>
</tr>
<tr>
<td>Identify probability situations and apply a knowledge of probability</td>
<td>•</td>
</tr>
<tr>
<td>Identify the favorable outcomes among the total number of possible outcomes, and state the associated probability</td>
<td>•</td>
</tr>
<tr>
<td>List the possible outcomes of simple experiments by using tree diagrams, modeling, and lists</td>
<td>•</td>
</tr>
<tr>
<td>Recognize that if ( n ) events are equally likely, the probability of any one of them occurring is ( \frac{1}{n} )</td>
<td>•</td>
</tr>
<tr>
<td>Understand and use appropriate terminology to describe complementary and mutually exclusive events</td>
<td>•</td>
</tr>
<tr>
<td>Use a table to identify all possible outcomes of two independent events</td>
<td>•</td>
</tr>
<tr>
<td>Use computer or other simulations to solve probability and data collection problems</td>
<td>•</td>
</tr>
<tr>
<td>Use definitions of probability to calculate complex probabilities from tree diagrams and lists (e.g., for tossing a coin and rolling a die at the same time)</td>
<td>•</td>
</tr>
<tr>
<td>Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations</td>
<td>•</td>
</tr>
</tbody>
</table>

## Rate, Ratio, and Proportion Concepts

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop, analyze, and explain methods for solving problems involving proportions</td>
<td>•</td>
</tr>
<tr>
<td>Distinguish between rate and ratio</td>
<td>•</td>
</tr>
<tr>
<td>Respond to numerical information in a variety of media</td>
<td>•</td>
</tr>
<tr>
<td>Use proportion to solve problems</td>
<td>•</td>
</tr>
<tr>
<td>Express ratios in equivalent forms</td>
<td>•</td>
</tr>
<tr>
<td>Derive and apply unit rates</td>
<td>•</td>
</tr>
<tr>
<td>Use ratios and proportions to represent quantitative relationships</td>
<td>•</td>
</tr>
</tbody>
</table>
### Measurement Concepts

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend knowledge of linear measurement, area, surface area, volume, capacity, and mass</td>
<td>•</td>
</tr>
<tr>
<td>Calculate the surface area and volume of prisms and cylinders</td>
<td>•</td>
</tr>
<tr>
<td>Define radius, diameter, and circumference</td>
<td>•</td>
</tr>
<tr>
<td>Calculate the area of parallelograms, trapezoids, circles, and more complex shapes</td>
<td>•</td>
</tr>
<tr>
<td>Estimate and calculate the area of composite figures</td>
<td>•</td>
</tr>
<tr>
<td>Estimate and calculate the perimeter and area of an irregular shape</td>
<td>•</td>
</tr>
<tr>
<td>Apply measurement concepts to everyday life</td>
<td>•</td>
</tr>
<tr>
<td>Understand both metric and traditional systems of measurement</td>
<td>•</td>
</tr>
</tbody>
</table>

### Fraction Concepts

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add, subtract, multiply, and divide simple fractions</td>
<td>•</td>
</tr>
<tr>
<td>Apply the order of operations to solve problems that involve whole numbers and fractions; brackets and exponents</td>
<td>•</td>
</tr>
<tr>
<td>Define and use power, base, and exponent</td>
<td>•</td>
</tr>
<tr>
<td>Demonstrate equivalent mixed numbers and improper fractions concretely, pictorially, and symbolically</td>
<td>•</td>
</tr>
<tr>
<td>Estimate, compute, and verify sum, difference, and product</td>
<td>•</td>
</tr>
<tr>
<td>Express repeated multiplication as powers</td>
<td>•</td>
</tr>
<tr>
<td>Present fractions and mixed numbers in decimal form</td>
<td>•</td>
</tr>
<tr>
<td>Use the associative and commutative properties of addition and multiplication and the distributive property of multiplication to calculate problems with fractions, integers, and decimals</td>
<td>•</td>
</tr>
</tbody>
</table>

### Decimal Concepts

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add, subtract, multiply, and divide decimals</td>
<td>•</td>
</tr>
<tr>
<td>Compare and order decimals, fractions, and percents and find their locations on a number line</td>
<td>•</td>
</tr>
<tr>
<td>Convert terminating decimals to fractions</td>
<td>•</td>
</tr>
<tr>
<td>Distinguish between a square root and its decimal approximation</td>
<td>•</td>
</tr>
<tr>
<td>Generate multiples and factors of given numbers</td>
<td>•</td>
</tr>
<tr>
<td>Mentally divide numbers by 0.1, 0.01, and 0.001</td>
<td>•</td>
</tr>
<tr>
<td>Represent any number in scientific notation</td>
<td>•</td>
</tr>
<tr>
<td>Work with decimals, percents, and fractions to solve problems</td>
<td>•</td>
</tr>
</tbody>
</table>
Introduction

The Math Concepts series features comprehensive curriculum-based programs presented in a motivating format with a variety of animations and graphics. These programs provide both guided instruction and practice.

Pattern and Algebra Concepts helps students extend their knowledge of basic operations and number sense to algebraic expressions, order of operations, and solving simple formulas. Students also graph linear equations and inequalities on a number line and manipulate various polynomials.

Geometry Concepts focuses on exploring details and properties about specific shapes. Students investigate lines and angles as well as properties of and formulas for triangles, quadrilaterals, and circles. Advanced transformations including reflections and rotations are presented.

Percent Concepts explores the relationships between percents, fractions, and decimals. In this program, students are given strategies for finding percentages. Real-world situations such as calculating interest, sales tax, commissions, and discounts are also covered.

In Whole Numbers and Integer Concepts, basic operations are applied using an expanded number set as students solve addition, subtraction, multiplication, and division problems and explore the relationships between positive and negative numbers.

Data Management Concepts focuses on data collection, organization, and analysis. Students progress through a series of tutorials and activities that introduce statistics concepts and vocabulary. The tutorial emphasizes real-world problem solving and career scenarios using statistics.

In Probability Concepts, students learn terminology and concepts of probability, apply probability knowledge to sports and games of chance, use experiments and data collection to make predictions, and determine the probability of given events through tutorials and quizzes.

In Rate, Ratio, and Proportion Concepts, students understand and estimate rate, ratio, and proportion. They also learn how to set up a proportion to estimate a variable and recognize real-life scenarios in which using rate, ratio, and proportion may be useful (i.e., reading a map, understanding blueprints, predicting information from a survey, measuring speed, etc.).

Measurement Concepts helps students calculate length, area, surface area, and the volume of various shapes. Students also learn that measuring is often used in nearly every aspect of life: carpeting or painting a room, wrapping a gift, etc. Problem solving is used to demonstrate an understanding of dimensional relationships, conversions, and measurement in meaningful scenarios.

Fraction Concepts helps students learn how to simplify, compare, add, subtract, multiply, and divide fractions. Students also learn about proper, improper, and mixed fractions; equivalent fractions; reducing fractions to their lowest terms; and comparing and ordering fractions.

In Decimal Concepts, students learn to order, add, subtract, multiply, and divide decimals and also learn that decimals can be used to represent proper, improper, and mixed fractions. Visual examples are used to promote understanding of key concepts.

Using Math Concepts 7-9

The following instructions will show you how to complete the programs from a student’s perspective.

After opening a program, you will see the main menu screen.

1. Click on a topic. A list of subtopics appears on the right-hand side of the screen.

   Note: Click Show Skills to view and/or print skills for each topic, click Zoom Skills for full-screen viewing, and click Hide Skills to return to the topics and subtopics lists. See “Subtopics Summary” for a list of subtopics for each program. See “Records” for information about the Records button.

2. Select a subtopic from the list, and then follow the instructions on your screen.
3 Use the on-screen buttons and follow the instructions to complete the activities:

- **Access** the online calculator, journal, or glossary. (See “Journal” and “Glossary.”)
- **Select** the Automatic Audio checkbox to have the text automatically read on each screen.
- **Listen to** (or repeat) a reading of the text on the screen. Click Tools (above) for Automatic Audio.
- **Navigate** via a list of sections within the tutorial (see below).

- **Return to** the previous menu.
- **Move backward.**
- **Move forward.**

### Quiz

1. **From the Select a Topic tab on the main menu, select the quiz.**

2. **Select a quiz type from the Select a Subtopic tab, and then follow the instructions on your screen.**

   In the *Practice Quiz*, students practice the type of questions they may find on a quiz and get immediate feedback on their answers, including explanations for correct answers. The Show Answer option allows students to view correct answers. Students may select topics they wish to practice in this quiz.

   *Sample Quiz* allows learners to continue practicing the skills they have learned.

   *Teacher’s Quiz* shows students a list of quizzes created by the teacher. Quiz information appears in the students’ records. (See “Program Parameters” for instructions on how to set up quizzes.)

### Records

Students may view results of their activities and quizzes along with a report of the date, time, and duration.

*Note: The Records option is not available in guest mode.*

1. **From the main menu, click the Records button.**

2. **Click Activity or Quiz to view reports.**

   - **Math Concepts 7,8 Activity Report**

3. **Click Close to return to the Reports screen.**

### Journal

The journal gives students a way to express their knowledge and problem-solving methods for a particular skill. Teachers may read student journal entries by having the student print them out. There is no limit to the number of entries in a student’s journal file. Entries remain available in the Orchard Manager until they are deleted.

1. **Access the journal from within any tutorial subtopic by clicking the Tools button.**

   The Tools menu appears.

2. **Click Journal to open the journal.**

   Type your text using the keyboard.
3 Use the following options to manage the journal:

- **New**
  - Open a new, untitled journal file.
- **Open**
  - Locate and open an existing journal file.
- **Save**
  - Save new changes made to the journal file.
- **Save As**
  - Name or rename and save the journal file.
- **Delete**
  - Delete the journal file.
- **Print**
  - Print the journal file.
- **Done**
  - Return to the previous screen in the program.

4 Click on a term.

The term definition appears (often with an example).

5 Use the following options on your screen to navigate the Glossary:

- **Back**
  - Return to the previous glossary screen.
- **Tools**
  - Access the online calculator, journal, or glossary. (See “Journal” and “Glossary.”)
  - Select the Automatic Audio checkbox to have the text automatically read on each screen.
- **Audio**
  - Listen to (or repeat) a reading of the text on the screen. Click Tools (above) for Automatic Audio.
  - Use the arrow keys to scroll backwards or forwards through glossary terms.
- **Done**
  - Return to the previous section.
Program Parameters

1. To change the parameters for this program, log into the Orchard Manager as a teacher.
2. Click on the appropriate class, if necessary, and then click OK.
3. Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

The Program/Test Parameters screen appears.

4. Select a program. You have the following options:
   - Edit allows you to manage student tutorial and quiz options. (See “Editing Student or Class Parameters.”)
   - Reset Defaults returns parameters to original settings; that is, all topic/subtopic options are available, audio options are disabled, and all quizzes you created are deleted. (Class only.)
   - Delete Parameters allows you to delete settings for a particular program, restoring the settings to their defaults. (Student only.)
   - Copy From... copies another class’s parameters to the class you select. (Class only. See “Copying Class Parameters” below.)
   - Done exits the Program/Test Parameters screen.

Copying Class Parameters

1. Follow the previous “Program Parameters” instructions to access the Program/Test Parameters screen.
2. Select the program that you wish to copy parameters to, and then click the Copy From... button.

The Copy Program Parameters screen appears.

3. Select the class name and program that you wish to copy from, and then click OK.

Editing Student or Class Parameters

1. Follow the previous “Program Parameters” instructions to access the Program/Test Parameters screen.
2. Select the appropriate program and click Edit.

The settings screen appears.

3. Select a topic to edit, and then select a subtopic.
   - Disable Topic/Subtopic removes the option from the students’ topic list.
   - Enable Topic/Subtopic restores the option to the students’ topic list.

4. Select audio options, as follows:
   - Automatic Audio checkbox—Select so students MUST listen to audio. The text is read aloud from every screen.
   - Disable Audio checkbox—Select so students do not have the option to listen to audio. The Audio button will be removed from student tutorials, and the individual student’s Automatic Audio option will be missing or inaccessible from his or her Tools menu.

5. Click Save to save your changes.

Editing and Creating Quizzes

1. Follow the previous “Editing Student or Class Parameters” instructions to access the settings screen.
2. Click the Edit Quizzes button.

The Teacher’s Quiz Manager screen appears.

3. Click New to create a new quiz, or select a quiz and click Edit to make changes to an existing quiz.

The Teacher’s Quiz Creator screen appears.
4 Select a topic from the Topics list box, and then select a question from the list on the right.

5 Use these buttons to create or edit a quiz:

   - **Save Quiz** | Save any changes.
   - **Preview** | Preview and answer a question before deciding to add or discard it.
   - **Add** | Add a question.
   - **Remove** | Remove a question.
   - **Menu** | Return to the previous menu.

6 Click Add to add the question to your list, and continue to click Add until all appropriate questions have been added.

7 Click Save Quiz to save your quiz questions. The Quiz Naming screen appears.

8 Follow the instructions on your screen, and enter a quiz name. If desired, enter an optional password.

9 Click Save.

   The new quiz appears in the teacher’s list and will appear on the students’ list of quizzes to choose from.

Deleting a Quiz

1 Follow the previous “Editing Student or Class Parameters” instructions to access the settings screen.

2 Click the Edit Quizzes button.

   The Teacher’s Quiz Manager screen appears.

3 Select the appropriate quiz, and then click Delete.

   A dialog box appears, asking, “Are you sure you wish to delete this quiz?”

4 Click Yes to delete the quiz.
Math Concepts 7-9 74MC-75MC, 77MC-78MC, & 182MC-186MC (cont.)

Subtopics Summary

Patterning and Algebra Concepts

Welcome to Patterning and Algebra demonstrates how people use patterning in daily life to predict results and how algebra can be used to create and analyze formulas for these patterns.

Variables and Expressions defines variable, formula, and algebraic expressions and demonstrates how to substitute true values for variables, develop formulas from patterns, review the order of operations, and more.

Patterns and Relationships demonstrates how to manipulate patterns using whole numbers and variables, discuss patterns using the appropriate language, predict and justify values within patterns, relate and compare different forms of representation for a relationship, and more.

Equations introduces equations and ways to solve them using inspection and systematic trials, translate complex statements into algebraic expressions or equations, recognize and generate equivalent forms for simple algebraic expressions, and solve linear equations.

Graphs teaches students how to interpolate and extrapolate number values from graphs and draw conclusions from a pattern. Students use graphs to analyze the nature of changes in quantities in linear relationships.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(izes).

Geometry Concepts

Welcome to Geometry introduces students to geometric ideas and relationships in many facets of everyday life.

Angles instructs students in the identification and classification of geometric figures; the use of mathematical language to describe geometric concepts; the use of reasoning and investigations; mathematical reasoning to determine the measures of angles in a diagram; the description, classification, and comprehension of relationships between types of two-dimensional objects using their defining properties; and more.

Intersecting, Parallel, and Perpendicular Lines examines the identification and investigation of the relationships among angles and pairs of angles, solving problems involving lines and angles, identifying angle properties, using coordinate geometry to represent and examine the properties of geometric shapes, and more.

Triangles demonstrates how to measure the sum of angles in triangles; the classification, description, and explanation of relationships among types of two-dimensional objects using their defining properties; ways to solve equations using inspection and systematic trials; and how to translate complex statements into algebraic expressions or equations.

Quadrilaterals teaches students to identify, investigate, and classify quadrilaterals according to their properties; use coordinate geometry to represent and examine the properties of quadrilaterals; and more.

Polygons examines the identification, investigation, and classification of polygons and types of two-dimensional polygons and their defining properties. Students also use coordinate geometry to examine regular polygons, or those with pairs of parallel or perpendicular sides.

Geometric Solids demonstrates the identification, drawing, and construction of three-dimensional geometric figures; recognition of the front, side, and back views of three-dimensional figures; and representations of three-dimensional figures from front, top, and side views.

Congruence and Similarity teaches students how to identify the conditions that make two shapes congruent; solve problems involving the congruence of shapes; identify whether a figure will tile a plane; examine the congruence, similarity, and line or rotational symmetry of objects using transformations; and represent, analyze, and describe enlargements and reductions.

Transformations further student knowledge of transforming geometric figures; creating, analyzing, and describing designs using translations (slides), rotations (turns), and reflections (flips); using ordered pairs in all four quadrants of the coordinate grid with translated and reflected images; examining the congruence, similarity, and line or rotational symmetry of objects using transformations; and more.

Symmetry examines the use of mathematical language to effectively describe lines and planes of symmetry and the congruence, similarity, and line or rotational symmetry of objects using transformations.

Pythagorean Theorem investigates the Pythagorean relationship using area models and diagrams; the application of the Pythagorean relationship to numerical problems involving area and right triangles; how to calculate the length of the third side of a right triangle; how to create and critique inductive and deductive arguments concerning geometric ideas and relationships; and more.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.
The Quiz tests students' abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(zes).

**Percent Concepts**

*Welcome to Percent* introduces students to some basic, introductory information about percents and their applications.

*Understanding Percent* provides useful examples of how percents are calculated and used.

*Operations with Percent* shows how to use percents to solve problems in meaningful contexts including discounts, sales tax, commission, and simple interest; solve problems that involve converting between fractions, decimals, and percents; calculate combined percentages in a variety of meaningful contexts; estimate and calculate percentages; and more.

*Problem Solving and Communication* shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(zes).

**Whole Numbers and Integer Concepts**

*Welcome to Whole Numbers and Integers* gives a general introduction to the origin of numbers and mathematical operations from various ancient cultures to modern times, and more.

*Understanding Whole Numbers* introduces students to multiples and factors of given numbers; how to represent whole numbers in expanded form using powers; and how to represent square roots concretely, pictorially, and symbolically. Students also learn how to estimate square roots of whole numbers; use factors, multiples, and prime factorization to solve problems; represent composite numbers as products of prime factors; and more.

*Understanding Integers* provides examples of integers and how they are used in real-life situations and shows students how to compare and order integers.

*Operations with Integers* teaches students to add and subtract integers; represents the addition and subtraction of integers using concrete materials, drawings, and symbols; and promotes the understanding and use of inverse relationships of addition and subtraction, multiplication and division, and squaring. It also shows how to find square roots to simplify computations and solve problems; apply the order of operations; estimate, compute, and verify the sum, difference, and product of integers; and more.

*Problem Solving and Communication* shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(zes).

**Data Management Step-by-Step**

*Welcome to Data Management* shows learners the three basic steps of statistics and examples of careers that use statistics.

*Collecting Data* introduces methods for data collection and defines statistics terms. Students learn how to sample populations and to design and conduct a study for a selected audience.

*Organizing and Representing Data* instructs students how to select charts and graphs that easily communicate their findings from collected data.

*Analyzing and Interpreting Data* teaches different ways to interpret data using measures of central tendency as well as measures of variability. Students learn to figure mode, mean, and average; rank numbers; compute quartiles; and compare and interpret data sets.

*Problem Solving and Communication* shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(zes).

**Probability Step-by-Step**

*Welcome to Probability* teaches students the concepts of chance and likelihood, how to make decisions based on probability, and the mathematics of probability. Careers that use probability are introduced.

*Charts and Trees* uses visual aids such as charting and listing to determine all possible combinations and outcomes. Students practice figuring probability by creating and using chart and tree diagrams.

*Experimental Probability* explores probability through dice, coins, and card games. Students learn to determine probability via research and data collection.

*Theoretical Probability* instructs learners how to use mathematical formulas to predict what should happen. Students distinguish between simple events and events with multiple outcomes, evaluate die congruency and bias, and compute theoretical probability.
Complex Events emphasizes differences between independent, dependent, and complementary events. Students solve event problems and compute probability figures based on what they have learned.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(izes).

Rate, Ratio, and Proportion Step-by-Step
Welcome to Rate, Ratio and Proportion demonstrates how people use proportions to make estimates in sports and recreation. Students find patterns, identify equivalent fractions, and identify fractions in lowest terms. Real-world scenarios that use rate, ratio, and proportion at home, work, and play are reviewed.

Rate introduces unit, equivalent, and converted rates. Students use estimation to justify the reasonability of calculations and test their typing rate in words per minute.

Ratio and Proportion defines ratios and demonstrates ways to write them. Students answer questions on ratio, proportion, and estimation.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(izes).

Measurement Step-by-Step
Welcome to Measurement introduces practical, everyday situations in which measuring is necessary and careers in which measuring is integral.

Length focuses on history of measurement, introduces metric conversions, and demonstrates the measurement of perimeter, radius, diameter, and composite shapes.

Area presents methods of measuring the area of shapes such as rectangles, parallelograms, triangles, circles, and composite shapes in problem-solving situations.

Surface Area defines surface area and its measurement in practical demonstrations.

Volume introduces how to measure the volume of rectangular and triangular prisms as well as cylinders.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(izes).

Fractions Step-by-Step
Welcome to Fractions demonstrates the daily use of fractions, and students identify factors and multiples. Students also answer practical questions and explore careers that use fractions.

Understanding Fractions focuses on defining and presenting proper, improper, mixed, and equivalent fractions. Students reduce fractions to lowest terms, plot fractions on a number line, compare and order fractions, and answer questions about what they’ve learned.

Operations with Fractions teaches students to add, subtract, multiply, divide, convert, and estimate fractions. This section introduces associative, distributive, and commutative properties as well as square roots, exponents, and the order of operations with fractions.

Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(izes).

Decimals Step-by-Step
Welcome to Decimals identifies the relationship between decimals and fractions and careers that frequently use decimals.

Understanding Decimals emphasizes understanding decimal concepts through visual aids and number lines. Place value, square roots, expanded form, comparison and ordering, and terminating and repeating decimals are emphasized.

Operations with Decimals teaches students to add, subtract, multiply, divide, and convert decimals. This section introduces associative, distributive, and commutative properties – as well as the order of operations – with decimal examples.

Scientific Notation defines scientific notation, gives examples using exponents, and provides questions along with answers and explanations.
Problem Solving and Communication shows students how to apply strategies they have learned to practice problems. Students answer questions, get immediate feedback, and receive explanations for correct answers. A review of how to approach problem solving is provided.

The Quiz tests students’ abilities to apply the skills they have learned. Students may take a practice quiz, a sample quiz, and/or the teacher’s quiz(ies).
Graphing Concepts 76MC

Grade Levels

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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Skills

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<thead>
<tr>
<th>Skills</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore the X, Y coordinate grid system</td>
<td></td>
</tr>
<tr>
<td>Name coordinate points as ordered pairs</td>
<td></td>
</tr>
<tr>
<td>Plot points on a coordinate grid</td>
<td></td>
</tr>
<tr>
<td>Investigate relationships between a figure and its translated, reflected, and rotated image</td>
<td></td>
</tr>
<tr>
<td>Explore numerical relations and ordered pairs</td>
<td></td>
</tr>
<tr>
<td>Interpolate and extrapolate coordinate values for integers and decimals</td>
<td></td>
</tr>
<tr>
<td>Construct graphs of linear relations</td>
<td></td>
</tr>
<tr>
<td>Calculate the slope of a line</td>
<td></td>
</tr>
<tr>
<td>Find X and Y intercepts</td>
<td></td>
</tr>
</tbody>
</table>

Introduction

In *Graphing Concepts*, also part of the *Math Concepts* series, students investigate how data, shapes, and the slope of a line are plotted and displayed on a coordinate grid. They gain practical experience manipulating a figure and its image through reflections, rotations, and translations.

Using Graphing Concepts

The following instructions will show you how to complete the program from a student’s perspective.

After logging into the program, you’ll see the *Graphing Concepts* main menu.

Interactive Tutorials

Graphing Concepts has five tutorials. Each tutorial focuses on a different skill and has a variety of in-depth lessons.

1. From the main menu, click on Tutorial.

2. Click on one of the Skills buttons.
   - In Skill 1, students learn about the coordinate plane, the X axis, the Y axis, the origin, quadrants, coordinates, and ordered pairs. Students give the coordinates of points on the coordinate plane and locate ordered pairs on the plane.
   - In Skill 2, students explore transformations (translations, reflections, and rotations) of geometric shapes.
   - In Skill 3, students learn about relations, domains, and ranges. They graph ordered pairs and explore both linear and nonlinear relationships.
   - In Skill 4, students interpolate and extrapolate coordinate values.
   - In Skill 5, students learn about the equation of a line, including the slope and the Y intercept.

3. Use these buttons and follow the on-screen instructions to complete the skills and activities:
   - Move backward one screen in the current skill.
   - Move forward one screen in the current skill.
   - Access the journal.
   - Access the online calculator.
   - Replay for another question (Practice and Tutorial modes).
   - Submit an answer/register a response.
   - Return to the main menu.
The tutorials frequently pause during a skill lesson to give you the opportunity to look at another example or to try a question on your own.

**Practice Mode**

The Practice mode allows you to select the types of questions you want to practice. Use the buttons at the bottom of the screen to check your work and control your practice session. Because the Practice mode does not record performance data, you can try several problems of the same question type before moving on to another question type. The computer offers immediate feedback when you submit your answers, and it also shows the correct answer after an unsuccessful attempt.

1. From the main menu screen, click on Practice.
2. Click on a Skill number button on the main menu screen.
3. Follow the on-screen instructions to answer each question.
4. Click OK after completing a problem to check your answer.
   - Correct answers receive a yellow checkmark.
   - For an incorrect attempt, the correct answer is displayed for you.
5. To move to other question types within the Skill, click the arrow buttons. You may click Replay to generate another question with different numbers and/or information.
6. When you are finished with the practice, click Exit.

**Test Mode**

All questions in the Test mode are tracked, and scores are recorded in the management system. The Test mode is designed to be continuous. Once the test is started, one question from each question type is presented. Each question type can have multiple items that are scored and included as part of the overall test score. Note that there are five separate tests—one for each skill on the main menu.

1. From the main menu screen, click on Test.
2. Click on one of the Skills buttons on the main menu screen.
Enter an answer for each question item on the screen.

Click the right arrow to move to the next question type.

Note: The computer only scores question items that are seen by you. Clicking the right arrow to move to the next screen (or question type) designates those question items as being seen, regardless of whether or not you enter answers for them.

If you wish to stop the test, click End Test.

Choose one of the following options:

- Click OK to score your test and display the Report button.
  
  Note: Click the Report button to view the Test Report screen, and then click Exit to return to the main menu.

- Click Cancel to return to the current question screen.

If you wish to print the results of your test, click the Print button.

Click OK to exit the Test Report screen and return to the main menu.

Journal

The journal gives students a way to express their knowledge and problem-solving methods for a particular skill. The teacher can gain valuable insight into the thinking process a student used to arrive at a solution and his or her overall understanding of the concept. This information can be shared at progress conferences with both parents and students.

Each new journal entry is automatically assigned the current date. Teachers can read student journal entries by having the student print them out. Entries remain available in the Orchard Manager until they are deleted.
Introducing the Journal

For many students, the journal may be a new experience, and it is important to establish expectations or guidelines for its use. Below is a five-step approach.

1. Discuss the purpose and benefits of consistent journal writing:
   • Enables private communication of ideas and questions
   • Builds confidence within a student
   • Encourages students to clarify their thoughts and ideas
   • Allows students to express alternative problem-solving approaches and methods

2. Set firm guidelines and expectations about making entries in and maintaining the journal.
   Assure your students that you will faithfully read their journals and respect their feelings and concerns. Some form of response by you is vital to student journal writing.

3. Provide class time for journal writing several times a week.
   It is not necessary for students to write in their journals every day. However, give each student a chance to work in the journal on a regular basis.

4. Design a format or template for students to follow:
   In other words, how do you want students to enter information? Will you pose questions for them to answer? Etc.

5. Assign a variety of journal entries periodically to encourage students to express themselves.
Algebra 187MC-190MC

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebraic Foundations 187MC</td>
<td></td>
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<tr>
<td>Funct., Geometric, &amp; Stat. Relationships 188MC</td>
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<td>Linear Relations 189MC</td>
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<tr>
<td>Quadratic Relations 190MC</td>
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</tbody>
</table>

Algebraic Foundations

**SKILLS**

- Identify integers and rational, irrational, and real numbers
- Justify steps used in simplifying expressions and solving inequalities
- Find the square root of a number
- Evaluate numerical expressions
- Determine the meaning of negative exponents and zero as an exponent
- Perform operations using the laws of exponents
- Represent a rational number with a decimal
- Translate verbal expressions into algebraic expressions
- Add, subtract, and multiply monomials and polynomials
- Apply basic factoring techniques
- Simplify algebraic expressions using the order of operations
- Solve linear equations
- Solve multi-step inequalities
- Use the commutative, associative, and distributive properties to simplify algebraic expressions
**Functional, Geometric, and Statistical Relationships**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions</td>
<td></td>
</tr>
<tr>
<td>Determine whether a relation defined by a graph, set of ordered pairs, or a symbolic expression is a function</td>
<td></td>
</tr>
<tr>
<td>Determine independent and dependent quantities in functional relationships</td>
<td></td>
</tr>
<tr>
<td>Identify domains and ranges</td>
<td></td>
</tr>
<tr>
<td>Identify zeroes of a function and confirm them using graphs</td>
<td></td>
</tr>
<tr>
<td>Calculate interior and exterior angles of triangles, quadrilaterals, and other polygons</td>
<td></td>
</tr>
<tr>
<td>Calculate surface area and volume of prisms, pyramids, cylinders, cones, and spheres</td>
<td></td>
</tr>
<tr>
<td>Learn principles of sampling and surveying</td>
<td></td>
</tr>
<tr>
<td>Identify trends and relationships among data</td>
<td></td>
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<tr>
<td>Determine the equation of a line of best fit for a scatter plot</td>
<td></td>
</tr>
<tr>
<td>Represent data from practical problems in matrix form</td>
<td></td>
</tr>
<tr>
<td>Compare and contrast multiple one-variable data sets using statistical techniques</td>
<td></td>
</tr>
</tbody>
</table>

**Linear Relations**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graph a linear equation and compute the X and Y intercepts</td>
<td></td>
</tr>
<tr>
<td>Derive linear equations using the point-slope formula</td>
<td></td>
</tr>
<tr>
<td>Distinguish between an equation of a straight line and an equation of nonlinear relation</td>
<td></td>
</tr>
<tr>
<td>Convert a linear equation from standard form to slope-intercept form</td>
<td></td>
</tr>
<tr>
<td>Determine the slope of a line segment using various formulas</td>
<td></td>
</tr>
<tr>
<td>Identify the slope of a linear relation as representing a constant rate of change</td>
<td></td>
</tr>
<tr>
<td>Learn the differences between linear relations and nonlinear relations</td>
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</tr>
<tr>
<td>Understand the ways in which linear functions may be represented</td>
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</tr>
<tr>
<td>Determine slopes from graphs, tables, and algebraic representations</td>
<td></td>
</tr>
<tr>
<td>Graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and Y-intercept</td>
<td></td>
</tr>
<tr>
<td>Recognize equations that represent lines</td>
<td></td>
</tr>
<tr>
<td>Graph a linear inequality</td>
<td></td>
</tr>
</tbody>
</table>

**Quadratic Relations**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>7-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify and solve quadratic equations</td>
<td></td>
</tr>
<tr>
<td>Understand the ways of solving a quadratic equation</td>
<td></td>
</tr>
<tr>
<td>Solve quadratic equations using factoring, the quadratic formula, the method of isolation, and “completing the square”</td>
<td></td>
</tr>
<tr>
<td>Determine the value of one or more unknowns from quadratic graphs</td>
<td></td>
</tr>
<tr>
<td>Determine the equation of a curve of best fit</td>
<td></td>
</tr>
<tr>
<td>Analyze/graph quadratic functions</td>
<td></td>
</tr>
<tr>
<td>Understand that graphs of quadratic functions are affected by the coefficients of the function</td>
<td></td>
</tr>
</tbody>
</table>
Introduction

The following Math Concepts algebra programs provide interactive lessons, activities, exercises, and assessments that introduce the basic concepts of algebra. Students progress through a series of tutorials and corresponding activities. The tutorial emphasizes real-world problem solving and career scenarios using algebra. Students then complete applications and/or quizzes that test skill mastery.

In Algebraic Foundations, students explore polynomials, factoring, rational expressions, equations, and inequalities. Among other skills, students will learn to represent verbal quantitative situations algebraically and to evaluate these expressions. Students will also use the commutative, associative, and distributive properties to simplify algebraic expressions.

In Functional, Geometric, and Statistical Relationships, students investigate functions and geometric and statistical relationships. Students will determine whether a relationship defined by a graph, set of ordered pairs, or a symbolic expression is a function; describe independent and dependent quantities in functional relationships; explore angles, triangles, polygons, and calculate surface area and volume; and learn how to collect, organize, and analyze data.

Linear Relations helps students understand and use linear functions, systems, and inequalities including slope and intercepts, interpolation and extrapolation, substitution and elimination, and others.

In Quadratic Relations, students solve equations using quadratic equations and functions. Students also will determine the value of one or more unknowns from a variety of quadratic graphs, determine realistic values for the domain and range of a quadratic function, and extrapolate using a curve of best fit.

Using Math Concepts - Algebra

The following instructions will show you how to complete the programs from a student’s perspective.

After opening a program, you will see the main menu.
Select a quiz type.

In the Practice Quiz, students practice answering the types of questions they may find on a quiz and get immediate feedback on their answers, including explanations for correct answers. The Show Answer option allows students to view correct answers. Students may select topics to practice.

Sample Quiz allows learners to continue practicing skills on the topic they have chosen. Students progress through a series of questions. A number of questions are provided; however, the values in the questions are randomized. Therefore, the sample quiz can be retaken. Student scores are tracked, but no answers or explanations are available. Click Sample Quiz and follow the instructions on your screen.

Teacher’s Quiz shows learners a list of quizzes created by the teacher. The teacher must pre-select a set of questions for students to access a Teacher’s Quiz. The values in the questions are randomized; therefore, a Teacher’s Quiz can be retaken. Student scores are tracked, but no answers or explanations are available. (See Program Parameters for information on how to set up quizzes.)

If you opted to take a Practice Quiz, select a Question Set from the available list by clicking the radio button next to your choice.

A list of subtopics appears.

Click on a subtopic from the list.

The Question Descriptor indicates the skill(s) tested by the quiz.

Click Do Question and follow the instructions on your screen to complete the Practice Quiz.

Click these buttons for question results:

- **Show Answer**: View the correct answer(s).
- **Mark**: See if your answers are correct.
  - X = Incorrect
  - √ = Correct
- **Explain**: View an explanation for the correct answer.

Click Menu to select another question, or click it again to view your score. Click OK to return to the list of subtopics.

Note: Click Replay to receive another question type like the one you just answered with different numbers.

**Records**

Students may view results of their activities and quizzes along with a report of the date, time, and duration.

Access the journal from within any tutorial subtopic by clicking the Tools button.

The Tools menu appears.

Select the appropriate modules.

Click either Activity or Quiz to view the appropriate report(s).

Click Close to return to the Reports screen, and click Close again to return to the main menu or subtopic menu screen.

Note: The Records option is not available in guest mode.

**Journal**

The journal gives students a way to express their knowledge and problem-solving methods for a particular skill. Teachers may read student journal entries by having the student print them out. There is no limit to the number of entries in a student’s journal file. Entries remain in a student’s journal file until they are deleted.

Access the journal from within any tutorial subtopic by clicking the Tools button.

The Tools menu appears.
2 Click Journal.
The Journal appears.

<table>
<thead>
<tr>
<th>Journal: Journal Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Jane</td>
</tr>
<tr>
<td>Date: 07/29/2005</td>
</tr>
<tr>
<td>1. Explain your solution to this problem.</td>
</tr>
<tr>
<td>2. Are there any alternative solutions?</td>
</tr>
<tr>
<td>3. Pass another question of this type.</td>
</tr>
<tr>
<td>4. Suggest other examples.</td>
</tr>
<tr>
<td>5. Justify your choices.</td>
</tr>
<tr>
<td>6. Develop other puzzles.</td>
</tr>
<tr>
<td>7. Summarize your conclusions after using a mathematical explorer.</td>
</tr>
<tr>
<td>8. Evaluate your herearchical reasoning in the the solution to this problem.</td>
</tr>
<tr>
<td>9. Provide directions in the solution to this problem after examining another student’s work that contained errors or incomplete solutions.</td>
</tr>
</tbody>
</table>

3 Type your text using the keyboard.

4 Use the following options to manage the journal:

- **New**: Open a new, untitled, and unsaved journal file.
- **Open**: Locate and open an existing journal file.
- **Save**: Save new changes made to the journal file.
- **Save As**: Name or rename and save the journal file. File names must be fewer than 22 characters long and consist of letters and numbers with no spaces between them.
- **Delete**: Delete the journal file by selecting the journal entry you wish to remove, and clicking Delete.
- **Print**: Open the Print dialog box to print the journal file.
- **Menu**: Return to the previous screen in the program.

**Glossary**

1 Access the glossary from within any subtopic by clicking the Tools button.

2 On the Tools menu, click Glossary.
The Glossary appears.

3 Click on a letter at the top of the screen.
A list of terms appears.

4 Click on the appropriate term.
The term’s definition appears (often with an example).

5 Use the following options on your screen to navigate the Glossary:

- **Back**: Return to the previous term or screen.
- **Audio**: Listen to (or repeat) a reading of the text on the screen.
- **DONE**: Select the Automatic Audio check box on the Tools menu to have the text on each screen read automatically without having to click the Audio button.
- **Back**: Use the arrow keys to scroll backwards or forwards through glossary terms.

Return to the previous tutorial section.
Program Parameters

Program parameters provide a means for teachers to adjust program settings to customize student and class options.

1. To change the parameters for this program, log into the Orchard Manager as a teacher.

2. Select a class, and then click OK.

3. Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

   The Program/Test Parameters screen appears.

4. Select an Algebra program. You have the following options:

   - **Edit** allows you to manage tutorial and quiz options. (See “Editing Student or Class Parameters.”)
   - **Reset Defaults** returns parameters to original settings; that is, all topic/subtopic options are available, audio options are disabled, and all quizzes you created are deleted. (Class only.)
   - **Delete Parameters** allows you to delete settings for a particular program, restoring the settings to their defaults. (Student only.)
   - **Copy From...** copies another class’s parameters to the class you select. (Class only. See “Copying Class Parameters” below.)

   **Done** exits the Program/Test Parameters screen.

Copying Class Parameters

1. Follow the previous “Program Parameters” instructions to access the Program/Test Parameters screen.

2. Select the program or pretest that you wish to copy parameters to, and then click the Copy From... button. The Copy Program Parameters screen appears.

3. Select the class name and program that you wish to copy from, and then click OK.

Editing Student or Class Parameters

1. Follow the previous “Program Parameters” instructions to access the Program/Test Parameters screen.

2. Select the appropriate program, and then click the Edit button.

   The settings screen appears.

3. Select audio options, as follows:

   - **Automatic Audio checkbox**—Select so students MUST listen to audio. The text is read aloud from every screen.
   - **Disable Audio checkbox**—Select so students do not have the option to listen to audio. The Audio button will be removed from student tutorials, and the individual student’s Automatic Audio option will be missing or inaccessible from the Tools menu.

4. Choose which topics/subtopics students may access by selecting the appropriate checkboxes.

   - **Notes:** Select subtopics by clicking on the topic and then selecting the appropriate checkboxes next to the subtopics.
   - **Click the Skills button on the subtopics screen to view skills for each topic.
   - **Click Menu to return to the settings screen. You will have the option to save your changes before you exit.

5. Click Save to save your changes, or click Exit.

Editing and Creating Quizzes

1. Follow the previous “Editing Student or Class Parameters” instructions to access the settings screen.

2. Click the Edit Quizzes button.

   The Teacher’s Quiz Manager screen appears.
3 Click New to create a new quiz, or select a quiz and click Edit to make changes to an existing quiz.

The Teacher’s Quiz Creator screen appears.

4 Select a Question Set, and then select a question type from the list on the right. 

Note: All questions are taken from the student Practice Quizzes listed in the program’s subtopic menu (see “Quiz”).

5 Use these buttons to create or edit a quiz:

- Save Quiz: Save any changes.
- Preview: Preview and answer a question before deciding to add or discard it.
- Add Question: Add a question.
- Remove: Remove a question.
- Menu: Return to the previous menu.

6 Click Add Question to add the question to your list, and continue to select questions and click Add Question until all appropriate questions have been added.

7 Click Save Quiz to save your quiz questions. The Quiz Naming screen appears.

8 Enter a quiz name. If you are editing a quiz, enter the same quiz name. If desired, enter an optional password.

9 Click Save. If you are editing a quiz, click Yes to save the changes.

The new/edited quiz appears on the teacher’s list and will appear on the students’ list of quizzes to choose from.

Deleting a Quiz

1 Follow the previous “Editing Student or Class Parameters” instructions to access the settings screen.

2 Click the Edit Quizzes button to delete student quiz options.

The Teacher’s Quiz Manager screen appears.

3 Select the appropriate quiz, and then click Delete. A dialog box appears, asking, “Are you sure you wish to delete this quiz?”

4 Click Yes to delete the quiz.

Viewing Class Results

1 Follow the previous “Editing Student or Class Parameters” instructions to access the settings screen.

2 Click the Edit Quizzes button.

The Teacher’s Quiz Manager screen appears.
3 Select the appropriate quiz, and then click Class Results.
   The Teacher’s Quiz Class Results screen appears.

4 Select the appropriate topic to view or print class results,
   including mean, median, and standard deviation.

5 Click Class Scores in order to view or print a list of
   individual student scores.
   The Teacher’s Quiz Class Scores screen appears.

6 Click Menu until you return to the settings screen. Click
   Exit to exit the program parameters, or click Save and
   skip to step 8.
   A dialog box appears.
   ![Dialog Box]
   Do you want to save the changes
   you have made to the settings
   before you exit?
   [Exit] [Save]

7 Click Save to save your changes.

8 Click Yes or No to determine whether your changes will
   affect students who have already accessed this program
   (class only).

9 Click Done to exit the Program/Test Parameters screen.

---

**Subtopics Summary**

### Algebraic Foundations

**Numbers** introduces and defines integers, rational and irrational numbers, squares and square roots, power evaluation, exponent laws, powers less than 1, and scientific notation. Associative and closure properties are introduced as well as exponential, expanded, and standard forms.

**Polynomials** introduces variables in equations and formulas, equivalent expressions, and the distributive property. It also teaches adding, subtracting, multiplying, and simplifying monomials, binomials, trinomials, and polynomials.

**Factoring** teaches students how to use the greatest common factor to solve equations. Also emphasized is factoring using difference of squares, perfect squares, and simple, complex, and multi-step trinomials.

**Rational Expressions** teaches multiplying, dividing, adding, and subtracting rational expressions after defining these expressions using examples. Students learn to solve optimization problems, avoid undefined values, and use restrictions when simplifying.

**Equations** instructs students to translate words and expressions into mathematical models by correlating variables and math expressions to story problems. Students build mathematical models, solve equations, identify the lowest common denominator, use substitution, rearrange formulas, and solve real-world exercises. A journal exercise is provided.

**Inequalities** defines inequalities and introduces learners to the similarities and the one exception to solving an inequality versus solving an equation.

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### Functional, Geometric, and Statistical Relationships

**Functions** introduces and defines mathematical relations, sets of ordered pairs, functions, vertical line tests, domain, range, and independent and dependent variables. Students identify functions, domain, range, other values, and zeros in the following forms: sets of ordered pairs, tables of values, graphs, lists, and word descriptions. Concepts of function continuity and notation are introduced along with methods of problem solving using square roots, denominators, implicit restrictions, and other equation challenges.

**Geometric Relationships** introduces students to various types of angles and teaches them how to compute angles of parallel lines, transversals, and shapes. Students learn how to solve mathematical problems involving triangles, quadrilaterals, and polygons. Additionally, students calculate the volume and surface area of triangles and circles as well as three-dimensional and composite shapes.
Statistical Relationships introduces students to collecting data, forming research questions and hypotheses, and categorizing data. Students identify qualitative, quantitative, discrete, and continuous variables as well as methods of data collection including census, simple and stratified methods, and random and multi-stage random samples. Additionally, students identify means of organizing data including graphs and tables. Students analyze data using measures of central tendency, range, comparison of data sets, scalar matrix manipulation, and matrix addition, subtraction, and multiplication operations. Students also use line of best fit to predict data.

Linear Relations

Linear Functions introduces the concepts of working with a coordinate graph, equations, and tables of values. At the end of these tutorials, students will be able to determine parts of linear graphs, identify linear functions by differences and points that lie on a function, calculate slope and identify types of slope, determine the equation of a line from two points, and graph equations. Students also learn direct and partial variation, how to identify and convert the general form of a linear equation, how to identify horizontal and vertical lines from equations, and how to interpolate and extrapolate. Application problems and a problem-solving review are provided.

Linear Systems defines systems of equations and introduces methods to solve them by using tables of values, graphing, substitution, elimination, and identifying when there is no solution. Application problems give students a chance to practice what they’ve learned.

Linear Inequalities teaches students to define and graph linear inequalities and linear inequality systems. Application problems give students a chance to practice what they’ve learned.

Quadratic Relations

Quadratic Equations introduces and defines quadratic equations and their key properties. Students identify quadratic equations, roots, and discriminants, and then students solve by isolation, factoring, the zero principle, completing perfect squares, and the quadratic formula. An applications section tests skill mastery.

Quadratic Functions defines quadratic functions and their relationship to quadratic equations. Students learn how to graph vertical stretches and translations, reflections, horizontal translations, and the curve of best fit. An applications section tests skill mastery.
**Percents: Mixed Practice 12LG**

**Enrichment**

**Core**

**Remedial**

<table>
<thead>
<tr>
<th>Grade Levels*</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>Percents: Mixed Practice 12LG</td>
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</table>

* See the Scope and Sequence chart at the end of this chapter for the types of problems covered in this program.

**Introduction**

In *Percents: Mixed Practice*, students find a percent when a number is known or unknown, calculate decimal/percent equivalents, rewrite percent problems as equations and solve them, and rewrite fractions or decimals as percents and vice versa.

**Using Percents: Mixed Practice**

The following instructions will show you how to complete the program from a student's perspective.

1. After logging into the program, the Second Player box appears. Choose whom you would like to play against by clicking the appropriate button: Another Player, Guest, or Computer.

   If you choose...
   - **Another Player**, the second student may type his or her username (and password if the student has one). Click OK. (The student’s full name will appear on the game screens.)
   - **Guest**, the guest may enter the name by which he or she would like to be called. (No progress data are saved for Guest players.)
   - **Computer**, the learning game will automatically begin.

2. The Game Type screen appears.

3. Choose a game and click OK.

   For detailed information about the skills covered in each game, refer to the Scope and Sequence chart at the end of this chapter.

4. Enter team names in the fields provided.

5. When both team names have been entered, click OK.

   Each game begins with a coin toss. The computer randomly picks which team wins the coin toss and receives the football first. As soon as you click OK, the kickoff begins the game.

**The Scoreboard**

The scoreboard displays both teams' names and their scores. Down, Yards To Go, and On Line (yard line) are updated after each play.

The scoreboard also displays Time Left. The clock always runs while you solve problems. It may also be set to run while you read messages and pick your plays; in this case, the clock runs continuously.

**Object of the Game**

The object of the game is to score touchdowns by moving the football down the field and across your opponent's goal line. You have four plays in which to move the ball 10 yards. If you do not gain 10 yards in four plays, the other team gets the ball. You gain yards on a play by entering the correct answer to a math problem.
Choosing Your Play
A football player appears in the Team Name box when it is that team’s turn to answer.
On your turn, choose a play and click OK.

• If you choose a running play, you get an easy problem. If your answer is correct, you gain 1 to 4 yards.
• If you choose a short pass, you get a problem of medium difficulty and gain 9 to 13 yards with a correct answer.
• If you choose a long pass, you get a hard problem and gain 20 to 30 yards with a correct answer.
• If you choose to punt, the punt may be 30 to 41 yards long, or it may be blocked; the other team gets the ball after a punt.

Entering Your Answers
After you pick your play and click OK, a problem and an answer box appear above the scoreboard.

Time limits are enabled by default (see Program Parameters). The number of seconds you have to enter an answer are counted down for you; otherwise, you may take as long as you need to enter your answer. The time limits may be set so that more time is allotted to answer easy (run), medium (short pass), and hard (long pass) problems.

• Enter your answer into the box provided. Select “How to Enter Answers” from the Instructions menu for tips on how to enter your answers.
• After entering your answer, click OK.

If your answer is correct, you gain yards based on the difficulty of the play you chose. If your answer is incorrect and the time limits are enabled, the other team has 16 seconds to enter an answer; otherwise, the other team may take as long as it needs to enter an answer. If the other team’s answer is correct, you lose yards or possession of the ball. If the other team’s answer is also incorrect, you replay the down.

Click Time Out (if enabled in the program parameters) when answering a problem to view a tutorial for problem-solving. The tutorial corresponds with the game level of difficulty. Click OK when you are ready to return to the game.

Scoring
If you score a touchdown, you earn six points.
After you score a touchdown, you may choose to kick for the extra point or pass for the two-point conversion.

• If you choose to attempt the extra point, you solve a problem of medium difficulty. If your answer is correct, you score one point.
• If you choose to attempt the two-point conversion, you solve a hard problem; if your answer is correct, you score two points.
Ending
The game ends when playing time runs out or when you choose the End Game command from the Game menu.

1. Click OK on the game screen to see performance data for each player.

   These data tell how many of each type of problem you attempted, how many you solved correctly, and the percent correct.

   Performance data for each player are automatically saved in the students’ records.

2. If you wish to quit playing and return to the Orchard Manager, click the Exit button.

3. If you would like to play another game, click Play Again.

Playing Again
If you choose to play again, the team names and game type remain the same unless you change them.

1. To enter new team names, use the Change Names of Teams command in the Game menu.

2. To change the type of game, use the Change Game Type command in the Game menu.

Quitting
Use the Quit command from the program menu (Mac OS X) or Exit command from the Game menu (Windows) to return to the Orchard Manager.

The Menu Bar
For Windows users, the Game, Instructions, Tools, and Help menus are accessible from the menu bar during a game.

For Mac OS X users, the Game and Instructions menus are available during a game. Rather than a Help menu, select About... from the program menu at the top of the screen to access program information. The Preferences menu replaces the Tools menu for Mac OS X users.

Game Menu
1. To change the names of teams, use the Change Names of Teams command at any time except during game play.

   You may change one or both teams’ names. You do not have to change players to change the teams’ names.

2. To select a different game type (High School, College, Pro, or Bowl game) and change the game difficulty level, select Change Game Type.

3. To end a game, select End Game.

   A winner is declared based on the total number of points, or, if the score is tied, on the total number of yards. If both teams have the same number of points and yards, no winner is declared, and the game is called a tie.

4. To return to the Orchard Manager, use the Quit option from the title menu at the top of the screen (Mac OS X), or select Exit from the Game menu (Windows).

Instructions Menu
1. To see the rules for playing the game, select Rules.

   Scroll to see all of the rules. Click OK to return to the game screen.

2. To see the guidelines for entering answers, select the How to Enter Answers command.

   Scroll to see all of the instructions. Click OK to return to the game screen.

Tools Menu (Windows) or Preferences (Mac OS X)
1. The General options allow you to turn the sound on or off and choose whether or not to allow timeouts.

   - Sounds are enabled by default.
   - Timeouts give assistance for problem-solving the item on your screen.
The initial settings allow time limits of 40 seconds for easy problems, 50 seconds for medium problems, and 60 seconds for hard problems.

*Note: Students are only allowed to change the time limits if the “Let players change time limits” box is selected by the teacher in the program parameters. See Program Parameters.*

4. Click OK to return to the game screen.

**Help Menu (Windows) or About... (Mac OS X)**

Select About... from the Help menu (Windows) or About... from the program menu (Mac OS X) to view program information.

Click OK to return to the program screen.

**Program Parameters**

1. To change the parameters for this program, log into the Orchard Manager as a teacher.

2. Click either Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

You will see a list of programs to choose from.


Several menus accessible from the Program Parameters are also available to students and are described in the previous section.

**Skills Menu**

This menu allows you to control the skill and difficulty levels of the problems presented to players during a game. The problems players are given during a game are randomly generated according to the specific criteria developed for each skill.

The High School, College, Pro, and Championship Bowl games each consist of three levels of problems: Easy, Medium, and Hard. To customize the program to meet individual needs, you may choose the skills you want to incorporate into each level of the High School, College, and Pro games.

The problems in the Bowl game come from the three other games in equal proportions; therefore, you control the skills in the Bowl game when you choose the skills in the other three games.

1. To set the skills for a game, select the desired game from the Skills menu.
Select or deselect the checkbox in front of each skill to enable or disable it in the game.

Click on the Difficulty Level tabs to view all of the skills for a game.

If you wish to view a sample problem for a given skill, click the Sample button next to that skill.

You may see a sample problem at any time, whether or not a skill is selected. The sample problems are randomly generated from within the program and will vary each time you select Sample. You may see as many sample problems as you want.

When you are finished selecting skills, click OK.

**Saving Changes**

To save changes you made to the program parameters, choose Exit from the Skills menu (Windows) or Quit from the program menu (Mac OS X).
## Percents: Mixed Practice 12LG (cont.)

### Scope and Sequence

<table>
<thead>
<tr>
<th>PERCENTS: MIXED PRACTICE</th>
<th>6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High School Game:</strong> fraction/percent/decimal equivalent</td>
<td></td>
</tr>
<tr>
<td>Easy problems (running plays): simple equivalencies</td>
<td></td>
</tr>
<tr>
<td>Rewrite percents as fractions</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite fractions as percents</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite percents as decimals</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite decimals as percents</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite whole numbers as percents or the reverse</td>
<td>•</td>
</tr>
<tr>
<td><strong>Medium problems (short passes): equivalencies</strong></td>
<td></td>
</tr>
<tr>
<td>Rewrite whole numbers as percents or the reverse</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite mixed numbers as percents or the reverse</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite whole percents &lt;10% as decimals or the reverse</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite whole percents &gt;100% as decimals or the reverse</td>
<td>•</td>
</tr>
<tr>
<td><strong>Hard problems (long passes): difficult equivalencies</strong></td>
<td></td>
</tr>
<tr>
<td>Rewrite percents as fractions: thirds, sixths, or eighths</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite percents as fractions: ninths, twelfths, fifteenths, or sixteenths</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite percents as mixed numbers: thirds, sixths, or eighths</td>
<td>•</td>
</tr>
<tr>
<td>Rewrite decimal percents as percents or the reverse</td>
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</tr>
<tr>
<td><strong>College Game:</strong> find a percent of a number</td>
<td></td>
</tr>
<tr>
<td>Easy problems (running plays): simple percents</td>
<td></td>
</tr>
<tr>
<td>Percent is 10%, 20%, 30%, ... 90%</td>
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</tr>
<tr>
<td>Percent is a whole number from 11% to 99%</td>
<td>•</td>
</tr>
<tr>
<td>Percent is 1%, 2%, 3%, ... 9%</td>
<td>•</td>
</tr>
<tr>
<td>Percent is 100%</td>
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<tr>
<td>Medium problems (short passes): harder percents</td>
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<tr>
<td>Percent is a whole number from 11% to 99%</td>
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</tbody>
</table>
### Percents: Mixed Practice 12LG (cont.)

<table>
<thead>
<tr>
<th>PERCENTS: MIXED PRACTICE (cont.)</th>
<th>6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent is 1%, 2%, 3%, ... 9%</td>
<td>●</td>
</tr>
<tr>
<td>Percent is 100%</td>
<td>●</td>
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<tr>
<td>Percent is 200%, 300%, 400%, ... 900%</td>
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</tr>
<tr>
<td>Percent is a whole number &gt;100%</td>
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<tr>
<td><strong>Hard problems (long passes): difficult percents</strong></td>
<td></td>
</tr>
<tr>
<td>Percent equals 1/3, 2/3, 1/6, or 5/6</td>
<td>●</td>
</tr>
<tr>
<td>Percent equals 1/8, 3/8, 5/8, or 7/8</td>
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<tr>
<td>Percent is a mixed number &lt;10%</td>
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<tr>
<td>Percent is a decimal number &lt;10%</td>
<td>●</td>
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<tr>
<td>Percent is a decimal number from 10% to 99%</td>
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<tr>
<td><strong>Pro Game: find the number when a percent is known or find the unknown percent</strong></td>
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<tr>
<td><strong>Easy problems (running plays): simple percents</strong></td>
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<tr>
<td>Percent is 10%, 20%, 30%, ... 90%</td>
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<td><strong>Hard problems (long passes): difficult percents</strong></td>
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<tr>
<td>Percent equals a fraction: thirds, sixths, or eighths</td>
<td>●</td>
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<tr>
<td>Percent is a mixed number &lt;10%</td>
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<tr>
<td>Percent is a decimal &lt;10%</td>
<td>●</td>
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<tr>
<td>Percent is a decimal number from 10% to 99%</td>
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**Math Word Problems: Advanced 18LG**

### Grade Levels

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<tr>
<th>Grade Levels</th>
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<th>2</th>
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### Skills

- Determine what operation or operations (addition, subtraction, multiplication, or division) to use in solving problems
- Identify key words that tell what operation(s) to use
- Solve word problems by using addition, subtraction, multiplication, division, or a combination of operations

### Introduction

*Math Word Problems: Advanced (or Word Problem Square Off)* is a two-player learning game that focuses on word problems using addition, subtraction, multiplication, and division. Each player determines the appropriate mathematic operation or operations and solves word problems to earn a chance to solve a mystery phrase by buying a vowel or guessing a letter.

The player chooses skills (if enabled in the Program Parameters) and the mystery phrase category. The player with the most points wins the game. Students may click Help on the game screens to view instructions on how to play the game and enter their responses.

### Using Math Word Problems: Advanced

The following instructions will show you how to complete the program from a student’s perspective.

1. After logging into the program, the Second Player box appears. Choose whom you would like to play against by clicking the appropriate button: Another Player, Guest, or Computer.
   - If you choose...
     - Another Player, the second student may type his or her username (and password if the student has one). Click OK. (The student’s full name will appear on the game screens.)
     - Guest, the guest may enter the name by which he or she would like to be called. (No progress data are saved for Guest players.)
     - Computer, the program will automatically begin.

2. The Word Problem Square Off welcome screen appears.
   - **Note:** If the “Character” Graphic Skin is selected in the Program Parameters, each player may choose a character to be for the game. Click on the character, and click OK.

   By default, Math Word Problems: Advanced does not ask you to choose a character to represent you. This option may be enabled in the program parameters. See the Program Parameters section for more information.

3. From the welcome screen, you will have the following options:
   - Click OK to begin.
   - Click Help to view information about how to play the game.
   - Note: If audio is enabled, you may position your cursor over a portion of text to hear it read aloud. Click OK to return to the welcome screen.
   - Click on the speaker button if you would like the sound On or Off. (By default, sound is enabled.)
   - Click New Game (where available) to begin a new game. The players will remain the same unless you Quit the program.
   - Click Quit to exit the program and return to the Orchard Manager. (A dialog box will appear, asking if you wish to quit. Click Yes or Cancel.)

4. Click OK to begin the game.
   - **Note:** If the “Character” Graphic Skin is enabled in the Program Parameters, each player may choose a character to be for the game. Click on the character, and click OK.
   - By default, Math Word Problems: Advanced does not ask you to choose a character to represent you. This option may be enabled in the program parameters. See the Program Parameters section for more information.

5. Choose up to two word problem skills from the categories (i.e., “addition and subtraction” and “multiplication and division”).
Note: You will only be able to select skills if “Allow the student to select the skills” option is selected in the Program Parameters (default option). You may choose one skill in each group at a time; that is, you may choose one skill from the addition and subtraction category and one skill from the multiplication and division category, but not two skills from one category. You must choose at least one skill to continue.

6 Next, choose one of the mystery phrase categories, and click OK.

7 The Help screen appears. You may access this screen at any time during the game by clicking the Help button on the right side of the screen.

Click OK to begin the game.

Note: If you wish to start a new game after you are finished playing a game or to start over in the middle of a game, click New Game. Click Yes at the dialog box asking if you wish to start a new game. You will return to the screen where you may select word problem skills.

8 The Mystery Phrase Board appears. The computer randomly picks which player goes first.

9 Click OK to begin the game.

The object of the game is to be the first player to correctly guess the Mystery Phrase. To earn a chance to guess individual letters or the phrase itself, you must correctly answer word problems.

Playing the Game
The Word Problem Board contains the word problem and an answer box.

1 Enter your answer using the keyboard.
   • If your answer has four or more digits, you may enter it with or without commas.
   • If you enter commas, they must be in the proper places.
   • Important: If the word problem involves units of measurement, you must enter those units with your answer if Require Units of Measure is selected in the program parameters. A list of the units of measurement required in the game is accessible from the How to Enter Answers instructions in the Help screen.

2 If the first player’s answer is incorrect, the second player has 25 seconds in which to enter an answer to the problem. If a player’s answer is correct, the circles surrounding the Word Problem Board start to flash in sequence.

3 Press the space bar to stop the flashing and to uncover a circle.
   The circle that is uncovered may give a point value, say “Lose a turn,” or say “Extra guess.”

4 Click OK to continue.
   If the circle said “Lose your turn,” you do not get to go to the Mystery Phrase Board. When you click OK, a problem for the second player appears in the Word Problem Board.

   If the circle contains points, the Mystery Phrase Board appears when you click OK, and those points are added to your total.

   If the circle says “Extra guess,” the Mystery Phrase Board appears when you click OK, and you receive one extra guess. You may use your extra guesses after you have been to the Mystery Phrase Board three times.
The Mystery Phrase Board shows your Mystery Phrase category and the points and extra guesses you have accumulated.

To guess a letter in the Mystery Phrase, click on the button containing the letter. Alternatively, use the keyboard to type the letter. If the letter is in the Mystery Phrase, it is placed in the proper square or squares. After you guess a letter, the button containing that letter is disabled so that you cannot select it again.

Note: Until you have answered three problems correctly, you may only guess a consonant. After you answer three problems correctly, you may guess a consonant, buy a vowel for 200 points, or guess the entire Mystery Phrase.

Click OK to continue.

If the second player answers correctly on his or her turn, he or she may get a chance to guess a letter in the Mystery Phrase. If the second player answers incorrectly, you will have a chance to respond to the question. (A timer will appear; you have 25 seconds to respond.)

Click OK to continue the game.

Once you have answered three word problems correctly, you have three options: you may guess a letter, buy a vowel, or guess the phrase.

If you choose to buy a vowel, 200 points are subtracted from your total. You guess a vowel in the same way you guess any other letter. If you choose to guess the phrase, you fill in each missing letter.

To guess the phrase:
- Click on the letter buttons to enter the missing letters or type them on the keyboard. You may also use the mouse to choose the square you wish to fill by moving the pointer to the square and then clicking on it.
- A blinking question mark appears in the box.
- Type the letter or click on the letter box to enter a letter.
- If you want to change a letter after you have entered it, click the original letter (it will flash) and type another letter.
- When you have filled all the squares, click OK to see if you have guessed the phrase correctly.
- If your response is not the Mystery Phrase, click OK to continue playing. If you guess correctly, you may earn enough points to win the game.

Note: During the game, you may accumulate one or more extra guesses. Once you have answered three word problems correctly, you are asked if you want to use an extra guess. If you do not choose to use an extra guess, the Word Problem Board appears with a word problem for the second player.

Ending the Game
The game ends when one player correctly guesses the Mystery Phrase or when you choose Quit.

If a player correctly guesses the Mystery Phrase, that player earns 1,000 bonus points. The winner is the player with the most points. If you both have the same number of points, the winner is whoever correctly guesses the Mystery Phrase.

Click OK to see the Score Board.
This screen tells how many of each type of word problem you answered correctly, how many you attempted, and the percent correct.
2 To quit playing and return to the Orchard Manager, use the Quit button.

Note: Performance data for each student are automatically saved in the student records in the Orchard Manager (but not for a player in Guest mode).

3 To play another game, click the New Game button.

Playing Again
If you choose to play again, settings remain the same unless you change them. Click New Game to play another game. You will return to the Skills menu or to the Score Board.

Changing Players
To change players, click Quit to return to Orchard Manager and log in to the program again.

Program Parameters
1 To change the parameters for this program, log into the Orchard Manager as a teacher.

2 Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

You will see a list of programs to choose from.

3 Select Math Word Problems: Advanced 18LG, and click Edit.

The Word Problems Setting screen appears.

4 Select “Allow the student to select the skills” (default option) if you wish to allow the student to choose the skills he or she wishes to use in the game. Alternatively, select “Use the skills selected below” if you wish to choose which skills the student will use in the game. Select the radio button(s) next to the skill(s) you wish the student to cover.

Note: During the game, word problem scenarios and numbers are randomly generated.

One-step word problems are problems that require only one operation to answer.

Two-step problems require two operations to answer.

In the addition and subtraction skill level, the two operations may be both addition, both subtraction, or one addition and one subtraction. In the multiplication and division skill level, the two operations may be both multiplication, both division, or one multiplication and one division.

Multi-step problems require two or more operations and may use any combination of addition, subtraction, multiplication, and division.

5 Select or deselect “Enable Voice and Sound” if you wish to enable the speaker button during the game. (This box is selected by default.)

6 Select “Require Units of Measure” to require students to enter proper units of measurement with their answers.

7 Under “Graphic Skin,” select Character if you wish to allow the student to choose a character to represent him or her during the game. Select Non-Character if you do not wish to enable this feature (default option).

8 Click OK to return to the Orchard Manager.
Perimeter, Area, & Volume: Mixed Practice 66LG

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
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</tbody>
</table>

**Skills**

- Find the perimeter of rectangles, squares, triangles, parallelograms, trapezoids, and other polygons
- Find the circumference of circles
- Find the area of rectangles, squares, triangles, circles, parallelograms, trapezoids, and other irregular figures
- Find the volume of rectangular prisms, triangular prisms, cylinders, rectangular pyramids, triangular pyramids, and cones
- Find the surface area of rectangular prisms, triangular prisms, cylinders, and rectangular pyramids
- Solve word problems involving perimeter, area, volume, and surface area

**Introduction**

*Perimeter, Area, and Volume: Mixed Practice* focuses on basic measurement of two- and three-dimensional objects. Students practice calculating the perimeters and areas of two-dimensional objects and the volumes and surface areas of three-dimensional objects.

Players choose skills to practice and move through the pyramid, solving math problems to obtain pieces of a secret formula.

**Using Perimeter, Area, and Volume: Mixed Practice**

The following instructions will show you how to complete the program from a student’s perspective.

**Choosing Your Skills**

After logging in to the program, you’ll see an introduction screen that provides the background information for the game.

**Note:** You will only be able to choose skills if Yes is checked in the Players Choose Skills command in the program parameters.

As soon as you check perimeter, area, volume, or surface area, a second dialog box appears.

1. Click the OK button.
2. Choose the skills required for game play from the dialog boxes that appear.
3. Choose specific figures and determine whether word problems are included, and then click OK.
4. Choose another skill if you want the problems in the game to represent several skills, or click OK if you are finished selecting skills.

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**The Story**

The evil Queen of Catanus has created a tantalizing soft drink—so tempting is the drink that even Catanus’ Cat can resist trying it. Soon the fur of every cat in the land is soft! The triumphant Queen invites a her pyramidal pyramid at the edge of the city, taking the formula for the mushroom with her.

You have been chosen by your fellow cats to enter the pyramid and find the formula. The Queen has turn it into five pieces and hidden every piece in each of the pyramid’s rooms. To make matters worse, she has put pieces from other formulas in the same rooms. If you can put together the correct combination of pieces, you will not return to normal, and you will be a hero. If you get it wrong...
Playing the Game

The Queen of Catopia has created a tantalizing drink. So tempting is the drink that not one Catopian cat can resist tasting it. Soon the fur of every cat in the land is blue! The triumphant Queen retreats to her pyramid at the edge of the city, taking the formula for the antidote with her.

You have been chosen by your fellow cats to enter the pyramid and find the formula. The Queen has torn it into five pieces and hidden one piece in each of the pyramid’s rooms. To make matters worse, she has put pieces from other formulas in the same rooms. If you can put together the correct combination of pieces, your fur will return to normal, and you’ll be a hero. If you get it wrong...

You begin outside the pyramid.

1 Click OK.
   The dungeon is the first of the five rooms you explore. In each room, search for a piece of the formula.

2 To move left or right, click the left and right arrow buttons or use the left and right arrow keys on the keyboard.

3 To look into or behind an artifact, click the magnifying glass button or use the space bar.

4 When asked if you would like to answer a question, click Yes or type Y to answer it, or click No or type N to skip the question.

5 Type your answer from left to right.

If the answer has more than four digits, you must enter it with commas. You also must enter the unit with your answer. To enter a superscript 2 or 3 (for squared or cubed), enter the number after the units. The number will automatically be superscripted.

Note: A list of the units of measurement required in the game are accessible from the How to Enter Answers command in the Instructions menu.

6 If you would like to change an answer, press the Delete key, or double-click on the answer and then type your new answer.

For each question you answer correctly, you get an ingredient for the antidote. Each of the first four rooms has two or three ingredients hidden somewhere in the room. If you answer a question correctly and get an ingredient you don’t want, you can continue looking in the room. When you find the other ingredient, you can answer a question to replace the first ingredient.

7 If you answer a question incorrectly, you may look at the artifact again to get another question.

If you choose to answer the sphinx’s question, a problem appears.
Ending the Game

The game ends when you get the last formula piece by correctly answering a question in the fifth room. The sphinx then reveals whether the formula you have pieced together returns all the cats to their natural colors or has some other unexpected effect.

1 When you click OK at the end of the game, your scores appear.

2 To quit playing and return to the Orchard Manager, click the Quit button. Performance data are automatically saved in the Orchard Manager’s student records.

3 If you would like to play another game, click Play Again.

Playing Again

When you select Play Again, the skills remain the same. If Yes in the Players Choose Skills command is checked in the program parameters, you may change the skills. To change the skills, use the Skills command in the Preferences menu.

Changing Players

1 To change players, use the Quit (Macintosh) or Exit (Windows) command in the File menu to return to Orchard Manager.

2 Log in as described in the Accessing Assignments section of this manual, using the new student names.

The Menu Bar

In the Macintosh version of this program, the File, Preferences, and Instructions menus are accessible from the menu bar during a game. In Windows, players can access these three menus, plus the About option (which contains the program version and credits).

File Menu

1 To access the Most Heroic Cats dialog box, select the Most Heroic Cats option. The Most Heroic Cats are the latest 10 players to have found the antidote.

2 To end a game, use the End Game command.

Preferences Menu

1 To turn the sound on or off, select Sound from the Preferences menu. The default setting is On.

2 To choose the kinds of problems to be used in the game, use the Skills command. The Skills command is accessible only if Yes is checked in the Players Choose Skills command. At the end of a game, if you choose to play again, the kinds of problems remain the same unless you change them from this command.

Instructions Menu

1 To see the story line for the game, select Story.

2 For instructions on how to enter your answers, select How to Enter Answers.

3 To see a formula and a sample problem, select the type of formula and then the specific geometric shape.
Program Parameters

1. To change parameters for this program, log into the Orchard Manager as a teacher.

2. Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

   You will see a list of programs to choose from.


   Five menus are accessible from Program Parameters. They are File, Preferences, Instructions, Options, and Skills. (The first three menus are accessible to students and are described earlier.)

Options Menu

1. To control the players’ use of the desktop calculator during the game, use the Calculator Desk Accessory command.

   This option is unavailable in the Windows version.

2. To determine whether or not players may choose the skills to be used during the game, use the Players Choose Skills command.

   The default setting is Yes.

3. To determine whether or not players may view formulas during the game, use the Let Players View Formulas command.

   The default setting is Yes.

4. To change the formula for the antidote, use the Reset Antidote Formula command.

   If you choose to change the formula for the antidote, players must assemble different formula pieces in order to change the cats back to their normal colors.

Skills Menu

This menu allows you to control the skills presented to players during a game. The skill levels have been carefully designed to provide a structured review of perimeter, area, volume, and surface area. The problems that players solve during a game are randomly generated according to the specific levels you select.

1. To change the skills required during the game when No is checked in the Players Choose Skills command in the Options menu, select Perimeter, Area, Volume, and Surface Area.

2. Choose skills by selecting the checkboxes.

   Each time you select a skill, a subskill menu appears.

   Note: If you wish to see the subskill menu for a skill that is already selected, uncheck the box in front of the skill and then recheck it.

   Subskill menus with default selections are shown here.

3. Use the dialog boxes to select skills for your students to work on.
If you would like to view a sample question, click the Sample button next to a subskill.
You may see sample problems at any time whether or not a skill is checked. The sample problems are randomly generated from within the program, and therefore, they will vary each time you select Sample.
You may see as many sample problems as you want.

When you are done selecting skill and subskills, click OK at the Skills menu to return to the Orchard Manager.

Saving Your Changes
To save changes you make from the commands in the menus in Program Parameters, choose the Quit/Exit command from the File menu.
### SkillBuilders 9SB, 15SB, and 92SB A/B

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<tbody>
<tr>
<td>Fractions: Advanced 9SB</td>
<td></td>
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<tr>
<td>Decimals: Beginning 92SB-B</td>
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<tr>
<td>Decimals: Advanced 92SB-A</td>
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</table>

#### Fractions: Advanced 9SB

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<tr>
<th>SKILLS</th>
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<tbody>
<tr>
<td><strong>Multiplying Fractions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply two fractions, no common factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply two fractions, common factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply two fractions, larger numbers, common factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply two fractions, larger numbers, some common factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Multiplying Mixed Numbers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply a mixed number and a fraction</td>
<td></td>
<td></td>
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<tr>
<td>Multiply a mixed number and a whole number</td>
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<td></td>
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<tr>
<td>Multiply two mixed numbers, smaller numbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply two mixed numbers, larger numbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dividing Fractions</strong></td>
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<tr>
<td>Divide two fractions, no common factors</td>
<td></td>
<td></td>
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<tr>
<td>Divide two fractions, common factors</td>
<td></td>
<td></td>
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<tr>
<td>Divide two fractions, larger numbers, common factors</td>
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<tr>
<td>Divide fractions and whole numbers, some common factors</td>
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<tr>
<td><strong>Dividing Mixed Numbers</strong></td>
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<tr>
<td>Divide mixed numbers and fractions</td>
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<tr>
<td>Divide mixed numbers and whole numbers</td>
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<td>Divide mixed numbers, smaller numbers</td>
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<td>Divide mixed numbers, larger numbers</td>
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## Perimeter, Area, and Volume 15SB

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<tr>
<td>Triangles</td>
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<tr>
<td>Parallelograms</td>
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<td><strong>Area</strong></td>
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<td>Triangles</td>
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<td>Parallelograms</td>
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<td>Trapezoids</td>
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<td><strong>Volume</strong></td>
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<tr>
<td>Rectangular prisms</td>
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<td>Triangular prisms</td>
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<tr>
<td>Cylinders</td>
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<td>Rectangular pyramids and cones</td>
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<td>Triangular pyramids</td>
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<td>Cones</td>
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<td><strong>Surface Area</strong></td>
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<td>Rectangular pyramids</td>
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## Decimals: Beginning and Advanced 92SB A/B

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<tr>
<td>Two decimals, one to three decimal places</td>
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<tr>
<td>Three decimals, one to three decimal places</td>
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<tr>
<td>Three or four decimals, uneven decimal lengths</td>
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<tr>
<td>Two decimals, uneven lengths, and one whole number</td>
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<tr>
<td>Money</td>
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<tr>
<td>Subtraction</td>
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<tr>
<td>Decimals, one to three decimal places, no whole number units</td>
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<tr>
<td>Decimals, one to three decimal places</td>
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<tr>
<td>Decimals from whole numbers</td>
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<tr>
<td>Decimals, uneven lengths</td>
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<td>Multiplication</td>
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<td>Two- or three-digit multiplicand, whole-number multiplier</td>
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<tr>
<td>Two- or three-digit multiplicand, multiplier is 0.2 to 0.9</td>
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<td>Four- or five-digit multiplicand</td>
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<td>Decimal times decimal, no whole number units</td>
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<tr>
<td>Whole number times decimal or the reverse</td>
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<tr>
<td>Decimal times decimal with whole number unit</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Two-digit multiplier, no extra zeros in product</td>
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<td></td>
<td></td>
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<tr>
<td>Two-digit multiplier, extra zeros in product</td>
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<tr>
<td>Division</td>
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</tr>
<tr>
<td>One-digit divisor, whole number by whole number</td>
<td>•</td>
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<tr>
<td>One-digit divisor, decimal by whole number</td>
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<tr>
<td>One-digit divisor, whole number by decimal</td>
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<td>One-digit divisor, decimal by decimal</td>
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<td>Two-digit divisor, decimal by whole number</td>
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<tr>
<td>Two-digit divisor, whole number by decimal</td>
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<tr>
<td>Two-digit divisor, decimal by decimal</td>
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</table>
Introduction

Fractions: Advanced focuses on the multiplication and division of fractions. Perimeter, Area, and Volume gives students practice calculating the perimeter and area of two-dimensional objects and the volume and surface area of three-dimensional objects. Decimals: Beginning and Advanced focus on the addition, subtraction, multiplication, and division of decimals.

These SkillBuilder programs lead students step-by-step through math operations using tutorials, practice, and tests. Those who achieve the pre-set mastery level can choose from four exciting reward games. See the skills charts for a comprehensive list of skills and subskills covered by these Skill Trees.

Using SkillBuilders 9SB, 15SB, and 92SB A/B

The following instructions will show you how to complete the programs from a student’s perspective.

If “Students Select Skills” is enabled in the program parameters (default setting), you will be able to select skills after you log in.

1 The first time you enter the program, select one or more skills to work on by clicking the checkbox(es). (You may change the skills the next time you log in by clicking CHANGE SKILLS.)

2 Click OK to continue.

3 Now you will see which skills you will be using.

On this screen, you may also choose the practice or test format. (Teachers may enable or disable either mode. See Program Parameters.)

Note: The teacher may select or deselect subskills in the program parameters; however, these subskills will not appear on this screen in order to prevent confusion.

• In practice mode, you will practice answering the types of questions you may encounter in test mode. Step-by-step instructions are available, and feedback is given for incorrect answers. Scores are recorded by the Orchard Manager, and if you achieve the mastery percentage set in the program parameters, you may choose between four reward games.

• In test mode, you will test your knowledge of the skills and subskills you have practiced. Scores are also recorded by the Orchard Manager. Mastery of a subskill and cumulative scores will only be indicated in test mode.

• Click CHANGE SKILLS to return to the skills selection screen. (Select or deselect skills you wish to work on, and then click OK.)

Note: This button will not appear if the Skill Tree was assigned as a result of an assessment test and/or if “Students Select Skills” is deselected in the program parameters.

• Click EXIT to return to the Orchard Manager. The next time you log in, you will return to the screen that tells you which skills you will be working on, where you may change them (if enabled in the program parameters).

4 Click PRACTICE or TEST to begin working on the problems.

Practice Mode

If you selected practice mode, you have several options:

• Click INTRO (enabled in the program parameters by default) to view a brief tutorial. Use the NEXT and PREVIOUS buttons to navigate through the tutorial. Click CLOSE to return to the practice screen.

• Click GLOSS to view the glossary. Click CLOSE to return the practice screen.

Note: For Perimeter, Area, and Volume 15SB, there is a FORMULAS button instead. Click this button to access formulas for perimeter, circumference, area, and volume.

• Use the STEPS, REVIEW, and CALC buttons, as available, to answer a question step by step; review definitions, rules, and examples for the specific question types; and activate the desktop calculator.

• Click STOP to end the practice session and change skills, choose a different mode, or exit the program.

1 Click OK to begin the practice mode.

If you need help answering a question, click HELP to view guidelines on how to enter answers. Click CLOSE to return to the practice screen.
2 Enter or select your answer, and click OK or press Enter/Return to register your response. Follow the on-screen instructions to complete the problem. (You may have multiple components for one practice problem.)

Remember: You may use the STEPS button to solve the problem step-by-step with guidance along the way.

- Correct responses are congratulated. If you answer a question incorrectly, you will be prompted to try again. If you answer incorrectly a second time, you will be prompted to click the STEPS button. On the third incorrect attempt, you will be given a hint to the correct answer. On the fourth incorrect attempt, you are given the correct answer.

3 Click OK or press Enter/Return to advance to the next question. When you have finished answering all of the practice questions, you are taken to the scores screen, which shows a list of skills, the number correct for each, and the percentage correct.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplying fractions</td>
<td>10 of 10 (100%)</td>
</tr>
</tbody>
</table>

Note: To minimize confusion, any subskills associated with each skill are not listed on this screen.

- If you achieved the percentage correct to play a reward game, click GAMES. (The default percentage is 80% and may be changed in the program parameters.) Click the button corresponding to the game you wish to play. (See Reward Games for instructions on how to play the games.)
- Click RESTART to begin the program again. You may change the skills and mode on which to work (default setting).
- Click PRINT to print your scores.
- Click EXIT to exit the program and return to the Orchard Manager.

Test Mode

If you selected test mode, you have the following options:

- Click INTRO (enabled in the program parameters by default) to view a brief tutorial. Use the NEXT and PREVIOUS buttons to navigate through the tutorial. Click CLOSE to return to the practice screen.
- Click GLOSS to view the glossary. Click CLOSE to return to the test screen.

Note: For Perimeter, Area, and Volume 15SB, there is a FORMULAS button instead. Click this button to access formulas for perimeter, circumference, area, and volume.
- Click STOP to return to the previous screen, where you may change skills, choose a different mode, or exit the program.

1 Click OK to begin the test.

2 Enter your answer and click OK, or press Enter/Return. You have one chance to answer correctly.

From the question screens, you also have the following options:

- Click REVIEW to review definitions, rules, and examples for the specific question type. (Click CLOSE to return to the test screen.)
- Click GLOSS/FORMULAS to review a glossary of mathematical terms/formulas. (Click CLOSE to return to the test screen.)
- Click CALC to open the desktop calculator. To close the calculator, click the X in the upper right-hand corner (Win) or the red circle in the upper left-hand corner (Mac).
- Click STOP to end the test and go to the scores screen.

3 Correct responses are congratulated. If you answer incorrectly, you will receive the correct answer. Click OK or press Enter/Return to advance to the next question.

Note: Remember to enter units of measurement or symbols such as dollar signs in your answer, if necessary.
4 When you have completed the test, you will be taken to the scores screen. The screen shows the skill(s), the score for each, and the cumulative score as well as whether or not the skill was mastered.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Score</th>
<th>Accumulative</th>
<th>Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving Fractions</td>
<td>2/2 (100%)</td>
<td>5/5 (100%)</td>
<td>★</td>
</tr>
</tbody>
</table>

Note: The cumulative score indicates the overall score for a skill each time a test has been taken covering the skill; this score continues to count towards mastery. A student may master each question on a test that relates to a particular skill/subskill; however, mastery is achieved only when the minimum number of questions set in the program parameters is answered correctly. See Program Parameters.

To minimize student confusion, any subskills associated with each skill are not listed on this screen.

- If you achieved the percentage correct to play a reward game, click GAMES. (The default percentage is 80% and may be changed in the program parameters.) Select the button corresponding to the game you wish to play. (See Reward Games for instructions on how to play the games.)
- Click RESTART, if available, to begin the program again. You may change the skills and mode on which to work (default setting). The test and practice modes will not pull questions from any mastered skills/subskills.
- Click PRINT to print your scores.
- Click EXIT to exit the program and return to the Orchard Manager.

Note: If you exit the program after mastering all assigned skills, the Skill Tree will drop from your assignment list. For example, if the Skill Tree was assigned as a result of an assessment test, the program will be disabled after all assigned skills are completed.

If the program is assigned by the teacher and “Students Select Skills” is deselected, the Skill Tree will exhaust after all assigned skills are completed.

If the teacher assigns the Skill Tree and allows the student(s) to select skills, the program will disable after all available skills are mastered. Not just those which the student(s) chose at the skills selection screen (i.e., student(s) must master all available skills in test mode, assuming the minimum number of questions for each assigned skill/subskill are completed).

The teacher may re-enable the Skill Tree by selecting the Students tab, choosing a student, clicking Edit Student Assignments, and double-clicking on the Skill Tree name (it will be grayed out) in the Assignment Order list. At the dialog box, click Yes to restart the program.

**Program Parameters**

1 To change the parameters for this program, log into the Orchard Manager as a teacher.
2 Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.
3 You will see a list of programs to choose from.
4 Select a SkillBuilder program, and click Edit.
5 The Settings screen contains four tabs: Preferences, Practice Format, Test Format, and Reward Games.

**Preferences Tab**

The Preferences tab allows you to change settings for the skills and format. The default settings are shown below.

- Under Skills, click Students Select Skills to allow the student(s) to select the skills they wish to use from those which you enable on the Select Skills screen.
- Click Select Skills to view the Skill Selection screen. The left-hand side of the screen shows the available skills. The subskills appear on the right-hand side of the screen when you click on a skill. The first time you click on a skill, the subskills for that skill appear on the right. The second time you click on a skill, all subskills for that skill are selected (or deselected) automatically. (You may also click SELECT ALL or SELECT NONE to select/deselect them all at once; or, click DEFAULTS to restore the selections to their default settings.) Click OK to return to the Settings screen.

**Important:** If the Students Select Skills box is selected, student(s) may choose from those skills that you enable on the Skill Selection screen.

- Under Format, select Practice, Test, or Student’s Choice to choose whether the student(s) may only access the practice mode, test mode, or both.
- Click OK to save your changes.
Practice Format Tab
The Practice Format tab allows you to change settings for the practice mode. The default settings are shown below.

- Decide if the introduction should be required (automatically brings up the introduction when you select practice mode), off (the INTRO button will not appear), or if you wish to have the student(s) choose (enables the INTRO button).
- Select or deselect “Let student review during practice session” to also allow the student to view the introduction during the practice session and not just at the initial practice screen.
- Under Questions, enter the number of questions the student(s) will receive in the practice session (1-25).
- Determine whether students will enter the final answer to a question only (disables the STEPS button) or intermediate steps, or if the method of input will be the student’s choice. If you select Student’s Choice, the student(s) may click the STEPS button to receive instructions for each step of the problem and prompts regarding regrouping. Selecting “Intermediate Steps Required” disables the STEPS button and steps the student through the question components automatically.
- Determine whether students may view the glossary and desktop calculator by selecting or deselecting the corresponding checkboxes.
- Click OK to save your changes.

Test Format Tab
The Test Format tab allows you to change settings for the test mode. The default settings are shown below.

- Decide if the introduction should be required (automatically brings up the introduction when you select test mode), off (the INTRO button will not appear), or if you wish to have the student(s) choose (enables the INTRO button).
- Select or deselect “Let student review during test” to also allow the student to view the introduction during the test and not just at the initial test screen.
- Under Questions, enter the number of questions the student(s) will take on the test (1-25).
- Select “Present problems horizontally” if you wish to have the program present the problems on a single line for an added challenge. If this box is deselected, the problems will be presented vertically.
  - Note: This option is not available for Fractions: Advanced 9SB or Perimeter, Area, and Volume 15SB.
- Determine whether students may view the glossary and desktop calculator by selecting or deselecting the checkboxes.
- Under Mastery, you may enter the minimum number of questions for mastery of a subskill (1-10). You may also enter the percent correct of the number of questions required for mastery (1-100). For example, if you set the minimum number of questions to 5 and the percent correct at 80%, the student(s) must answer 80% of the 5 questions for that subskill correctly, or 4 out of 5. If the student does not achieve 80% in 5 questions, he or she will continue to receive questions until this mastery percentage is achieved. (Note: If the student answers the fourth question correctly, achieving 80%, he or she will still get the fifth question because 5 is the minimum number of questions set for mastery.)
- Click OK to save your changes.
Reward Games Tab

The Rewards Game tab allows you to change settings for the reward games. The default settings are shown below.

- Select or deselect Sound to enable or disable audio in the games. This option is selected by default.
- Select or deselect Reward Games Active to enable or disable the reward games (Arthropod, Racer, Stepping Stones, and Treasure Hunt).
- Enter the percent correct the student(s) must achieve to be able to play the reward games. (The default is 80%.) This percentage is based on the number of questions set in the practice or test mode. The student(s) cannot play the reward games if they do not complete the set number of questions—whether or not they achieve the correct percentage.
- The Top Ten Players box shows the players who hold the ten highest game scores in the class. Use the drop-down menu to select the game for which you would like to view this information. To clear this list, click Clear Names.
- Click OK to save your changes.
## Math Exit Skills 139SB-140SB

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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<tbody>
<tr>
<td>High School Math Exit Skills 139SB</td>
<td></td>
<td></td>
<td></td>
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<td>Algebra 1 Exit Skills 140SB</td>
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<td></td>
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</tbody>
</table>

### High School Math Exit Skills

#### SKILLS

### Number Concepts
- Use scientific notation
- Compare and order real numbers
- Round whole numbers and decimals
- Determine relationships between fractions, decimals, and percents
- Find squares and square roots
- Understand matrices, factoring, and exponents
- Understand powers
- Investigate infinite, converging, and diverging series
- Understand arithmetic sequences and theories
- Understand the communicative, associative, distributive, and transitive properties

### Algebraic Concepts
- Use real number properties and inverse operations
- Determine missing elements in patterns
- Identify ordered pairs and solution sets in one and two dimensions
- Apply ratio and proportion
- Evaluate variables and expressions (formulas)
- Solve simple equations involving integers, decimals, and fractions
- Understand algebraic methods and their variations
- Understand the binomial theorem
- Understand sigma notation

### Geometric Concepts
- Use the basic elements of geometry
- Use geometric figures and understand their characteristics
- Understand right triangle properties
- Use indirect measurement with similar triangles
- Apply geometric properties
- Work with cones
- Understand geometric sequences and theories
- Understand transformations
- Understand similarities and congruence among objects
- Conduct proofs

### Measurement Concepts
- Use metric and customary units
**Math Exit Skills 139SB-140SB (cont.)**

<table>
<thead>
<tr>
<th>Measurement Concepts (cont.)</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve problems involving measures</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Find distance, perimeter, circumference, area, surface area, and volume</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Recognize precision</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

**Probability and Statistics**

| Use counting procedures (tree diagrams, multiplication) | • | • |
| Find the probability of simple and compound events | • | • |
| Determine mean, median, and mode | • | • |

**Operations**

| Use the operations of addition, subtraction, multiplication, and division with real numbers in practical situations | • | • |

**Problem Solving**

| Estimate solutions | • | • |
| Identify strategies for solving/solve proportion problems | • | • |
| Determine methods for finding/find percent and percentage | • | • |
| Determine methods for solving/solve measurement problems | • | • |
| Formulate or solve problems using geometric concepts | • | • |
| Analyze or solve probability and statistics problems | • | • |
| Make predictions | • | • |
| Formulate equations/inequalities | • | • |
| Analyze or interpret graphs, charts, tables, maps, or diagrams, and use the information derived to solve problems | • | • |
| Determine the validity of conclusions drawn from statistical data | • | • |
| Evaluate reasonability | • | • |

**Algebra 1 Exit Skills**

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
</table>

**Graphing Problems**

| Describe the domains and ranges of various functions and relations | • | • |
| Identify the effects of simple parameter changes on the graphs of relations and linear, quadratic, and absolute value functions | • | • |
| Graph a line given its characteristics or equation | • | • |
| Graph linear inequalities with one or two variables | • | • |
| Graph systems of inequalities and recognize the solution(s) from the graph | • | • |
| Write an equation of a line given its graph or description | • | • |

**Expressions, Equations, and Inequalities**

| Formulate or solve linear equations/inequalities | • | • |
| Formulate or solve systems of linear equations | • | • |
| Solve absolute value equations/inequalities | • | • |
| Formulate or solve quadratic equations | • | • |
| Perform operations on polynomials | • | • |
| Factor polynomials using models | • | • |
| Solve rational expressions and equations | • | • |
| Solve radical equations | • | • |
**Math Exit Skills 139SB-140SB (cont.)**

### Problem Solving

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analyze and/or solve problems involving the laws of exponents, quadratic situations, right triangles, one-variable situations, two-variable situations, probability, and ratio and proportions</strong></td>
<td>9</td>
<td>•</td>
</tr>
<tr>
<td><strong>Analyze graphical and tabular data including scatter plots and/or make predictions based on the data</strong></td>
<td>10</td>
<td>•</td>
</tr>
</tbody>
</table>

### Introduction

**High School Math Exit Skills** and **Algebra 1 Exit Skills** are Completion Skill Trees designed to test students’ knowledge of key skills and supplements a student’s classroom instruction and textbook. These programs have a series of carefully selected skill levels. Teachers may choose the combination of skills appropriate for their student(s) or allow the student(s) to select specific skills/subskills.

### Using High School Math Exit Skills and Algebra 1 Exit Skills

The following instructions will show you how to complete the programs from a student’s perspective.

#### Selecting Skills

If “Students Select Skills” is enabled in the program parameters, you will be able to select skills after you log in. (“Students Select Sub-Skills” must also be selected if you wish to allow the student(s) to choose subskills as well.)

**Note:** You have the option of selecting skills/subskills only the first time you enter the Skill Tree or after you master a skill/subskill.

1. Choose the skills you wish to work on by selecting the checkboxes next to the skill(s). (Click on the skill once to view the subskills associated with that skill [Students Select Sub-Skills must also be selected in the program parameters], and click on it again to select it.) If enabled, you may select or deselect specific subskills on the right-hand side of the screen. You may also click SELECT ALL or SELECT NONE to select or deselect the skills/subskills all at once.

![Skill Selection Screen]

**Note:** The teacher may select or deselect specific skills/subskills in the program parameters. If any skills/subskills have been disabled, they will be grayed out. A star will appear next to any mastered skill/subskill.

2. Click OK to begin the test.

#### Questions

You will receive 10 questions randomly selected from the chosen skills/subskills.

For each question, choose your answer and click OK, or type the letter of your answer and press Enter/Return. For an incorrect response, you’ll receive a message such as “No, try again.” (In some SkillBuilders, you’ll get a hint to the correct solution.) You will get one more chance to answer correctly. For a correct response on the second attempt, you’ll receive a congratulatory message, followed by a brief explanation of the solution. If your second answer is incorrect, you will receive the solution and a brief explanation.

- Click STOP if you wish to end the test early and go to the scores screen.
- Click HELP to view instructions for the program.
- Click CALC to access the calculator (if enabled).

#### Finishing the Program

After you have answered the questions (or click STOP to end the test early), you will be taken to the scores screen. The screen shows the subskill(s), the score for each, and the cumulative score as well as whether or not the subskill was mastered. (A star will appear in the Mastery column to indicate any mastered subskill.)

**Note:** You may need fewer than 10 questions to master all assigned/selected skills and subskills and be taken to the scores screen.
The cumulative score indicates the overall score for a subskill each time a test has been taken covering the subskill; this score continues to count towards mastery. A student may master each question on a test that relates to a particular skill/subskill; however, mastery is achieved only when the minimum number of questions set in the program parameters is answered correctly. See Program Parameters.

1 At the Scores screen, you have several options:
   • To receive more problems using the skills already assigned but not yet mastered or new skills chosen at the skills selection screen, click Restart (if available).
   • If you achieved the percentage correct to play a reward game, click GAMES. (The default percentage is 80% and may be changed in the program parameters.) Select the button corresponding to the game you wish to play. (See Playing the Games for instructions on how to play the games.)
   • Click PRINT to print your scores.

2 Click EXIT to exit the program and return to the Orchard Manager.

Note: If you exit the program after mastering all assigned skills, the Skill Tree will drop from your assignment list. For example, if the Skill Tree was assigned as a result of an assessment test, the program will be disabled after all assigned skills are completed.

If the program is assigned by the teacher and “Students Select Skills” is deselected, the Skill Tree will exhaust after all assigned skills are completed.

If the teacher assigns the Skill Tree and allows the student(s) to select skills, the program will disable after all available skills are mastered, not just those which the student(s) chose at the skills selection screen (i.e., student(s) must master all available skills, assuming the minimum number of questions for each assigned skill/subskill are completed).

The teacher may re-enable the Skill Tree by selecting the Students tab, choosing a student, clicking Edit Student Assignments, and double-clicking on the Skill Tree name (it will be grayed out) in the Assignment Order list. At the dialog box, click Yes to restart the program.
4 Select or deselect Sound to turn the music and sound effects on or off.

5 Select or deselect Calculator to make it available or unavailable to the student(s).

6 Select Game if you would like to allow the student(s) to play a game after they complete the program. Enter the percent correct the student(s) must achieve to be able to play a reward game. (The default is 80%.)

7 Select Students Select Skills and Students Select Sub-Skills to allow students to choose the skills and/or subskills they would like to work on from those which you enable on the skills selection screen.

8 Click Skills to view the skills selection screen. The left-hand side of the screen shows the available skills. The subskills appear on the right-hand side of the screen when you click on a skill. The first time you click on a skill, the subskills for that skill appear on the right. The second time you click on a skill, all subskills for that skill are selected (or deselected) automatically. (You may also click SELECT ALL or SELECT NONE to select/deselect them all at once; or, click DEFAULTS to restore the selections to their default settings.) Click OK to return to the settings screen.

   Important: If the Students Select Skills box is selected, student(s) may choose from those skills that you enable on the skill selection screen.

9 You may enter the minimum number of questions for mastery of a subskill (1-10). You may also enter the percent correct of the number of questions required for mastery (1-100). For example, if you set the minimum number of questions to 5 and the percent correct at 80%, the student(s) must answer 80% of the 5 questions for that subskill correctly, or 4 out of 5. If the student does not achieve 80% in 5 questions, he or she will continue to receive questions until this mastery percentage is achieved. (Note: If the student answers the fourth question correctly, achieving 80%, he or she will still get the fifth question because 5 is the minimum number of questions set for mastery.)

10 Click OK to save your changes and return to the Orchard Manager.
**Math Strategies 7-8 150SB**

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>K</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
</table>

**Enrichment**

**Core**

**Remedial**

**SKILLS**

<table>
<thead>
<tr>
<th>Estimation and Problem Solving</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize and apply a variety of estimation strategies</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Predict outcomes</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Understand and determine the reasonableness of results</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Select, develop, and apply problem-solving strategies</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Apply reasoning strategies in working with and solving computation, measurement, and real-life problems</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Solve real-world problems</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Logic problems, i.e., if/and/or/not</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probability, Statistics, and Data Analysis</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect, organize, and describe data</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Represent and interpret displays of data</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Use probability in the real world</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Make predictions and analyze results based on probability samples</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Use counting arrangements</td>
<td>•</td>
<td>•</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number Concepts</th>
<th>7</th>
<th>8</th>
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</thead>
<tbody>
<tr>
<td>Determine the mean, the median, and the mode</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Addition, subtraction, multiplication, and division</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Round decimal and whole numbers</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Solve problems involving exponential notation</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Solve problems involving scientific notation</td>
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<tr>
<td>Identify place value</td>
<td>•</td>
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<tr>
<td>Determine relationships between and among fractions, decimals, and percents</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Number properties, i.e., prime, composite, LCM, GCF</td>
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<tr>
<td>Square roots</td>
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<table>
<thead>
<tr>
<th>Algebraic Concepts</th>
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<tbody>
<tr>
<td>Evaluate variables and expressions (formulas)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Identify ordered pairs and solution sets in one and two dimensions</td>
<td>•</td>
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</tr>
<tr>
<td>Apply ratio and proportion</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Solve simple equations involving integers, decimals, and fractions</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Compare and order rational numbers</td>
<td>•</td>
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<tr>
<td>Solve inequalities</td>
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<tr>
<th>Geometric Concepts</th>
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<tbody>
<tr>
<td>Use the basic elements of geometry</td>
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<tr>
<td>Use geometric figures and their characteristics</td>
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<tr>
<td>Use right triangle geometry with Pythagorean property, similarity, indirect measurement, and ratios</td>
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<td></td>
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<tr>
<td>Use similarity, congruence, and symmetry</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Recognize basic geometric constructions</td>
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### Introduction

**Math Strategies 7-8** is a Completion Skill Tree designed to test students’ knowledge of key skills and supplements a student’s classroom instruction and textbook. This program has a series of carefully selected skill levels. Teachers may choose the combination of skills appropriate for their student(s) or allow the student(s) to select specific skills/subskills.

### Using Math Strategies 7-8

The following instructions will show you how to complete the program from a student’s perspective.

#### Selecting Skills

If “Students Select Skills” is enabled in the program parameters, you will be able to select skills after you log in. (“Students Select Sub-Skills” must also be selected if you wish to allow the student(s) to choose subskills as well.)

**Note:** You have the option of selecting skills/subskills only the first time you enter the Skill Tree or after you master a skill/subskill.

1. **Choose the skills you wish to work on by selecting the checkboxes next to the skill(s).** (Click on the skill once to view the subskills associated with that skill [Students Select Sub-Skills must also be selected in the program parameters], and click on it again to select it.) If enabled, you may select or deselect specific subskills on the right-hand side of the screen. You may also click SELECT ALL or SELECT NONE to select or deselect the skills/subskills all at once.

2. **Click OK to begin the test.**

#### Questions

You will receive ten questions randomly selected from the chosen skills/subskills.

For each question, choose your answer and click OK, or type the letter of your answer and press Enter/Return. For an incorrect response, you’ll receive a message such as “No, try again.” (In some SkillBuilders, you’ll get a hint to the correct solution.) You will get one more chance to answer correctly. For a correct response on the second attempt, you’ll receive a congratulatory message, followed by a brief explanation of the solution. If your second answer is incorrect, you will receive the solution and a brief explanation.

- Click **STOP** if you wish to end the test early and go to the scores screen.
- Click **HELP** to view instructions for the program.
- Click **CALC** to access the calculator (if enabled).

#### Finishing the Program

After you have answered the questions (or click **STOP** to end the test early), you will be taken to the scores screen. The screen shows the subskill(s), the score for each, and the cumulative score as well as whether or not the subskill was mastered. (A star will appear in the Mastery column to indicate any mastered subskill.)

**Note:** You may need fewer than ten questions to master all assigned/selected skills and subskills and be taken to the scores screen.
The cumulative score indicates the overall score for a subskill each time a test has been taken covering the subskill; this score continues to count towards mastery. A student may master each question on a test that relates to a particular skill/subskill; however, mastery is achieved only when the minimum number of questions set in the program parameters is answered correctly. See Program Parameters.

1 At the Scores screen, you have several options:
   - To receive more problems using the skills already assigned but not yet mastered or new skills chosen at the skills selection screen, click Restart (if available).
   - If you achieved the percentage correct to play a reward game, click GAMES. (The default percentage is 80% and may be changed in the program parameters.) Select the button corresponding to the game you wish to play. (See Playing the Games for instructions on how to play the games.)
   - Click PRINT to print your scores.

2 Click EXIT to exit the program and return to the Orchard Manager.

Note: If you exit the program after mastering all assigned skills, the Skill Tree will drop from your assignment list. For example, if the Skill Tree was assigned as a result of an assessment test, the program will be disabled after all assigned skills are completed.

If the program is assigned by the teacher and “Students Select Skills” is deselected, the Skill Tree will exhaust after all assigned skills are completed.

If the teacher assigns the Skill Tree and allows the student(s) to select skills, the program will disable after all available skills are mastered, not just those which the student(s) chose at the skills selection screen (i.e., student(s) must master all available skills, assuming the minimum number of questions for each assigned skill/subskill are completed).

The teacher may re-enable the Skill Tree by selecting the Students tab, choosing a student, clicking Edit Student Assignments, and double-clicking on the Skill Tree name (it will be grayed out) in the Assignment Order list. At the dialog box, click Yes to restart the program.

The Menu Bar
You can access the menus at the top of the screen at any time.

The File Menu
1 If you wish to print the scores screen at the end of the lesson, select Print. (Select Print Setup to access the Print dialog box.)
2 If you wish to end the lesson early, select End Lesson. (You will be taken to the scores screen.)
3 If you wish to end the lesson and leave the Orchard Manager, select Exit (Windows) or Quit SkillBuilder (Mac OS X).

The Preferences Menu
1 To toggle the sound on or off, select or deselect Sound Enabled.
2 Select Skills..., when available, to choose skills/subskills to work on.

The Help Menu
1 To see instructions for the program, select Instructions.
2 To see the program credits, select About (Windows) or About SkillBuilder from the SkillBuilder menu (Mac OS X).

Program Parameters
1 To change the parameters for this program, log into the Orchard Manager as a teacher.
2 Click Edit Class Parameters on the Class tab, or select a student and click Edit Student Parameters on the Students tab.

You will see a list of programs to choose from.
3 Select Math Strategies 7-8 150SB, and click Edit.

The settings screen appears.
4 Select or deselect Sound to turn the music and sound effects on or off.

5 Select or deselect Calculator to make it available or unavailable to the student(s).

6 Select Game if you would like to allow the student(s) to play a game after they complete the program. Enter the percent correct the student(s) must achieve to be able to play a reward game. (The default is 80%.)

7 Select Students Select Skills and Students Select Sub-Skills to allow students to choose the skills and/or subskills they would like to work on from those which you enable on the skills selection screen.

8 Click Skills to view the skills selection screen. The left-hand side of the screen shows the available skills. The subskills appear on the right-hand side of the screen when you click on a skill. The first time you click on a skill, the subskills for that skill appear on the right. The second time you click on a skill, all subskills for that skill are selected (or deselected) automatically. (You may also click SELECT ALL or SELECT NONE to select/deselect them all at once; or, click DEFAULTS to restore the selections to their default settings.) Click OK to return to the settings screen.

Important: If the Students Select Skills box is selected, student(s) may choose from those skills that you enable on the skill selection screen.

9 You may enter the minimum number of questions for mastery of a subskill (1-10). You may also enter the percent correct of the number of questions required for mastery (1-100). For example, if you set the minimum number of questions to 5 and the percent correct at 80%, the student(s) must answer 80% of the 5 questions for that subskill correctly, or 4 out of 5. If the student does not achieve 80% in 5 questions, he or she will continue to receive questions until this mastery percentage is achieved. (Note: If the student answers the fourth question correctly, achieving 80%, he or she will still get the fifth question because 5 is the minimum number of questions set for mastery.)

10 Click OK to save your changes and return to the Orchard Manager.
These reward games are available in the following SkillBuilder programs:

- Fractions: Advanced 9SB
- Perimeter, Area, and Volume 15SB
- Decimals: Beginning and Advanced 92SB A/B
- Math Exit Skills 139SB-140SB
- Math Strategies 7-8 150SB

**Arthropod**

The object of Arthropod is to eat all of the bugs and escape through the hole before time runs out.

1. To read the instructions, click the Instructions button.
2. You may choose the difficulty level by clicking the Difficulty Level button and selecting Easy, Medium, or Hard.
3. You can view the top ten scores by clicking the Top Ten button.
4. If you wish to quit without playing the game, click Exit.
5. Click the Play button to play Arthropod.
6. Use the arrow keys to change the arthropod’s direction.
   *Note: Once you start the arthropod moving by pressing an arrow key, you do not have to hold down the arrow keys to keep it moving in the desired direction.*
7. Eat as many bugs as you can during the allotted time by moving the arthropod over them.
   Gold bugs are worth more points. The arthropod grows as it eats.
8. When you hear the frog croak, get out of the way (the frog can only attack straight down).
9. After you have eaten all of the bugs, leave through the hole at the left side of the screen.
10. If you wish to quit early, press Esc.

The game stops automatically after the time runs out or after the arthropod “dies” three times by either running into the wall or getting eaten by the frog.
When the game is over, your score is shown along with the top ten scores.

**Racer**

The object of Racer is to get around the track the number of times required by your level while gaining points by picking up gas cans, tools, and tires along the way.

1. To get instructions, click the Instructions button.
2. You may choose the difficulty level by clicking the Difficulty Levels button and selecting Easy, Medium, or Hard.
3. You can see the top ten scores by clicking the Top Ten button.
4. If you wish to quit without playing the game, click Exit Game.
5. Click the Play button to play Racer.
   The Racer game screen appears.
   You’ll hear a series of beeps as the dots in the upper left corner of the screen turn white in the middle. When the final dot turns white, the car will move forward.
6. Use the arrow keys to steer the car.
   Speed bumps will slow the car down, and mud holes cause the car to skid out of control.
7. Picking up gas cans, tools, and tires as you go around the track will give you extra points.
8. If you wish to quit early, press Esc.
   The game stops automatically after you have driven the number of laps required for the level or when the time runs out.
When the game is over, your score is shown along with the top ten scores.
9. Click OK.

**Stepping Stones**

The object of stepping stones is to turn all the stones from blue to yellow and then to orange by stepping on them before time runs out.

1. To get instructions, click the Instructions button.
2. You may choose the difficulty level by clicking the Difficulty Levels button and selecting Easy, Medium, or Hard.
3. You can view the top ten scores by clicking the Top Ten button.
4. If you wish to quit without playing the game, click Exit.
5. Click Play As Zade or Play As Zelda to play Stepping Stones as that character.
The Stepping Stones game screen appears.

6 Use the arrow keys to jump from stone to stone. Stones turn yellow the first time you step on them and orange the second time. When bananas thrown by the monkey land on a stone, they turn the stone blue. Step on the stone again to turn it yellow and once more to turn it orange.

7 Pick up gems to get extra points.

8 Avoid the jumping monkey! It will cause you to stop and fall off of the stone.

9 If you wish to quit early, press Esc. The game stops automatically after you have turned all the stones orange, when time runs out, or when you fall for the third time.

When the game is over, your score is shown along with the top ten scores.

10 Click OK.

Treasure Hunt

The object of Treasure Hunt is to gather all the coins and escape through the door as quickly as possible, while dodging the pirates who are trying to catch you.

1 To get instructions, click the Instructions button.

2 You can choose the difficulty level by clicking the Difficulty Levels button and selecting Easy, Medium, or Hard.

3 You can see the top ten scores by clicking the Top Ten button.

4 If you wish to quit without playing the game, click Exit Game.

5 Click the Play button to play Treasure Hunt. The Treasure Hunt game screen appears. You are the figure at the top of the screen in the doorway. The object is to collect the coins and escape without being caught by the pirates. If the pirates catch you, you start over at the top of the screen. You get three chances to collect the coins and escape.

6 Use the arrow keys to move through the castle.

7 Pick up coins by moving over them. Flashing red coins are worth more points.

8 When you have collected all of the coins, leave through the doorway at the top of the screen.

9 If you wish to quit early, press Esc. The game stops automatically when the time runs out or when you are captured by the pirates three times. When the game is over, your score is shown, along with the top 10 scores.

10 Click OK.
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