Instructional Unit Plan

Unit I Georgia Performance Standards

M8D2a Use tree diagrams to find the number of outcomes.

M8D2b Apply the addition and multiplication principles of counting.

M8D3a Find the probability of simple independent events.

M8D3b Find the probability of compound independent events.

Unit 1 Framework Essential Questions

How do I determine a sample space?
How can a tree diagram help me find the number of possible outcomes related to a given event?
When and why do I use addition to determine sample space size?
When and why do I use multiplication to determine sample space size?
When and why do I use addition to determine the probabilities?
When and why do I use multiplication to determine probabilities?

Vocabulary

Event	Probability	Impossible
Tree diagram	Certain	Equally likely
Mutual exclusive	Disjoint events	Sample Space
Relative frequency		
Fundamental Counting Principle		
Addition Counting Principle		

Unit I Assessment

GPS Framework, Grade 8, Unit 1, Probability, Culminating Tasks:
Activity 1 “Is It Fair?” And Activity 2 “A Fair Hopper,” pp. 33 – 41 of 41

Unit 1 Framework Enduring Understandings

Tree diagrams are useful for describing relatively small sample spaces and computing probabilities, as well as for visualizing why the number of outcomes can be extremely large.
Sometimes the outcome of one event does not affect the outcome of another event. (This is when the outcomes are called independent.)
When two compound events occur, we use multiplication to determine their probability. That is, to find the probability of event A happens **and** event B happens, we should multiply the probability that A happens times the probability that B happens.
When we find the probability that event A happens **or** event B happen, we should add the probability that A happens to the probability that B happens.
Probabilities are similar to percents. They are all between 0 and 1, where a probability of 0 means an outcome has 0% chance of happening and probability of 1 means that the outcome will happen 100% of the time.
If we add the probabilities of every outcome in a sample space, the sum should always equal 1.
If the probability that an event will happen is “P,” then the probability that it won’t happen is “1 minus P.”

Literacy GPS

ELA8RC2 The student participates in discussions related to curricular learning in all subject areas.

ELA8RC3 The student acquires new vocabulary in each content area and uses it correctly.

Georgia Performance Standards

M8D3a Find the probability of simple independent events.

M8D3b Find the probability of compound independent events.

Unit 1 Framework Enduring Understandings	Unit 1 Framework Essential Questions
Sometimes the outcome of one event does not affect the outcome of another event. (This is when the outcomes are called independent.) When two compound events occur, we use multiplication to determine their probability. That is, to find the probability of event A happens **and** event B happens, we should multiply the probability that A happens times the probability that B happens. When we find the probability that event A happens **or** event B happen, we should add the probability that A happens to the probability that B happens. Probabilities are similar to percents. They are all between 0 and 1, where a probability of 0 means an outcome has 0% chance of happening and probability of 1 means that the outcome will happen 100% of the time. If the probability that an event will happen is "P," then the probability that it won't happen is "1 minus P."	When and why do I use addition to determine the probabilities? When and why do I use multiplication to determine probabilities?
Vocabulary Event Probability Mutual exclusive Experimental Probability Theoretical Probability Dependent event Equally likely Impossible Certain Disjoint events Independent event	**Literacy GPS** **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly.

Atlanta Public Schools Teaching Plans **Eighth Grade** **Quarter: 1 Week: 1**

Warm-Up/Quick Practice	Problem Solving
Mental Math: Halve and double to multiply (or example, for 4 x 5, think 2 x 10; for 8 x 15, think 4 x 30) Perform operations on rational numbers Write each fraction in simplest form Skill Mastery: Compare and order rational numbers	Review problem-solving steps: (1) Understand the Problem (2) Make a Plan (3) Solve (4) Look Back Solve non-routine problems involving the *Draw a Diagram* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 814

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.1.1	M8D3a	**Find the probability of a simple independent event**	Holt Mathematics Course 3, Lesson 10 -1, "Probability," pp. 522 - 526	Textbook, pp. 522 – 526 Probability line from the lesson Optional: Coins, number cubes, and spinners
1.1.2	M8D3a	**Estimate probability using experimental methods**	Holt Mathematics Course 3, Lesson 10 -2, "Experimental Probability," pp. 527 – 530	Textbook, pp. 527 - 530
1.1.3	M8D3a	**Estimate probability using theoretical methods** **Find the probability of mutually exclusive events**	Holt Mathematics Course 3, Lesson 10 -4, "Theoretical Probability," pp. 540 - 544	Textbook, pp. 540 – 544 Optional: Dominoes, Monopoly Game
1.1.4	M8D3b	**Find the probability of independent and dependent events**	Holt Mathematics Course 3, Lesson 10 -5, "Independent and Dependent Events," pp. 545 – 549	Textbook, pp. 545 – 549 Optional: Spinners as pictured
1.1.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Find the probability of an event using Holt Mathematics Course 3, "Ready to Go On?" Problems 1 – 8, p. 538. (*note*: All activities listed in the instructional task component are done so with the expectation that students work with partners or small groups to develop mathematical communication skills)

Maintenance: Simplify numerical expressions using Holt Mathematics Course 3, "Are You Ready?" Problems 6 – 9, 17 – 24, p. 3.

Maintenance: Connect mathematics with other content areas using Holt Mathematics Course 3, "Social Studies Link," pp. 25 and 43.

Exploration: Explore different geometric ways to represent the same fractional part with and without pattern blocks.

Intervention:

Homework

Weekly Focus: Find the probabilities of independent and dependent events; find possible outcomes

Maintenance: Perform operations on rational numbers

Skill: Compare and order rational numbers

Reflection with Closure

What is the difference between an independent and dependent event? Give an example of each.
When determining the probability of a compound event occurring, which type of problem involves adding to determine the probability of the event and which type of problem involves just multiplying? Give an example of each.

Journal

Illustrate the complete sample space for the experiment of pulling two coins from a jar that contains two pennies, a nickel, and a dime.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Compare and order rational numbers. Place the following numbers in order from greatest to least:

-1.2 0.65 -12 6/5 -3/4

Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8D2 Students will determine the number of outcomes related to a given event.
M8D2a Use tree diagrams to find the number of outcomes.
M8D2b Apply the addition and multiplication principles of counting.
M8D3a Find the probability of simple independent events.

Unit 1 Framework Enduring Understandings	Unit 1 Framework Essential Questions
Tree diagrams are useful for describing relatively small sample spaces and computing probabilities, as well as for visualizing why the number of outcomes can be extremely large.	How do I determine a sample space? How can a tree diagram help me find the number of possible outcomes related to a given event? When and why do I use addition to determine sample space size? When and why do I use multiplication to determine sample space size? When and why do I use addition to determine the probabilities? When and why do I use multiplication to determine probabilities?
Vocabulary	**Literacy GPS**
Sample Space Fundamental Counting Principle Addition Counting Principle	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Atlanta Public Schools Teaching Plans **Eighth Grade** **Quarter: 1 Week: 2**

Warm-Up/Quick Practice	Problem Solving
Mental Math: Halve and double factors (for example, for 4 x 45, think 2 x 90) Perform operations on rational numbers Write equivalent fractions, decimals, and percents SM: Perform operations on whole numbers	Solve non-routine problems involving the *Make a Model* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 815 Solve multi-step routine problems

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.2.1	M8D2a, b	**Explore a counting situation in which multiplication provides an answer**	GPS Framework, Grade 8, Unit 1, Probability, "Mrs. Love's Children," pp. 7 – 10 of 41	Copies of task, p. 7 of 41
1.2.2	M8D2b	**Construct a systematic list of outcomes for complex processes**	GPS Framework, Grade 8, Unit 1, Probability, "Reading in the Dark," pp. 11 – 12 of 41	Copies of task, p. 11 of 41
1.2.3	M8D2a, b M8D3a	**Find the number of possible outcomes in an experiment**	Holt Mathematics Course 3, Lesson 10 -8, "Counting Principles," pp. 558 – 562	Textbook, pp. 558 – 562 Snap cubes to represent clothing to illustrate tree diagram
1.2.4	M8D2b	**Distinguish among problems where order is not important from those in which it is**	Holt Mathematics Course 3, Lesson 10 -9, "Permutations and Combinations," pp. 563 – 567	Textbook, pp. 563 - 567
1.2.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks	Homework
Weekly Focus: Determine possible outcomes using Holt Mathematics Course 3, "Ready to Go On?" Problems 9 – 15, p. 568. **Maintenance**: Simplify numerical expressions. **Maintenance**: Connect mathematics with other content areas using Holt Mathematics Course 3, "Social Studies Link," pp. 25 and 43. **Exploration**: Explore different geometric ways to represent the same fractional part with and without pattern blocks. **Intervention**: *Include the reteaching of finding the probability of compound independent events.*	**Weekly Focus**: Use tree diagrams or organized lists to determine possible outcomes **Maintenance**: Find the probability of compound independent events **Skill**: Perform operations with whole numbers

Reflection with Closure

When making a tree diagram and the diagram becomes too time consuming and extremely large, what are your options?
Are tree diagrams always useful in determining possible outcomes? If not, give examples of situations where they are not useful and explain why.

Journal

How do you determine whether or not order is important when determining the possible outcomes?

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Perform operations with whole numbers.
(1) 547 x 293= (2) 6,084 ÷ 26 = (3) 208 + 12,846 + 19 + 4,082 = (4) 59,002 – 39,648 =
Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8D2a Use tree diagrams to find the number of outcomes.
M8D2b Apply the addition and multiplication principles of counting.
M8D3a Find the probability of simple independent events.
M8D3b Find the probability of compound independent events.

Unit 1 Framework Enduring Understandings	Unit 1 Framework Essential Questions
Sometimes the outcome of one event does not affect the outcome of another event. (This is when the outcomes are called independent.) When two compound events occur, we use multiplication to determine their probability. That is, to find the probability of event A happens **and** event B happens, we should multiply the probability that A happens times the probability that B happens. Probabilities are similar to percents. They are all between 0 and 1, where a probability of 0 means an outcome has 0% chance of happening and probability of 1 means that the outcome will happen 100% of the time. If the probability that an event will happen is "P," then the probability that it won't happen is "1 minus P."	How can I use probability to determine if a game is fair or to figure my chances of winning the lottery? When and why do I use addition to determine sample space size? When and why do I use multiplication to determine sample space size? When and why do I use addition to determine the probabilities? When and why do I use multiplication to determine probabilities?
Vocabulary	**Literacy GPS**
Fair, Equally likely, Complement Sample space, Relative frequency, Independent event Compound independent events Multiplication Rule of Probability Addition Rule of Probability	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Atlanta Public Schools Teaching Plans **Eighth Grade** **Quarter: 1** **Week: 3**

Warm-Up/Quick Practice	Problem Solving
Mental Math: Halve and double factors including decimals (for example, for 8 x 1.5, think 4 x 3; for 20 x 6.5. think 10 x 13) Determine the probability of a simple event not happening (the complement of an event) Write sets of three equivalent fractions SM: Use order of operations to simplify expressions	Solve non-routine problems involving the *Guess and Test* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 816 Solve multi-step routine problems

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.3.1	M8D3a, b M8D2a	**Use a tree diagram to determine the fairness of a game** **Determine the probability of compound independent events**	GPS Framework, Grade 8, Unit 1, Probability, "Heads Wins!" pp. 19 -22 of 41	Copies of tasks Optional: Coins to simulate probability event
1.3.2	M8D2b	**Calculate the probability of winning the lottery**	GPS Framework, Grade 8, Unit 1, Probability, "Fancy Winning the Lottery," pp. 25 – 26 of 41	Copies of tasks
1.3.3	M8D2b M8D3a, b	**Determine the fairness of a game**	GPS Framework, Grade 8, Unit 1, Probability, "Number Cube Sums," pp. 29 – 31 of 41	Pairs of different colored dice Copies of tasks
1.3.4	M8D2a, b M8D3a, b	**Determine the fairness of a game** **Perform experimental probability** **Calculate relative frequency** **Make a tree diagram of possible outcomes** **Compute theoretical probability**	GPS Framework, Grade 8, Unit 1, Probability, Culminating Task "Activity 1: Is It Fair?" pp. 33 – 34 of 41 *Begin the assignment in class and complete at home. Assignment is due the following Monday.*	Red-red chips Red-yellow chips Red-blue chips Blue-yellow chips Cups Copies of assignment
1.3.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Use probability to make decisions and predictions from Holt Mathematics Course 3, p. 553, *Problem Solving Lesson 10 – 6.*

Maintenance: Play "Permutations," a game with Scrabble™ tiles (or make a set), Holt Mathematics Course 3, p. 570.

Maintenance: Review addition and subtraction of decimal fractions.

Exploration: Explore math tricks using Holt Mathematics Course 3, "Math Magic," p. 50.

Intervention: *Include the reteaching of identifying the difference in the structure of problems in which order is not important from those in which it is.*

Homework

Weekly Focus: Determine fairness of games

Maintenance: Determine possible outcomes when order is important and when it is not

Skill: Use order of operations to simplify expressions

Reflection with Closure

If ten red snap cubes and five blue snap cubes were placed in a bag. A game is played where you receive one point for every red cube that is drawn and your partner receives two points for every blue cube that is drawn. Is the game fair or not? Explain your reasoning.

Journal

Create a counting problem that can be solved by a tree diagram or an organized list. Solve the problem both ways and give advantages and disadvantages of each solution.
You are playing a game tossing a pawn and you receive one point if the pawn lands on its side and your opponent receives two points if it lands straight up. Is the game fair or unfair? Explain your reasoning.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Use order of operations to simplify expressions. (1) $4 + 18 \div 2 - 5 =$ (2) $11 - (1 + 8) \div 3 =$
(3) $(5 + 3) \times (10 - 2) =$ (4) $6 + 3\,(8 - 5) - 9 \div 3 =$
Performance Assessments:
Culminating Tasks:

Instructional Unit Plan

Unit 2 Georgia Performance Standards

M8D2a Use tree diagrams to find the number of outcomes.
M8D2b Apply the addition and multiplication principles of counting.
M8D3a Find the probability of simple independent events.
M8D3b Find the probability of compound independent events.

Unit 2 Framework Enduring Understandings	Unit 2 Framework Essential Questions
Exponents are useful for representing very large or very small numbers.	When are exponents used and why are they important? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots?
Vocabulary Exponent Base Factor Exponential growth Exponential form Standard form Growth factor	**Literacy GPS** **ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.
Unit 2 Assessment GPS Framework, Grade 8, Unit 2, Exponents, "Culminating Task: Constructing the Irrational Number Line," pp. 42 – 45 of 45	

Georgia Performance Standards

M8N1 Students will understand different representations of numbers including square roots, exponents, and scientific notation.
M8N1i Simplify expressions containing integer exponents.
M8N1k Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.
M8A1b Simplify and evaluate algebraic expressions.

Unit 2 Framework Enduring Understandings	Unit 2 Framework Essential Questions
Exponents are useful for representing very large or very small numbers.	When are exponents used and why are they important? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots?
Vocabulary	**Literacy GPS**
Exponent, Base, Factor Exponential form, Standard form	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Atlanta Public Schools Teaching Plans **Eighth Grade** **Quarter: 1** **Week: 4**

Warm-Up/Quick Practice	Problem Solving
Mental Math: Halve and double factors including decimals (for example, for 6 x 3.5, think 3 x 7; for 24 x 0.25, think 12 x .5 then 6 x 1) Determine the possible outcomes of an event Simplify expressions involving order of operations SM: Write equivalent fractions, decimals, and percents	Solve non-routine problems involving the *Work Backward* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 817 Solve multi-step routine problems

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.4.1	M8N1i, k	**Develop an understanding of exponents** **Explore bases other than ten**	GPS Framework, Grade 8, Unit 2, Exponents, "A Few Folds," pp. 7 – 8 of 45 *and* "Exploring Powers of 10," pp. 30 – 33 of 45 *Allow this to be a two-day activity by beginning "Extension", p. 33 of 45—exploring other bases*	Patty paper, if possible Copies of tasks, pp. 7 of 45 *and* pp. 30 – 31 of 45
1.4.2	M8N1i	**Develop a deeper understanding of exponents by exploring bases other then ten**	GPS Framework, Grade 8, Unit 2, Exponents, "Extension," p. 33 of 45	None required
1.4.3	M8N1i M8A1b	**Write expressions in exponential and standard forms**	Holt Mathematics Course 3, Lesson 4-1, "Exponents," pp. 162 – 165	Textbook, pp. 162 - 165
1.4.4	M8N1i M8A1b	**Begin to recognize exponential patterns in tables** **Evaluate expressions with negative exponents and the zero exponent**	Holt Mathematics Course 3, Lesson 4-2, "Look for a Pattern in Integer Exponents," pp. 166 – 169	Textbook, pp. 166 - 169
1.4.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Further explore bases other than 10.

Maintenance: Play "Permutations," a game with Scrabble™ tiles (or make a set), Holt Mathematics Course 3, p. 570.

Maintenance: Review addition and subtraction of decimal fractions.

Exploration: Explore math tricks using Holt Mathematics Course 3, "Math Magic," p. 50.

Intervention: *Include the reteaching of determining the fairness of a game.*

Homework

Weekly Focus: Evaluate expressions involving exponents

Maintenance: Determine the fairness of a game

Skill: Write equivalent fractions, decimals, and percents

Reflection with Closure

In the equation $y = 2^n$ how does the value of *y* change each time *n* increases by 1?
How does an exponential graph differ from a linear graph? Give an example of each.

Journal

Describe how you can distinguish a linear relationship from an exponential relationship from looking at a table.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Fraction, Decimal, Percent Equivalents

Complete the table.

Fractions	Decimals	Percents
2/3	___	66.6%
___	1.25	___
9/10	___	___

Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8N1 Students will understand different representations of numbers including square roots, exponents, and scientific notation.

M8N1i Simplify expressions containing integer exponents.

M8N1j Express and use numbers in scientific notation.

M8N1k Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

Unit 2 Framework Enduring Understandings	Unit 2 Framework Essential Questions
Exponents are useful for representing very large or very small numbers.	When are exponents used and why are they important? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots?
Vocabulary Scientific notation Standard notation Exponent Power Base Factor Reciprocal	**Literacy GPS** **ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Warm-Up/Quick Practice	Problem Solving
Mental Math: Think money (for example, for 12 x 5, think 12 nickels, that's 60; for 48 x 25, think 48 quarters, that's 12 dollars, so the answer is 1200) Evaluate expressions with positive integer exponents Determine the probability of a compound event SM: Find the percent of a number	Solve non-routine problems involving the *Find a Pattern* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 818 Solve multi-step routine problems

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.5.1	M8N1i	**Apply the properties of exponents**	Holt Mathematics Course 3, Lesson 4-3, "Properties of Exponents," pp. 170 – 173	Textbook, pp. 170 - 173
1.5.2	M8N1i, k	**Apply knowledge of exponents to a real-life situation**	GPS Framework, Grade 8, Unit 2, Exponents, "Nesting Dolls," pp. 36 – 37 of 45	Copies of task, p. 36 of 45 Calculators
1.5.3	M8Ni, j, k	**Express large and small numbers in scientific notation** **Compare two numbers written in scientific notation**	Holt Mathematics Course 3, Lesson 4-4, "Scientific Notation," pp. 174 – 178 *and* "Multiply and Divide Numbers in Scientific Notation," p. 179	Textbook, pp. 174 – 179 Calculators
1.5.4	M8Ni, j, k	**Apply knowledge of large and small numbers to real-life situations**	GPS Framework, Grade 8, Unit 2, Exponents, "It's A Big Universe (or is it small?)," pp. 34 – 35 of 45	Copies of task, p. 34 Video (refer to lesson)
1.5.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Explore powers of 10 using GPS Framework, Grade 8, Unit 2, Exponents, "Exploring Powers of 10", pp. 30 - 33 of 45.

Maintenance: Review fractions and mixed numbers using Holt Mathematics Course 3, "Are You Ready?" p. 61.

Maintenance: Use different strategies to solve problems from Holt Mathematics Course 3, "Problem Solving on Location" pp. 456 - 457.

Exploration: Explore squared and cubed numbers using a calculator. Record a list of squared and cubed numbers.

Intervention: *Include the reteaching of recognizing patterns of exponential growth in tables and equations.*

Homework

Weekly Focus: Evaluate expressions with positive and negative integers; write numbers in scientific notation

Maintenance: Identify tables as linear or exponential relationships

Skill: Find the percent of a number

Reflection with Closure

Why do you subtract exponents when dividing powers with the same base?

Journal

Create a list of occupations that would find scientific notation useful. Explain how each occupation listed uses scientific notation.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Percent of a Number
Find the following: (1) 84% of 620 (2) 93% of 1,967 (3) 5% of 3,458 (4) 102% of 5,975
Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8N1 Students will understand different representations of numbers including square roots, exponents, and scientific notation.
M8N1a Find the square roots of perfect squares.
M8N1b Recognize the (positive) square root of a number as a length of a side of a square with a given area.
M8N1e Recognize and use the radical symbol to denote the positive square root of a positive number.
M8N1f Estimate the square root of a positive number.
M8N1i Simplify expressions containing integer exponents.
M8N1j Express and use numbers in scientific notation.
M8N1k Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

Unit 2 Framework Enduring Understandings	Unit 2 Framework Essential Questions
Exponents are useful for representing very large or very small numbers. There are many relationships between the lengths of the sides of a right triangle.	When are exponents used and why are they important? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots? Why is it useful for me to know the square root of a number?
Vocabulary	**Literacy GPS**
Perfect square Square root Radical	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Warm-Up/Quick Practice	Problem Solving
Mental Math: Continue to think money (for example, for 64 x 50, think 64 half dollars, that's 32 dollars, so the answer is 3200). Write large and small numbers using scientific notation Evaluate expressions with negative exponents SM: Multiply and divide fractions and mixed numbers	Solve non-routine problems involving the *Make a Table* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 819 Solve multi-step routine problems

Focus Lessons				
Ref#	**State Standards**	**Objectives**	**Resources**	**Materials**
1.6.1	M8Ni, j, k	**Apply scientific notation to real-life situations**	Mathematics In Context, (MIC), Revisiting Numbers, "Speed of Light," Problems 16 – 18, pp. 8 – 9 *and* "Distance in Space," Problems 19 – 23, p. 10	MIC, pp. 8 - 10
1.6.2	M8Ni	**Further investigate powers of ten**	MIC, Revisiting Numbers, "Notation: Base Ten," Problems 1 – 10, pp. 16 – 18	Copies of Student Activity Sheet 2 MIC, pp. 16 - 18
1.6.3	M8N1j, k	**Further explore exponents using real-life applications**	MIC: Revisiting Numbers, "Notation: Base Ten," Problems 11 – 19, pp. 18 – 20 *and* "Small Numbers," Problems 20 – 24, pp. 20 – 21	MIC, pp. 20 - 21
1.6.4	M8N1a, b, e, f	**Find areas of polygons drawn on a dot grid using various strategies**	GPS Framework, Grade 8, Unit 2, Exponents, "Pythagoras Plus," pp. 9 - 17of 45	Copies of task, pp. 9 – 12 of 45
1.6.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks	Homework
Weekly Focus: Use scientific notation from Holt Mathematics Course 3, p. 177, *Practice Lesson 4-4.* **Maintenance**: Review fractions and mixed numbers. **Maintenance**: Use different strategies to solve problems from Holt Mathematics Course 3, "Problem Solving on Location" pp. 456 - 457. **Exploration**: Explore squared and cubed numbers using a calculator. Record a list of cubed numbers. **Intervention**: *Include the reteaching of expressing and using numbers in scientific notation.*	**Weekly Focus**: Multiply and divide numbers in scientific notation; find the length of a line segment drawn on grid paper **Maintenance**: Solve problems involving scientific notation **Skill**: Multiply and divide fractions and mixed numbers

Reflection with Closure

Create a list of ten square roots that are whole numbers and a list of ten square roots that are not whole numbers. Explain why you chose the numbers in each list.
Between which two whole numbers does the square root of 94 lie? Prove it.

Journal

Describe how you would find the side length of a square drawn on dot paper without using a ruler. Consider both upright and tilted squares.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Multiply and divide fractions and mixed numbers. (1) 3/8 x 3/8 (2) 2 3/5 x 1 2/3 (3) 7/9 ÷ 2/3 (4) 2 3/4 ÷ 1 1/2
Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8N1 Students will understand different representations of numbers including square roots, exponents, and scientific notation.
M8N1a Find the square roots of perfect squares.
M8N1b Recognize the (positive) square root of a number as a length of a side of a square with a given area.
M8N1c Recognize square roots as points and as lengths on a number line.
M8N1d Understand that the square root of zero is zero and that every positive number has two square roots that are opposite in sign.
M8N1e Recognize and use the radical symbol to denote the positive square root of a positive number.
M8N1f Estimate the square root of a positive number.
M8N1g Simplify, add, subtract, multiply, and divide expressions containing square roots.
M8N1k Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.
M8G2 Students will understand and use the Pythagorean theorem.
M8G2a Apply properties of right triangles, including the Pythagorean theorem.
M8G2b Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.

Unit 2 Framework Enduring Understandings	**Unit 2 Framework Essential Questions**
All real numbers can be plotted on a number line. There are many relationships between the lengths of the sides of a right triangle. Some properties of real numbers hold for all irrational numbers.	Why is it useful for me to know the square root of a number? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots? What is the Pythagorean theorem and when does it hold?
Vocabulary	**Literacy GPS**
Perfect square, Square root, Significant digits Pythagorean theorem, Proof, Theorem Leg, Hypotenuse, Radical	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Warm-Up / Quick Practice	Problem Solving
Mental Math: Use compatible factors, (for example, for 2 x 8 x 5, think 2 x 5 = 10, and 10 x 8 = 80) Identify perfect square numbers Simplify expressions with negative and positive exponents SM: Compute with rational numbers	Solve non-routine problems involving the *Solve a Simpler Problem* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 820 Solve multi-step routine problems

Focus Lessons

Ref #	State Standards	Objectives	Resources	Materials
1.7.1	M8N1a, b, d, e, g	**Find square roots** **Develop understanding that every positive number has two square roots that are opposite in sign**	Holt Mathematics Course 3, "Squares and Square Roots," pp. 182 - 185	Textbook, pp. 182 – 185 Calculators
1.7.2	M8N1c, f, k	**Estimate square roots to a given number of decimal places** **Solve problems involving square roots**	Holt Mathematics Course 3, "Estimating Square Roots," pp. 186 - 189 *Include a discussion on significant digits as a way of describing how precisely a number is written*	Textbook, pp. 186 – 189 Calculators
1.7.3	M8N1c, g, h, i, k	**Use a graphing calculator to evaluate expressions that have negative exponents**	Holt Mathematics Course 3, "Technology Lab: Evaluate Powers and Roots," p. 190	Graphing calculators Textbook, p. 190
1.7.4	M8N1.h	**Determine if a number is rational or irrational**	Holt Mathematics Course 3, "The Real Numbers," pp. 191- 194	Graphing calculators Textbook, pp. 190 - 194
1.7.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Demonstrate an understanding of squares and square roots by solving problems from Holt Mathematics Course 3, p. 185 *Problem Solving Lesson 4 – 5*.

Maintenance: Choose an operation and look back when solving problems from Holt Mathematics Course 3, "Focus on Problem Solving," pp. 91 and 181.

Maintenance: Collect, organize, and analyze data.

Exploration: Create *magic squares* using Holt Mathematics Course 3, "Game Time: Magic Squares," p. 202.

Intervention: *Include the reteaching of multiplying and dividing numbers in scientific notation.*

Homework

Weekly Focus: Solve problems involving square roots

Maintenance: Solve problems involving scientific notation

Skill: Compute with rational numbers

Reflection with Closure

Describe how you can use the Pythagorean theorem to find the distance between two dots on a sheet of dot paper without measuring. Create similar figures other than squares on the legs of a right triangle. Will the Pythagorean theorem still hold true? Explain.

Journal

Distinguish between the terms squares and square roots.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Rational Number Computations
Solve. (1) 1.3 x 6.4 = (2) 98.32 ÷ 0.4 = (3) 2.56 x 0.002 = (4) 357 ÷ 0.03 =
Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8N1 Students will understand different representations of numbers including square roots, exponents, and scientific notation.
M8N1a Find the square roots of perfect squares.
M8N1b Recognize the (positive) square root of a number as a length of a side of a square with a given area.
M8N1e Recognize and use the radical symbol to denote the positive square root of a positive number.
M8N1f Estimate the square root of a positive number.
M8N1g Simplify, add, subtract, multiply, and divide expressions containing square roots.
M8G2 Students will understand and use the Pythagorean theorem.
M8G2a Apply properties of right triangles, including the Pythagorean theorem.

Unit 2 Framework Enduring Understandings	Unit 2 Framework Essential Questions
There are many relationships between the lengths of the sides of a right triangle. Some properties of real numbers hold for all irrational numbers.	When are exponents used and why are they important? Why is it useful for me to know the square root of a number? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots? What is the Pythagorean theorem and when does it hold?
Vocabulary	**Literacy GPS**
Right triangle Equilateral triangle Perpendicular 30-60-90 triangle	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Warm-Up / Quick Practice	Problem Solving
Mental Math: Use compatible factors (for example, for 25 x 5 x 9 x 2 x 4, think 25 x 4 = 100, 5 x 2 = 10, so 100 x 10 x 9 = 9000) Find the square roots of perfect squares Determine the length of a line segment drawn on dot paper without measuring SM: Simplify numerical expressions using order of operations	Solve non-routine problems involving the *Use Logical Reasoning* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 821 Solve multi-step routine problems

Focus Lessons				
Ref #	**State Standards**	**Objectives**	**Resources**	**Materials**
1.8.1	M8N1a, b, e M8G2a, b	**Explore a proof of the Pythagorean theorem** **Use the Pythagorean theorem to solve problems**	Holt Mathematics Course 3, "Explore Right Triangles," p. 195 *and* "Use the Pythagorean Theorem to solve problems	Lab 4-8 Recording Sheet Scissors Paper Textbook, pp. 196 - 199
1.8.2	M8G2a, b	**Continue to use the Pythagorean theorem to solve problems**	MIC, Reasoning with Ratios, "Pythagoras," pp. 47 – 48 *(Exclude problems 5a and 5b) and* "Shadows and Blind Spots," p. 57	MIC, pp. 47 – 48, and 57
1.8.3	M8N1a, b, e, g M8G2a,b	**Apply the Pythagorean theorem to a real-life situation**	GPS Framework, Grade 8, Unit 2, Exponents, "Comparing TVs," pp. 18 – 22 of 45	Copies of the task, p. 18 of 45 Calculators
1.8.4	N8N1a, e, f, g M8G2a	**Apply knowledge of squares and right triangles to solve a problem**	GPS Framework, Grade 8, Unit 2, Exponents, "Making Quilts," pp. 23 – 28 of 45	Copies of tasks
1.8.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Solve problems where the Pythagorean theorem can be applied.

Maintenance: Choose an operation and look back when solving problems from Holt Mathematics Course 3, "Focus on Problem Solving," pp. 91 and 181.

Maintenance: Collect, organize, and analyze data.

Exploration: Create *magic squares* using Holt Mathematics Course 3, "Game Time: Magic Squares," p. 202.

Intervention: *Include the reteaching of solving problems involving square roots.*

Homework

Weekly Focus: Find the missing lengths of right triangles

Maintenance: Solve problems involving square roots

Skill: Simplify numerical expressions using order of operations

Reflection with Closure

If given the square root of the hypotenuse and the square root of one leg, how would you determine the dimensions of the right triangle? Will the Pythagorean theorem work on any other type of triangle besides a right triangle? If so, find another triangle when this theorem can be applied and prove that it works. If not, explain why.

Journal

In what ways is the Pythagorean theorem useful? Give at least two examples.

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Order of Operations
Simplify: (1) $7 \times (3 + 2) =$ (2) $12 \div (6 - 2) \times 1/2 =$ (3) $8 + 5(3 + 2) - 13 =$ (4) $\frac{(7 - 3)(4 + 4)}{} + 4$
Performance Assessments:
Culminating Tasks:

Georgia Performance Standards

M8N1a Find the square roots of perfect squares.
M8N1b Recognize the (positive) square root of a number as a length of a side of a square with a given area.
M8N1c Recognize square roots as points and as lengths on a number line.
M8N1d Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.
M8N1e Recognize and use the radical symbol to denote the positive square root of a positive number.
M8N1f Estimate the square root of a positive number.
M8N1g Simplify, add, subtract, multiply, and divide expressions containing square roots.
M8N1h Distinguish between rational and irrational numbers.
M8N1i Simplify expressions containing integer exponents.
M8N1k Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.
M8G2a Apply properties of right triangles, including the Pythagorean theorem.
M8G2b Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.

Unit 2 Framework Enduring Understandings	**Unit 2 Framework Essential Questions**
An irrational number is a real number that can not be written as a ratio of two integers. All real numbers can be plotted on a number line. Square roots can be rational or irrational. Some properties of real numbers hold for all irrational numbers. There are many relationships between the lengths of the sides of a right triangle.	Why is it useful for me to know the square root of a number? How do I simplify and evaluate algebraic expressions involving integer exponents and square roots? What is the Pythagorean theorem and when does it hold?
Vocabulary	**Literacy GPS**
Wheel of Theodorus, Terminating decimals, Repeating decimals, Significant digits, Real numbers, Rational numbers, Irrational numbers	**ELA8RC2** The student participates in discussions related to curricular learning in all subject areas. 5 **ELA8RC3** The student acquires new vocabulary in each content area and uses it correctly. **ELA8RC4** The student establishes a context for information acquired by reading across subject areas.

Warm-Up / Quick Practice	Problem Solving
Mental Math: Think about making compatible factors, e.g., 28 X 25, think 28 = 7 X 4, then 7 X 4 X 25, that's 100 X 7 = 700, etc. Find the two consecutive whole numbers in which a square root lie Use a calculator to find the square root rounded to the nearest tenth SM: Perform operations with whole numbers	Solve non-routine problems involving the *Act It Out* strategy from Holt Mathematics Course 3, *Problem Solving Handbook*, p. 822 Solve multi-step routine problems

Focus Lessons

Ref #	State Standards	Objectives	Resources	Materials
1.9.1	M8N1a, c, d, e, f, g, h, k M8G2a,b	**Demonstrate an understanding of squares, square roots, real numbers, and the Pythagorean theorem**	Holt Mathematics Course 3, "Ready to Go On," p. 200	Textbook, p. 200
1.9.2	M8N1i, g	**Compute surface area** **Determine cost for given situation**	GPS Framework, Grade 8, Unit 2, Exponents, "The Three Little Builders (continued)," pp. 23 – 28 of 45 *Students are to complete **e** and **f** only.*	Copies of the task, pp. 38 – 39 of 45
1.9.3	M8N1a, c, d, e, f, g, h, k M8G2a,b	**Construct a number line with rational and irrational numbers** **Use the Pythagorean Theorem** **Compare and order irrational numbers**	GPS Framework, Grade 8, Unit 2, Exponents, "Culminating Task: Constructing the Irrational Number Line," pp. 42 – 45 of 45 *Allow two days to complete this activity.*	Copies of the task, p. 42 of 45
1.9.4	M8N1a, c, d, e, f, g, h, k M8G2a,b	**Construct a number line with rational and irrational numbers** **Use the Pythagorean Theorem** **Compare and order irrational numbers**	GPS Framework, Grade 8, Unit 2, Exponents, "Culminating Task: Constructing the Irrational Number Line," pp. 42 – 45 of 45	Copies of the task, p. 42 of 45 Grid paper Compasses Rulers
1.9.5		**See Variety of Instructional Tasks**		

Variety of Instructional Tasks

Weekly Focus: Identify rational and irrational numbers.

Maintenance: Use different strategies to solve problems from Holt Mathematics Course 3, "Problem Solving on Location" pp. 112 - 113.

Maintenance: Interpret graphs.

Exploration: Explore writing repeating decimals as fractions.

Intervention: *Include in reteaching of solving problems whereas the Pythagorean theorem can be applied.*

Homework

Weekly Focus: Identify rational and irrational number

Maintenance: Collect, display, and analyze data

Skill: Perform operations with whole numbers

Reflection with Closure

How can you determine if a given decimal can be written as a fraction? Give three examples of decimals that can be written as fractions and three examples of decimals that cannot.

Journal

Write a fraction that is close to but less than the square root of ten. How can you tell that your fraction is close to but less than the square root of ten?
Find a fraction that is close to but greater than the square root of ten. How can you tell that your fraction is close to but greater than the square root of ten?

Evidence of Learning (Assessments)

Weekly Focus: Teacher-selected items
Skill Mastery: Operations with Whole Numbers
(1) 432 x 285 = (2) 4,089 ÷ 67 = (3) 3457 + 4,896 + 21,122 + 345,678 + 17 = (4) 40,013 – 27,865 =
Performance Assessments:
Culminating Tasks: