Grade 4 Mathematics
Standards Resources:

This document does not contain all of the Common Core Standards, but stresses the major clusters as identified by Achieve the Core. These priority standards require greater emphasis than the others based on the depth of the ideas, the time that it takes to master, and/or their importance to future mathematics or the demands of college and career readiness.*

However, it is important that the standards which are not deconstructed in this document continue to be part of your instruction. Neglecting those standards may leave gaps in student skill and understanding as well as not preparing students for the challenges of a later grade.

This project was funded from the nonprofit organization Student Achievement Partners. This organization assembles educators and researchers to design actions based on evidence that will improve student achievement.

***PPS Deconstructed Standards: Unpacked Content by Learning Progressions** is intended to clarify concepts inherent in the Common Core State Standards. These are an instructional resource that should be used to facilitate planning for units of study in Math, creating common assessments and general instructional support of CCSS.*

Resources from the following states were used to draft these documents: Arizona Dept. of Education; Kentucky Dept of Education Core Academic Standards with Targets; North Carolina Dept of Public Instruction Unpacked Content; Common Core Institute. Adjustments and modifications have been made to customize content for the PPS district.

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DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Use the four operations with whole numbers to solve problems.
Standard: 4.OA.1

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3.OA.A.1 **3.OA.A.3**	CCSS.MATH.CONTENT.4.OA.A.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	**5.NF.B.3** **5.NF.B.5** **5.NF.B.6**

Mathematical Practices
MP. 2 Reason abstractly and quantitatively. MP.4. Model with mathematics.

Guiding Questions	
● How can I represent mathematics in an equation to solve a problem?	
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Multiplication is a comparison. ● Know multiplication strategies.	● Interpret a multiplication equation as a comparison. ● Write a multiplication equation in several ways.

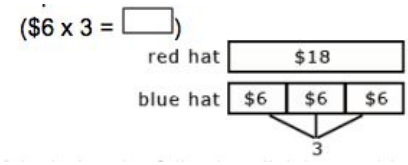
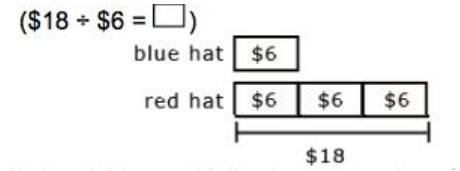
Academic Vocabulary	Explanations and Examples
Key Terms ● Multiplication/multiply ● Division/divide ● Addition/add ● Subtraction/subtract ● Equations	A multiplicative comparison is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "a is n times as much as b"). Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times. It is important to give our students experiences that allow them to use multiplication as comparison. For example: • Sally is five years old. Her mom is eight times older. How old is Sally's mom? 5x8=40 • Sally has five times as many pencils as Mary. If Mary has 5 pencils, how many pencils does Sally have? 5x5=25

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Use the four operations with whole numbers to solve problems.
Standard: 4.OA.2

Connecting Standard	Standard/Learning Outcome:	Connecting Standards
3.OA.A.3	CCSS.MATH.CONTENT.4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.	**4.NF.A.1** **4.NF.B.4** **5.NF.B.3** **5.NF.B.5** **5.NF.B.6** **6.RP.A.1** **6.RP.A.2** **8.EE.A.3**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● How can I represent mathematics in an equation to solve a problem?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Describe multiplicative comparison. ● Describe additive comparison ● Multiply or divide to solve word problems.	● Determine and use a variety of representations to model a problem involving multiplicative comparison. ● Distinguish between multiplicative comparison and additive comparison (repeated addition). ● Determine appropriate operation and solve word problems involving multiplicative comparison.

Academic Vocabulary	**Explanations and Examples**
Key Terms ● Multiplication ● Multiply ● Division ● Divide ● Unknown ● Equation	Students need many opportunities to solve contextual problems. • A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? In solving this problem, the student should identify $6 as the quantity that is being multiplied by 3. The student should write the problem using a symbol to represent the unknown.  • A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? In solving this problem, the student should identify $18 as the quantity being divided into shares of $6. The student should write the problem using a symbol to represent the unknown. 

	When distinguishing multiplicative comparison from additive comparison, students should note that: ● Additive comparisons focus on the difference between two quantities (e.g., Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have?). A simple way to remember this is, “How many more?” ● Multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is “How many times as much?” or “How many times as many?”

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Use the four operations with whole numbers to solve problems.
Standard: 4.OA.3

Connecting Standards	Standard/Learning Outcome:	Connecting Standard
3.OA.D.8 **4.NBT.A.3** **4.NBT.B.6**	CCSS.MATH.CONTENT.4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	**7.NS.A.3**

Mathematical Practices
MP.1. Make sense of problems and persevere in solving them. MP. 2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure.

Guiding Questions
● How can I represent mathematics in an equation to solve a problem?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Divide whole numbers including division with remainders.	● Represent multi-step word problems using equations with a letter standing for the unknown quantity. ● Interpret multi-step word problems (including problems in which remainders must be interpreted) and determine the appropriate operations to solve. ● Assess the reasonableness of an answer in solving a multi-step word problem using mental math and estimation strategies (including rounding).

Academic Vocabulary	**Explanations and Examples**
Key Terms ● Multiplication ● Multiply ● Division/divide ● Unknown ● Reasonableness	Students need many opportunities solving multi-step story problems using all four operations. An interactive whiteboard, document camera, drawings, words, numbers, and/or objects may be used to help solve story problems. Example: ● Chris bought clothes for school. She bought 3 shirts for $12 each and a skirt for $15. How much money did Chris spend on her new school clothes? ○ 3 x $12 + $15 = a In division problems, the remainder is the whole number left over when as large a multiple of the divisor as possible has been subtracted. Example: ● Kim is making candy bags. There will be 5 pieces of candy in each bag. She had 53 pieces of candy. She ate 14 pieces of candy. How many candy bags can Kim make now? ○ (7 bags with 4 leftover) ● Kim has 28 cookies. She wants to share them equally between herself and 3 friends. How many cookies will each person get? ○ (7 cookies each) 28 ÷ 4 = a ● There are 29 students in one class and 28 students in another class going on a field trip. Each car can hold 5 students. How many cars are needed to get all the students to the field trip?

	○ (12 cars, one possible explanation is 11 cars holding 5 students and the 12th holding the remaining 2 students) 29 + 28 = 11 x 5 + 2 Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies include, but are not limited to: ● Front-end estimation with adjusting (using the highest place value and estimating from the front end, making adjustments to the estimate by taking into account the remaining amounts) ● Clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate) ● Rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values) ● Using friendly or compatible numbers such as factors (students seek to fit numbers together - e.g., rounding to factors and grouping numbers together that have round sums like 100 or 1000) ● Using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate)

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Generalize place value understanding for multi-digit whole numbers.
Standard: 4.NBT.1

Connecting Standard	Standard/Learning Outcome:	Connecting Standards
2.NBT.A.1	**CCSS.MATH.CONTENT.4.NBT.A.1** Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division*.	**4.NBT.A.2** **4.NBT.A.3** **4.NBT.B.4** **4.NBT.B.5** **4.NBT.B.6** **5.NBT.A.1**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.6. Attend to precision. MP.7. Look for and make use of structure.
Guiding Questions
● How does a digit's position affect its value?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	

Academic Vocabulary	Explanations and Examples
Key Terms ● place value	Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: ● Investigate the product of 10 and any number, then justify why the number now has a 0 at the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 in 350 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones.) While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. ● Investigate the pattern, 6, 60, 600, 6,000, 60,000, and 600,000 by dividing each number by the previous number.

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Generalize place value understanding for multi-digit whole numbers.
Standard: 4.NBT.2

Connecting Standard	Standard/Learning Outcome:	Connecting Standards
4.NBT.A.1	CCSS.MATH.CONTENT.4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	**4.NBT.A.3** **5.NBT.A.3**

Mathematical Practices
MP. 2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.6. Attend to precision. MP.7. Look for and make use of structure.
Guiding Questions
● How does a digit's position affect its value?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form.	● Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Academic Vocabulary	Explanations and Examples
Key Terms ● greater than ● less than ● equal to ● ‹, ›, = ● comparisons/compare	The expanded form of 275 is 200 + 70 + 5. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, "both numbers have the same value of 10,000s and the same value of 1000s however, the value in the 100s place is different so that is where I would compare the two numbers".

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Generalize place value understanding for multi-digit whole numbers.
Standard: 4.NBT.3

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NBT.A.1 **4.NBT.A.1** **4.NBT.A.2**	CCSS.MATH.CONTENT.4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.	**4.OA.A.3** **5.NBT.A.4**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.6. Attend to precision.
Guiding Questions
● How does a digit's position affect its value?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form.	● Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Academic Vocabulary	Explanations and Examples
Key Terms ● Round ● Compare	When students are asked to round large numbers, they first need to identify which digit is in the appropriate place. **Example**: Round 76,398 to the nearest 1000. ● Step 1: Since I need to round to the nearest 1000, then the answer is either 76,000 or 77,000. ● Step 2: I know that the halfway point between these two numbers is 76,500. ● Step 3: I see that 76,398 is between 76,000 and 76,500. ● Step 4: Therefore, the rounded number would be 76,000.

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.
Standard: 4.NBT.4

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NBT.A.2 **4.NBT.A.1**	CCSS.MATH.CONTENT.4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.	**5.NBT.B.5** **5.NBT.B.6** **5.NBT.B.7**

Mathematical Practices
MP. 2. Reason abstractly and quantitatively. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Guiding Questions
● Why is the standard algorithm an efficient method for addition and subtraction?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Fluently add and subtract multi-digit whole numbers less than or equal to 1,000,000 using the standard algorithm.	

Academic Vocabulary	Explanations and Examples
Key Terms ● Addition/add ● Subtraction/subtract	Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. ● 3892 + 1567 Student explanation for this problem: 1. Two ones plus seven ones is nine ones. 2. Nine tens plus six tens is 15 tens. 3. I am going to write down five tens and think of the 10 tens as one more hundred. (notates with a 1 above the hundreds column) 4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds. 5. I am going to write the four hundreds and think of the 10 hundreds as one more 1000. (notates with a 1 above the thousands column) 6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand.

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics

Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standard: 4.NBT.5

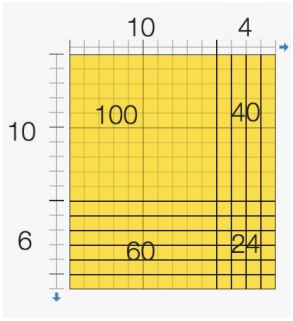
Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NBT.A.2 **3.NBT.A.3** **3.OA.B.5** **3.OA.C.7** **4.NBT.A.1**	**CCSS.MATH.CONTENT.4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**4.NBT.B.6** **5.NBT.B.5**

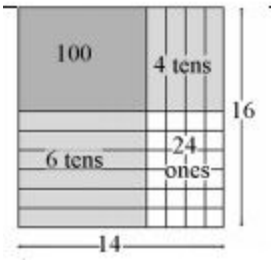
Mathematical Practices
MP. 2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● What is an efficient strategy for multiplying numbers?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Multiply a whole number of up to four digits by a one-digit whole number. ● Multiply two two-digit numbers with the algorithm.	● Use strategies based on place value and the properties of operations to multiply whole numbers. ● Illustrate and explain calculations by using written equations, rectangular arrays, and/or area models.

Academic Vocabulary	Explanations and Examples
Key Terms ● Multiply ● Place value ● Strategies ● Equation ● Array ● Area model ● Partial product ● Properties-rules about how numbers work	Students who develop flexibility in breaking numbers apart have a better understanding of the importance of place value and the distributive property in multi-digit multiplication. Students use base ten blocks, area models, partitioning, compensation strategies, etc. when multiplying whole numbers and use words and diagrams to explain their thinking. They use the terms factor and product when communicating their reasoning. Multiple strategies enable students to develop fluency with multiplication and transfer that understanding to division.Use of the standard algorithm for multiplication is an expectation in the 5th grade. Use of place value and the distributive property are applied in the scaffold examples below. To illustrate 154 x 6 students use base 10 blocks or use drawings to show 154 six times. Seeing 154 six times will lead them to understand the distributive property, 154 X 6 = (100 + 50 + 4) x 6 = (100 x 6) + (50 X 6) + (4 X 6) = 600 + 300 + 24 = 924.

Using the area model for 14 x 16, students can show and verbalize their understanding:





- 10 x 10 is 100
- 4 x 10 is 40
- 10 x 6 is 60
- 4 x 6 is 24

They use different strategies to record this type of thinking.

Students explain this strategy and the one above with base 10 blocks, drawings, or numbers.

25
x24
400 (20 x 20)
100 (20 x 5)
80 (4 x 20)
20 (4 x 5)
600

The model below should be introduced after students have facility with the strategies shown above.

	20	5	
20	400	100	500
4	80	20	100
	480 +120		600

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics

Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standard: 4.NBT.6

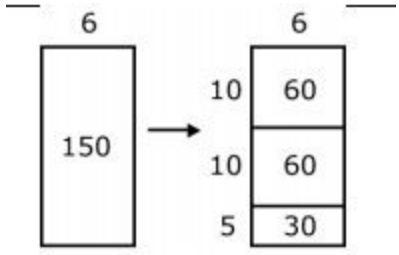
Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NBT.A.2 **3.OA.B.5** **3.OA.B.6** **3.OA.C.7** **4.NBT.A.1** **4.NBT.B.5**	CCSS.MATH.CONTENT.4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**4.OA.A.3** **5.NBT.B.6**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● What is an efficient strategy for dividing numbers?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Find whole number quotients and remainders with up to four-digit dividends and one-digit divisors.	● Use the strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. ● Illustrate and explain the calculation by using written equations, rectangular arrays, and/ or area models.

Academic Vocabulary	Explanations and Examples
Key Terms ● Operation ● Multiply ● Divide ● Factor ● Product ● Quotient ● Subtract ● Add ● Addend ● Sum	In fourth grade, students build on their third grade work with division within 100. Students need opportunities to develop their understandings by using problems in and out of context. Examples: ● A 4th grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box? ● **Using Base 10 Blocks**: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50. ● **Using Place Value**: 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4) ● **Using Multiplication**: 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65 Students may use digital tools to express ideas. ● **Using an Open Array or Area Model** After developing an understanding of using arrays to divide, students begin to use a more abstract model for division. This model connects to a recording process that will be formalized in the 5th grade.

Example 1: 150 ÷ 6

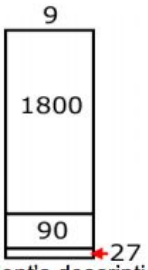


Students make a rectangle and write 6 on one of its sides. They express their understanding that they need to think of the rectangle as representing a total of 150.

1. Students think, 6 times what number is a number close to 150? They recognize that 6 x 10 is 60 so they record 10 as a factor and partition the rectangle into 2 rectangles and label the area aligned to the factor of 10 with 60. They express that they have only used 60 of the 150 so they have 90 left.
2. Recognizing that there is another 60 in what is left they repeat the process above. They express that they have used 120 of the 150 so they have 30 left.
3. Knowing that 6 x 5 is 30. They write 30 in the bottom area of the rectangle and record 5 as a factor.
4. 150 - 60 = 90, 90 - 60 = 30, 30 - 30 = 0
5. 10 + 10 + 5 = 25 therefore 150 ÷ 6 = 25

150 ÷ 6 = (60 ÷ 6) + (60 ÷ 6) + (30 ÷ 6) = 10 + 10 + 5 = 25

- Example 2: 1917 ÷ 9



A student's description of his or her thinking may be:

- I need to find out how many 9s are in 1917.
- I know that 200 x 9 is 1800. So if I use 1800 of the 1917, I have 117 left.
- I know that 9 x 10 is 90. So if I have 10 more 9s, I will have 27 left.
- I can make 3 more 9s.
- I have 200 nines + 10 nines + 3 nines. So I made 213 nines.
- 1917 ÷ 9 = 213.

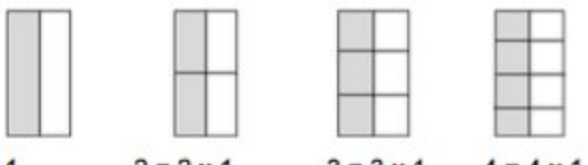
DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Extend understanding of fraction equivalence and ordering.
Standard: 4.NF.1

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NF.A.3 **4.OA.A.2**	**CCSS.MATH.CONTENT.4.NF.A.1** **Explain why a fraction *a*/*b* is equivalent to a fraction (*n* × *a*)/(*n* × *b*) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.**	**4.NF.A.2** **4.NF.B.3** **4.NF.C.5** **5.NF.A.1** **5.NF.B.5**

Mathematical Practices
MP. 2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.

Guiding Questions
● How do I know when fractions are equivalent?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Recognize and identify equivalent fractions with unlike denominators.	● Explain why a/b is equal to (n x a)/(n x b) by using fraction models with attention to how the number and size of the parts di er even though the two fractions themselves are the same size. ● Use visual fraction models to show why fractions are equivalent. Generate equivalent fractions using visual fraction models and explain why they can be called “equivalent.”

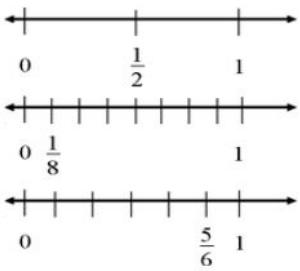
Academic Vocabulary	**Explanations and Examples**
Key Terms ● Partition(ed) ● Fraction ● Equivalent ● Denominator ● Numerator ● Comparison ● Compare (symbols ‹, ›, =) ● Benchmark fraction	This standard extends the work in third grade by using additional denominators (5, 10, 12, and 100). Students can use visual models or applets to generate equivalent fractions. All the models show 1/2. The second model shows 2/4 but also shows that 1/2 and 2/4 are equivalent fractions because their areas are equivalent. When a horizontal line is drawn through the center of the model, the number of equal parts doubles and size of the parts is halved. Students will begin to notice connections between the models and fractions in the way both the parts and wholes are counted and begin to generate a rule for writing equivalent fractions. 1/2 x 2/2 = 2/4.  1/2 = 2/4 = 2 x 1 / 2 x 2 = 3/6 = 3 x 1 / 3 x 2 = 4/8 = 4 x 1 / 4 x 2

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Extend understanding of fraction equivalence and ordering.
Standard: 4.NF.2

Connecting Standard	Standard/Learning Outcome:	Connecting Standards
4.NF.A.1	**CCSS.MATH.CONTENT.4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	**4.NF.C.7** **5.NF.A.2**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● How can I compare two fractions? ● How can a common numerators and common denominators or thinking about size help me compare fractions?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Recognize and record fraction comparisons using less than, greater than, and equal to symbols. ● Record comparison results with symbols: <, >, =. ● Use benchmark fractions such as 1/2 for comparison purposes. ● Make comparisons based on parts of the same whole.	● Compare two fractions with different numerators and denominators by creating common denominators or comparing to a benchmark fraction. ● Justify the results of a comparison of two fractions by using a visual fraction model.

Academic Vocabulary	Explanations and Examples
Key Terms ● Partition(ed) ● Fraction ● Denominator ● Numerator ● Comparison ● Compare (symbols ‹, ›, =) ● Justify	Benchmark fractions include common fractions between 0 and 1 such as halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and hundredths. Fractions can be compared using benchmarks, common denominators, or common numerators. Symbols used to describe comparisons include <, >, =. Fractions may be compared using 1/2 as a benchmark.  Possible student thinking by using benchmarks: 1/8 is smaller than 1/2 because when 1 whole is cut into 8 pieces, the pieces are much smaller than when 1 whole is cut into 2 pieces. Possible student thinking by creating common denominators: ○ $\frac{5}{6} > \frac{1}{2}$ because $\frac{3}{6} = \frac{1}{2}$ and $\frac{5}{6} > \frac{3}{6}$ Fractions with common denominators may be compared using the numerators as a guide. ○ $\frac{2}{6} < \frac{3}{6} < \frac{5}{6}$ Fractions with common numerators may be compared and ordered using the denominators as a guide. $\frac{3}{10} < \frac{3}{8} < \frac{3}{4}$

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Build fractions from unit fractions.
Standard: 4.NF.3

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
1.OA.B.3 **1.OA.B.4** **1.OA.D.8** **2.OA.A.1** **3.NF.A.1** **3.NF.A.2** **4.NF.A.1**	CCSS.MATH.CONTENT.4.NF.B.3 Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. CCSS.MATH.CONTENT.4.NF.B.3.a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. CCSS.MATH.CONTENT.4.NF.B.3.b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8*. CCSS.MATH.CONTENT.4.NF.B.3.c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. CCSS.MATH.CONTENT.4.NF.B.3.d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	**4.NF.C.5** **5.NF.A.1**

Mathematical Practices

MP.1. Make sense of problems and persevere in solving them.
MP.2. Reason abstractly and quantitatively.
MP.4. Model with mathematics.
MP.5. Use appropriate tools strategically.
MP.6. Attend to precision.
MP.7. Look for and make use of structure.
MP.8. Look for and express regularity in repeated reasoning.

Guiding Questions

- What is a unit fraction?
- How can I apply my understanding of operations (+, -, /,*) on whole numbers to build fractions?

Substandard Deconstruction	**4.NF.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Understand accumulating unit fractions (1/b) results in a fraction (a/b), where a is greater than 1.	● Using fraction models, reason that addition of fractions is joining parts that are referring to the same whole. ● Using fraction models, reason that subtraction of fractions is separating parts that are referring to the same whole.

Substandard Deconstruction	**4.NF.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Recognize multiple representations of one whole using fractions with the same denominator. ● Add and subtract fractions with like denominators.	● Using visual fraction models, decompose a fraction into the sum of fractions with the same denominator in more than one way. ● Record decompositions of fractions as an equation and explain the equation using visual fraction models.
Substandard Deconstruction	**4.NF.3c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Replace mixed numbers with equivalent fractions, using visual fraction models. ● Replace improper fractions with a mixed number, using visual fraction models.	● Add and subtract mixed numbers with like denominators by using properties of operations and the relationship between addition and subtraction. ● Add and subtract mixed numbers by replacing each mixed number with an equivalent fraction.
Substandard Deconstruction	**4.NF.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
	● Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, by using visual fraction models and equations to represent the problem.

Academic Vocabulary	Explanations and Examples
Key Terms ● Partition(ed) ● Fraction ● Denominator ● Numerator ● Comparison ● Compare (symbols ‹, ›, =) ● Justify	A fraction with a numerator of one is called a unit fraction. When students investigate fractions other than unit fractions, such as 2/3, they should be able to decompose the non-unit fraction into a combination of several unit fractions. Examples: Fraction Example 1: • 2/3 = 1/3 + 1/3 Being able to visualize this decomposition into unit fractions helps students when adding or subtracting fractions. Students need multiple opportunities to work with mixed numbers and be able to decompose them in more than one way. Students may use visual models to help develop this understanding. Fraction Example 2: • 1 1⁄4 - 3⁄4= 4/4 + 1⁄4 = 5/4 5/4 – 3⁄4 = 2/4 or 1⁄2

	Word Problem Example 1: Mary and Lacey decide to share a pizza. Mary ate 3/6 and Lacey ate 2/6 of the pizza. How much of the pizza did the girls eat together? Solution: The amount of pizza Mary ate can be thought of a 3/6 or 1/6 and 1/6 and 1/6. The amount of pizza Lacey ate can be thought of a 1/6 and 1/6. The total amount of pizza they ate is 1/6 + 1/6 + 1/6 + 1/6 + 1/6 or 5/6 of the whole pizza. A separate algorithm for mixed numbers in addition and subtraction is not necessary. Students will tend to add or subtract the whole numbers first and then work with the fractions using the same strategies they have applied to problems that contained only fractions. Word Problem Example 2: • Susan and Maria need 8 3/8 feet of ribbon to package gift baskets. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. How much ribbon do they have altogether? Will it be enough to complete the project? Explain why or why not. The student thinks: I can add the ribbon Susan has to the ribbon Maria has to find out how much ribbon they have altogether. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. I can write this as 3 1/8+5 3/8. I know they have 8 feet of ribbon by adding the 3 and 5. They also have 1/8 and 3/8 which makes a total of 4/8 more. Altogether they have 8 4/8 feet of ribbon. 8 4/8 is larger than 8 3/8 so they will have enough ribbon to complete the project. They will even have a little extra ribbon left, 1/8 foot.

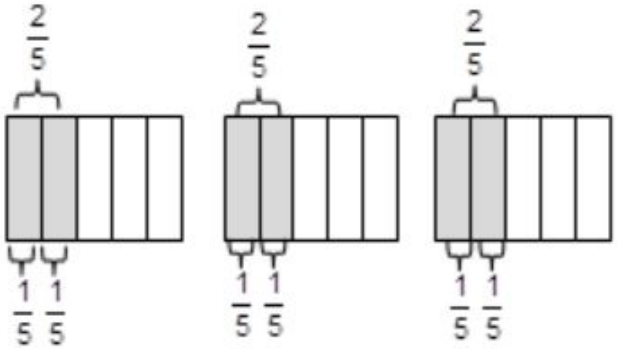
DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Build fractions from unit fractions.
Standard: 4.NF.4

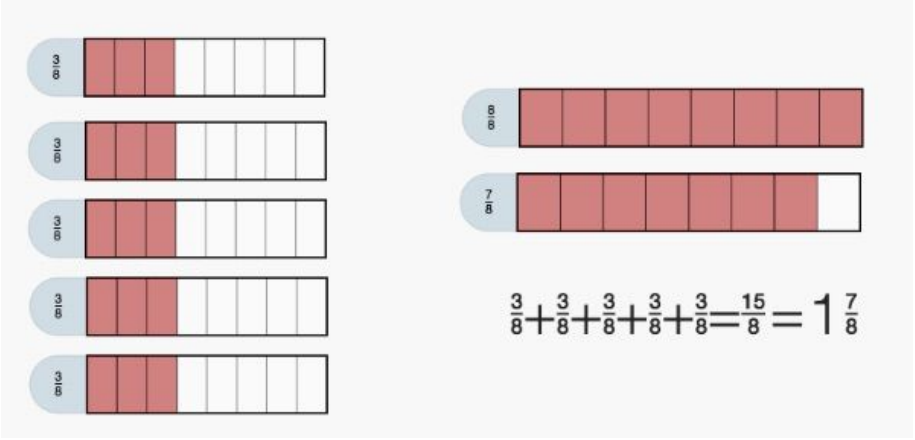
Connecting Standards	Standard/Learning Outcome:	Connecting Standards
3.NF.A.1 **3.OA.A.1** **3.OA.A.3** **4.OA.A.2**	CCSS.MATH.CONTENT.4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. CCSS.MATH.CONTENT.4.NF.B.4.a Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4)*. CCSS.MATH.CONTENT.4.NF.B.4.b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* CCSS.MATH.CONTENT.4.NF.B.4.c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*	**4.MD.A.2** **5.NF.B.4** **5.NF.B.7**

Mathematical Practices
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Guiding Questions
● What is a unit fraction? ● How can I apply my understanding of operations (+, -, /,*) on whole numbers to build fractions?

Substandard Deconstruction	**4.NF.4a Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Represent a fraction a/b as a multiple of 1/b (unit fractions).	● Apply multiplication of whole numbers to multiplication of a fraction by a whole number using visual fraction models.

Substandard Deconstruction	**4.NF.4b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Explain that a multiple of a/b is a multiple of 1/b (unit fraction) using a visual fraction model. ● Multiply a fraction by a whole number by using the idea that a/b is a multiple of 1/b.	
Substandard Deconstruction	**4.NF.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?**
KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Multiply a fraction by a whole number. ● Use fraction models and equations to represent the problem.	● Solve word problems involving multiplication of a fraction by a whole number

Academic Vocabulary	Explanations and Examples
Key Terms ● Partition(ed) ● Fraction ● Denominator ● Numerator ● Multiply	Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns. Examples: ● 3 x (2/5) = 6 x (1/5) = 6/5 

	● If each person at a party eats 3/8 of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie? A student may build a fraction model to represent this problem. 

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Understand decimal notation for fractions, and compare decimal fractions.
Standard: 4.NF.5

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
4.NF.A.1 **4.NF.B.3**	CCSS.MATH.CONTENT.4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.2*For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100*.	**4.MD.A.2** **5.NBT.A.1**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● How do I know when fractions are equivalent?

KNOW (Essential Concept)	**DO (Learning Targets/Essential Skills)**
● Rename and recognize a fraction with a denominator of 10 as a fraction with a denominator of 100. ● Recognize that two fractions with unlike denominators can be equivalent.	● Use knowledge of renaming tenths to hundredths to add two fractions with denominators 10 and 100.

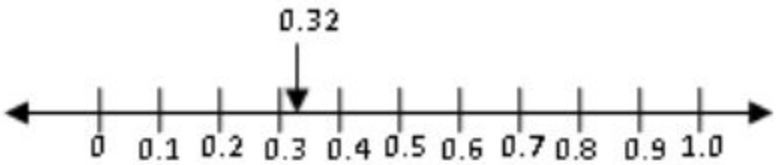
Academic Vocabulary	Explanations and Examples
Key Terms ● Fraction ● Denominator ● Numerator ● Equivalent ● Reasoning ● Decimals ● Tenths ● Hundredths ● Multiplication ● Comparisons/Compare	Students can use base ten blocks, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100. Students may represent 3/10 with 3 longs and may also write the fraction as 30/100 with the whole in this case being the flat (the flat represents one hundred units with each unit equal to one hundredth). This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade.

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Understand decimal notation for fractions, and compare decimal fractions.
Standard: 4.NF.6

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
	CCSS.MATH.CONTENT.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram*.	**4.MD.A.2** **4.NF.C.7** **5.NBT.A.1**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● How are fractions and decimals related?

KNOW (Essential Concept)	DO (Learning Targets/Essential Skills)
● Explain the values of digits in the decimal places. ● Read and write decimals through hundredths. ● Rename fractions with 10 and 100 in the denominator as decimals. ● Recognize multiple representations of fractions with denominators 10 or 100.	● Represent fractions with denominators 10 or 100 with multiple representations and decimal notation. ● Explain how decimals and fractions relate.

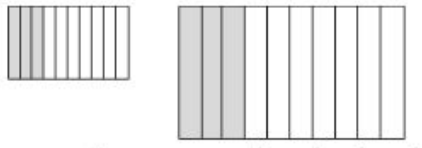
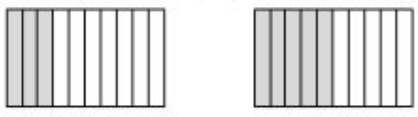
Academic Vocabulary	Explanations and Examples
Key Terms ● Fraction ● Denominator ● Numerator ● Equivalent ● Reasoning ● Decimals ● Tenths ● Hundredths ● Multiplication	Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say 32/100 as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model as shown below. Hundreds | Tens | Ones | • | Tenths | Hundredths | | | | • | 3 | 2 Students use the representations explored in 4.NF.5 to understand 32/100 can be expanded to 3/10 and 2/100. Students represent values such as 0.32 or 32/100 on a number line. 32/100 is more than 30/100 (or 3/10) and less than 40/100 (or 4/10). It is closer to 30/100 so it would be placed on the number line near that value. 

DECONSTRUCTED PRIORITY CCSS STANDARDS: Mathematics
Cluster: Understand decimal notation for fractions, and compare decimal fractions.
Standard: 4.NF.7

Connecting Standards	Standard/Learning Outcome:	Connecting Standards
4.NF.A.2 **4.NF.C.6**	CCSS.MATH.CONTENT.4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	**5.NBT.A.1** **5.NBT.A.3**

Mathematical Practices
MP.2. Reason abstractly and quantitatively. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.7. Look for and make use of structure.
Guiding Questions
● How do you compare decimals?

KNOW (Essential Concept)	DO (Learning Targets/Essential Skills)
● Recognize that comparisons are valid only when the two decimals refer to the same whole.	● Compare two decimals to hundredths by reasoning about their size. ● Record the results of comparisons with the symbols >, =, or <. ● Justify the conclusions using visual models and other methods.

Academic Vocabulary	Explanations and Examples
Key Terms ● Fraction ● Denominator ● Numerator ● Equivalent ● Reasoning ● Decimals ● Tenths ● Hundredths ● Multiplication ● Compare/Comparisons	Students build area and other models to compare decimals. Through these experiences and their work with fraction models, they build the understanding that comparisons between decimals or fractions are only valid when the whole is the same for both cases. Each of the models below shows 3/10 but the whole on the right is much bigger than the whole on the left. They are both 3/10 but the model on the right is a much larger quantity than the model on the left.  When the wholes are the same, the decimals or fractions can be compared. **Example**: Draw a model to show that 0.3 < 0.5. (Students would sketch two models of approximately the same size to show the area that represents three- tenths is smaller than the area that represents five- tenths. 

Fourth Grade Supporting Standards

Operations and Algebraic Thinking

Gain familiarity with factors and multiples.

4.OA.B.4
Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Generate and analyze patterns.

4.OA.C.5
Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

Measurement and Data

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

4.MD.A.1
Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

4.MD.A.2
Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

4.MD.A.3
Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Represent and interpret data.

4.MD.B.4
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

Geometric measurement: understand concepts of angle and measure angles.

4.MD.C.5
Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

4.MD.C.6
Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.C.7
Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Geometry

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.G.A.1
Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

4.G.A.2
Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

4.G.A.3
Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.