4th Grade
Math Standards Help Sheets
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Websites

- IXL – Math and Language both
- khanacademy.org
- learnzillion.com
- https://www.teachingchannel.org
- http://www.commoncoresheets.com
- www.mathisfun.com

All Year Standards

4.M.OA.A.03 I can solve multistep word problems with all four operations including estimation.

Big Ideas

- Students can solve and justify answers for multistep word problems
- Students can use all four operations to solve word problems.
- Students can solve word problems using estimation and mental math.
- Students should be able to interpret remainders.
- Students can justify the reasonableness of their answers.

Common Misconceptions

- To avoid misconceptions students will need to know how to round in order to estimate.

Performance Task / Model Product Example
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.
Examples:

- 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).

Vocabulary

- **Estimation** – finding a value that is close enough to the right answer
- **Rounding** – reducing the digits in a number while trying to keep its value similar
- **Remainder** – the amount left over after division

"Key Words and Catch Phrases" for Word Problems

- **Addition**
  - increased by add
  - more than
  - altogether
  - combined
  - both
  - together
  - in all
  - total of
  - sum
  - added to

- **Subtraction**
  - decreased by
  - how many more
  - minus
  - how much more
  - less left
  - difference
  - remain
  - less than
  - how much less
  - fewer than words ending with -er (longer, faster, heavier)
- **Multiplication**
  - of
  - every
  - times
  - at this rate
  - multiplied by
  - product of
- **Division**
  - share equally
  - each
  - per
  - average
  - out of
  - split
  - ratio of
  - quotient of
  - percent (divide by 100)
- **Equals**
  - is
  - are
  - was
  - were
  - will be
  - gives
  - yields
  - sold for

Steps for solving MULTI-STEP Word Problems

1. First, read the problem
2. Write the question here
   ____
3. Circle all the important numbers you will need
4. Write down all the keywords you need here
   ____
5. Group your first set of numbers. What do you need to do first, before you can find the answer?
   ____
6. What do you need to do next to answer the question?
   ____
7. Reread the question. Do you have your answer? YES / NO
8. Write your answer here
   ____

Examples

Jessica went to the store and bought four boxes of cereal for $4 each and a gallon of milk for $3. How much did Jessica spend altogether at the store?
4 x $4 = $16
$16 + $3 = $19
Jessica spent $19 at the store.

Lacey is going to give each student 5 pencils. She has 67 pencils. She gave 4 pencils to her sister. How many students will get 5 pencils?
67 – 4 = 63 (number of pencils to split between the students)
63 ÷ 5 = 12 with 3 left over (5 x 12 = 60 + 3)

If there is a remainder you need to say so in your answer 12 students will get 5 pencils with 3 pencils left over.

There are 98 students going to school. Each bus holds 22 people. How many buses will be needed to take all the students to school?
98 people ÷ 22 people on a bus
98 ÷ 22 = 4 with 10 left over (22 x 4 = 88 + 10)
**If there are left overs you have to add another bus. We will need 5 buses to get all the students to school.

Aug 10th

[4.M.NBT.A.01] I can determine that a digit in one place represents ten times what it represents in the place to its right.

Big Ideas:

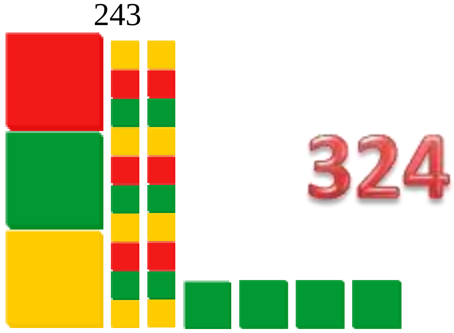
1. A digit in one place represents ten times what it represents in the place to its right.

Common Misconceptions:

1. Use base ten blocks and grids to teach. (To help clear up misconceptions)

Student Understanding:

- 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, 600,000 by dividing each number by the previous number.
- **Examples**
    - What do you notice about the similarities and differences between the two numbers? 324 and 243



6 x 100 = 600 because 600 represents 6 hundreds, 0 tens and 0 ones

Hundreds	tens	ones
6	0	0

Vocabulary introduction: Place Value – The value of where the digit is in the number (ones, tens, hundreds…)When we have more than one of a base-ten block tool, we refer to it as a **set**. So the number 243 has two sets of hundreds (**flats**), four sets of tens (**rods**), and three sets of ones (**cubes**).

How is the 3 in the number 324 similar to and different from the 3 in 243? One is 3 hundreds and the other is 3 ones and they both represent 3 sets of a place value?

Aug 15th (2 standards)

[4.M.NBT.A.02] I can read, write, and compare multi-digit whole numbers.

Big Ideas

- Place value determines which number has greater value.
- Expanded form can be used to compare whole numbers.
- Expanded form is taking a number and using place value to determine each digit's value.

Common Misconceptions

- Students may not realize that a zero in a number represents a place value.
- Students may not realize that a zero in a number can be omitted in expanded form.
- Students need to make sure that they are comparing the correct place values.

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.

Sample Problem: 63,407 hunting licenses were purchased in Arizona last year. Write 63, 407 in expanded form. a) 63,000 + 400 + 0 +7 **b) 60,000 + 3,000 + 400 + 0 + 7** c) 60,000 + 3,000 + 400 + 7

Sample Problem: Make a comparison with the two numbers below. What symbol should go in the circle?
75,285 ○ **75,391** a) < b) = c) >

Sample Problem: The population of Phoenix is 1,445,632 people. Write that number in expanded form and the number name (word form). **1,000,000 + 400,000 + 40,000 + 5,000 + 600 + 30 + 2 and one million, four hundred forty-five thousand, six hundred thirty-two**

Aug 15h (2nd standard)

[4.M.NBT.A.03] I can round multi-digit whole numbers to any place.

Big Ideas

- Estimating is finding an approximate answer.
- Rounding is a form of estimation.

Common Misconceptions

- Students tend to round to the highest place value instead of the listed place value-179 round to the nearest ten.
- Students don't follow with zeroes. They either leave them off and leave the numbers the same

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.

Sample problem: The store sold 5,846 computers in one month. Round the number of computers to the nearest thousand. a) 5,800 b) 6,800 c) 5,000 **d) 6,000**

Sample problem: Round the number 403,866 to the nearest ten and then round it to the nearest hundred. (You should have two different answers when you are done.) Justify your answers.

Answer: 403,870 (nearest ten) Possible **justification**: Since there is a six in the ones place the tens place goes up one and becomes a seven and the ones place becomes a zero.

Answer: 403,900 (nearest hundreds) **Possible justification**: Since there is a six in the tens place the hundreds place goes up one and becomes a 9, and all the places to the right become zeroes.

Aug 22nd

[4.M.OA.A.02] I can solve multiplication and division word problems using drawings and equations with a variable.

Big Ideas

- Multiplication and division word problems can be solved with an unknown (variable) using drawings and equations.
- Cue words will help students determine whether a word problem is multiplication or division.

Common Misconceptions

- Additive comparisons focus on the difference between two quantities. "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. "How many times as much?"
- Most resources use, "How many more?" for adding and multiplying
- Make sure when solving the problem to the use the inverse operation. E.g. for "how many times as much," because the student should use division to solve this problem.

Sample Problem: 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. **($6 x 3 = N) Using Multiplication**

1 Red hat	$18.00		
3 Blue hats	$6.00	$6.00	$6.00

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. **($18 ÷ $6 = N) Using Division**

Blue Hat	$6.00		
Red Hat	$6.00	$6.00	$6.00

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?"**

Vocabulary:

*** Equation** – a math statement that says that two expressions have the same value (any number sentence with a equal sign)

7 – 3 = 10 – 6
4 = 4

*** Variable** – a symbol for a number we don't know yet. It is usually a letter like x or y.

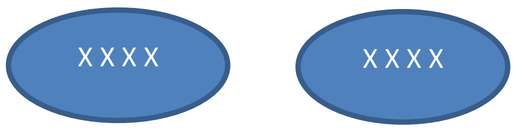
7x = 35 (x is the variable)

*** Represent – to take the place of (example: a variable represents an unknown number)**

Multiplication Strategies:

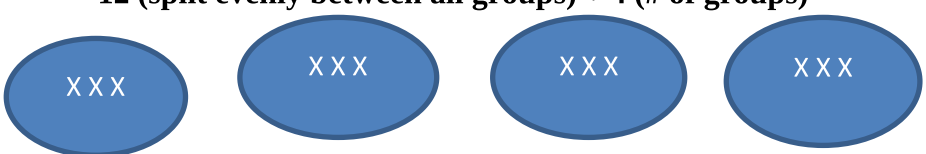
- **Repeated Addition: 2 x 4 = 2+2+2+2 = 8**
- **Array: 2 (rows) x 4 (in each row)**
  xxxx = 8
  xxxx

- **Groups of: 2 (groups) x 4 (in each group) = 8**



Division Strategies:

- **Repeated Subtraction: 12 ÷ 4 = 3**
  12 – 4 = 8 – 4 = 4 – 4 = 0
  1 2 3
- **Equal Groups:**
  12 (split evenly between all groups) ÷ 4 (# of groups)



= 3 (# in each group)

- **Solve** – to find an answer to, explanation for, or means for dealing with a problem.
- **Draw/Model –** draw a picture/model that can represent the problem. (Example: an array or equal groups)
- **Distinguish –** to tell the difference between two things

Sample Problem: A shirt costs $14. A jacket costs 7 times as much as a shirt. How much does the jacket cost? **Possible solutions** - $14 x 7 = $98. For a jacket or $14 + 14 = 28 + 14 = 42 + 14 = 56 + 14 = 70 + 14 = 84 + 14 = $98 for a jacket

Sample Problem: A pair of shoes costs $52 and a pair of socks cost $4. How many times as much does the pair of shoes cost as the pair of socks? **Possible solutions** - $52 / 4 = 13 times more or $52 – 4 = 48 – 4 = 44 – 4 = 40 – 4 = 36 – 4 = 32 – 4 = 28 – 4 = 24 – 4 = 20 – 4 = 16 – 4 = 12 – 4 = 8 – 4 = 4 – 4 = 0 or 13 times

Aug 29th (2 weeks)

[4.M.NBT.B.05] I can use multiple strategies to multiply whole numbers of 4 digits by 1 digit and 2 digits by 2 digits.

Big Ideas

- There are multiple ways to solve a multiplication problem.
- Multiplication strategies can provide a better understanding of place value.

Common Misconceptions

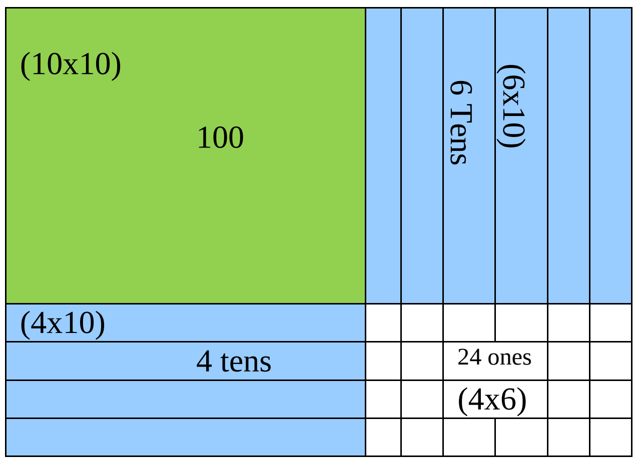
- The Lattice method is not to be confused with the Box Method.
- Using the traditional algorithm students can forget the place holder when multiplying the tens place.

- 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.

- **Turtle head**
  Website with videos
  http://www.teachertube.com/video/77588
  http://www.showme.com/sh/?h=V1AGnAG

- **Distributive Strategy**
  473 x 8 =
  (400 x 8) + (70 x 8) + (3 x 8) = 3,200 + 560 + 24 = 3,784

- The **area model** shows the partial products. 16 x 14 = 224



100 + 60 + 40 + 24 = 224

- **Partial Product Strategy**

53
x38
1,500 (50 x 30)
400 (50 x 8)
90 (30 x 3)
+ 24 (3 x 8)
2,014

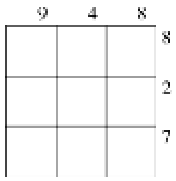
OR

47
x24
940 (20 x 47)
+188 (4 x 47)
1,128

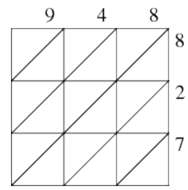
- **Box or Matrix Strategy (This is not lattice multiplication.)**
  96 x 48 =

	90	6	
40	3600	240	3840
8	720	48	768
	4320	288	4608

- **Lattice**

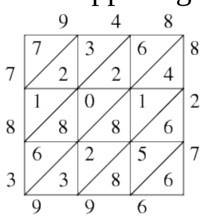


948 x 827



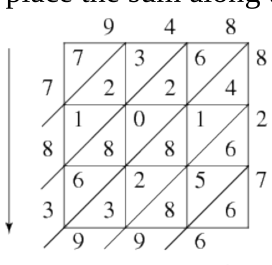
➢ The lattice method is an alternative to long multiplication for numbers. In this approach, a lattice is first constructed, sized to fit the numbers being multiplied. If we are multiplying an m-digit number by an n-digit number, the size of the lattice is m×n. The multiplicand is placed along the top of the lattice so that each digit is the header for one column of cells (the most significant digit is put at the left). The multiplier is placed along the right side of the lattice so that each digit is a (trailing) header for one row of cells (the most significant digit is put at the top). Illustrated above is the lattice configuration for computing 948×827.

➢ Before the actual multiplication can begin, lines must be drawn for every diagonal path in the lattice from upper right to lower left to bisect each cell. There will be 5 diagonals for our 3×3 lattice array.



➢ Now we calculate a product for each cell by multiplying the digit at the top of the column and the digit at the right of the row. The tens digit of the product is placed above the diagonal that passes through the cell, and the units digit is put below that diagonal. If the product is less than 10, we enter a zero above the diagonal.

➢ Now we are ready to calculate the digits of the product. We sum the numbers between every pair of diagonals and also between the first (and last) diagonal and the corresponding corner of the lattice. We start at the bottom half of the lower right corner cell (6). This number is bounded by the corner of the lattice and the first diagonal. Since this is the only number below this diagonal, the first sum is 6. We place the sum along the bottom of the lattice below the rightmost column.



➢ Next we sum the numbers between the previous diagonal and the next higher diagonal: 6+5+8=19. We place the 9 just below the bottom of the lattice and carry the 1 into the sum for the next diagonal group. (The diagonals are extended for clarity.)

➢ We continue summing the groups of numbers between adjacent diagonals, and also between the top diagonal and the upper left corner. The final product is composed of the digits outside the lattice which were just calculated. We read the digits down the left side and then towards the right on the bottom to generate the final answer: 783996.

➢ Although the process at first glance appears quite different from long multiplication, the lattice method is actually algorithmically equivalent.

Sept 12th (2 weeks)

[4.M.NBT.B.06] I can use multiple strategies to divide whole numbers of 4-digit dividends with 1-digit divisors with remainders.

Big Ideas

- There are multiple ways to solve a division problem.
- Division strategies can provide a better understanding of place value.
- 3.Remainders can be expressed as a whole number or a fraction

Common Misconceptions

- Students will struggle with the distributive property.
- Make sure students have an understanding of place value and expanded notation. (To avoid common misconceptions)

Sample Problem: 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.

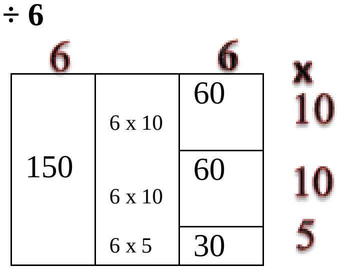
Using Place Value: 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4)

Using Multiplication: 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65

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: 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.

- 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.
- 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.
- Knowing that 6 x 5 is 30. They write 30 in the bottom area of the rectangle and record 5 as a factor
- Students express their calculations in various ways:

150   **150 ÷ 6 = 10 + 10 + 5 = 25**

- 60 (6 x 10)

90

- 60 (6 x 10)

30

- 30 (6 x 5)

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

Sample problem: Using the grouping strategy and the pictures to solve the problem. How many groups of 5 lady bugs can the scientist make with 30 lady bugs?

a) 30 ÷ 5 = 6 groups of lady bugs b) 30 ÷ 5 = 7 groups of lady bugs c) 30 ÷ 5 = 8 groups of lady bugs

Sample problem: Solve the problem using the distributive (place value) strategy.

745 ÷ 5 =

a) 745 ÷ 5 = (400 ÷ 5) + (65 ÷ 5) + (5 ÷ 5) = 80 + 13 + 1 = 94

b) 745 ÷ 5 = (740 ÷ 5) + (45 ÷ 5) + (5 ÷ 5) = 148 + 9 + 1 = 158

c) 745 ÷ 5 = (700 ÷ 5) + (40 ÷ 5) + (5 ÷ 5) = 140 + 8 + 1 = 149

Additional Standards - Month 1

4.M.OA.A.01 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.

4.M.NBT.B.04 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Sept 26th Benchmark #1 Test

Oct 3rd

[4.M.OA.B.04] I can find all the factor pairs, multiples, prime numbers, and composite numbers for whole numbers up to 100.

Big Ideas

- Factors are the numbers you multiply together to form a product.
- Factors are the numbers that can go evenly into a whole number.
- Multiples are the product of multiplying a number by a whole number.
- Multiples are the repetition of multiplying the whole number by another whole number.
- Prime numbers only have two factors.
- Composite numbers have more than two factors.

Common Misconceptions

- 0 is not a multiple.

Performance Task / Model Product Example

Students should understand the process of finding factor pairs so they can do this for any number 1 -100,

Example:

Factor pairs for 96: 1 and 96, 2 and 48, 3 and 32, 4 and 24, 6 and 16, 8 and 12.

Multiples can be thought of as the result of skip counting by each of the factors. When skip counting, students should be able to identify the number of factors counted e.g., 5, 10, 15, 20 (there are 4 fives in 20).

Example:

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24
Multiples: 1, 2, 3, 4, 5 … 24
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
3, 6, 9, 12, 15, 18, 21, 24
4, 8, 12, 16, 20, 24
8, 16, 24
12, 24
24

To determine if a number between1-100 is a multiple of a given one-digit number, some helpful hints include the following:

- all even numbers are multiples of 2
- all even numbers that can be halved twice (with a whole number result) are multiples of 4
- all numbers ending in 0 or 5 are multiples of 5

Prime vs. Composite:

- A prime number is a number greater than 1 that has only 2 factors, 1 and itself.
- Composite numbers have more than 2 factors.

Students investigate whether numbers are prime or composite by

- building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g. 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1, therefore it is a prime number)
- finding factors of the number

Oct 10th (2 standards)

[4.M.NF.C.06] I can read, write, and connect models of fractions and decimals.

Big Ideas

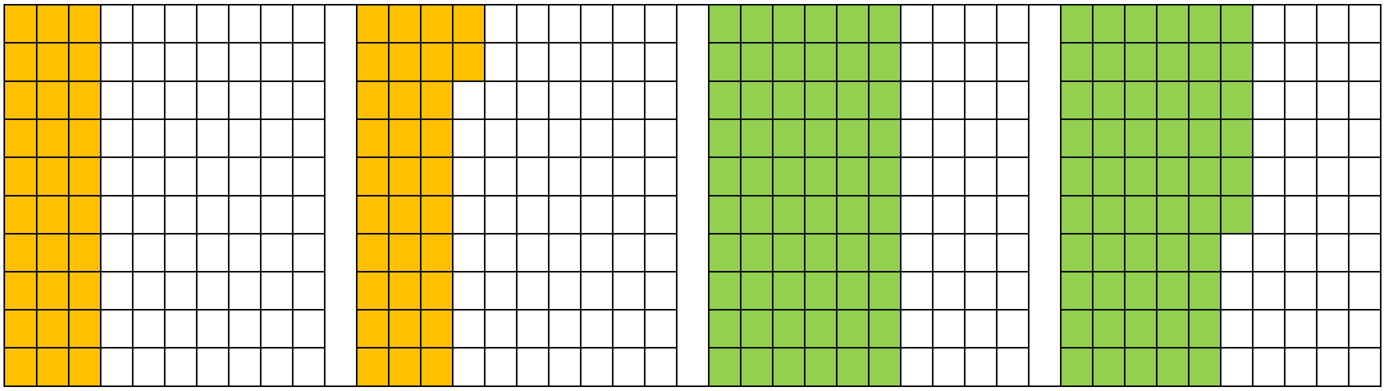
- The same number can be expressed in several different ways (fractions and decimals).
- Parts of a whole can be expressed by fractions and decimals.
- Equivalent fractions and decimals can be proven by using a number line, place value chart, or a base-10 model.

Common Misconceptions

- Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100.
- Students should know their benchmark fractions. ¼ = .25 ½ = .50 ¾ = .75

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.

Hundreds	Tens	.	Tenths	Hundredths	Thousandths
	0	.	3		
	0	.	3	2	
	0	.	6		
	0	.	5	6	



0.3 0.32 0.6 0.56

0.3 < 0.32 0.6 > 0.56

Sample Problem: Draw a model to show that 0.3 < 0.5.

Sample Problem: What are two ways to write 0.5 as a fraction?

a) 5/10 and 5/100 b) 50/10 and 50/100 **c) 5/10 and 50/100**

Oct 5th – 9th

[4.M.NF.C.07] I can compare two decimals to the hundredths. (Vail: thousandths)

Big Ideas

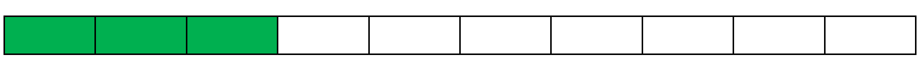
- Every place in a number has its own name.
- Numbers have a value depending on their place.
- A decimal represents less than one but more than zero.
- Numbers with more digits to the left of the decimal have a greater value.
- Decimals can be compared using place value.

Common Misconceptions

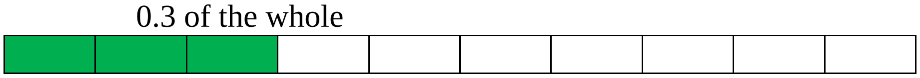
- Tenths and hundredths can represent the same amount.
- Make sure students line up the decimals according to place value.
- Tenths are like dimes.
- Hundredths are like pennies.

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 bottom is bigger than the whole on the top. They are both 3/10 but the model on the bottom is a larger quantity than the model on the top.



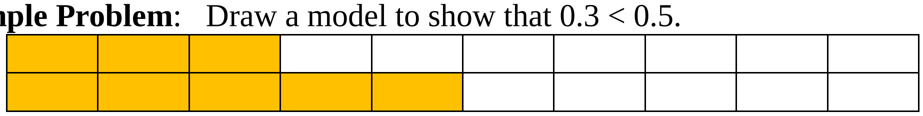
0.3 of the whole



0.3 of the whole

When the wholes are the same, the decimals or fractions can be compared.

Sample Problem: Draw a model to show that 0.3 < 0.5.



0.3 < 0.5

Oct 17th

[4.M.NF.C.05] I can add fractions with unlike denominators of 10 and 100.

Big Ideas

- Tenths and hundredths (1/10 and 10/100) can be equivalent fractions.
- 2.Common denominators must be found before adding.

Essential Questions

- What are tenths? How are they related to hundredths?
- What are hundredths? How are they related to tenths?
- What are unlike denominators? How do we add them?

Common Misconceptions

- Students must have knowledge 3/10 is not the same as 3/100.

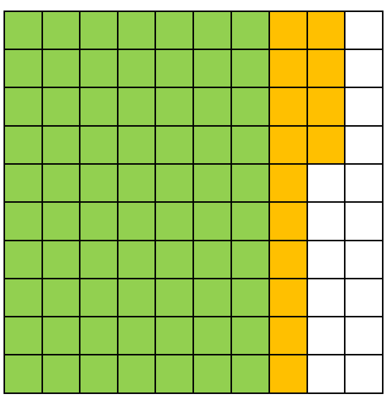
•Students can use base ten blocks, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100.
•Students may represent 3/10 with 3 longs and may also write the fraction as 30/100 with the whole in this case being the flat (the flat represents one hundred units with each unit equal to one hundredth).

Adding Fractions with unlike denominators of 10 and 100.

Sample Problem: Write the equivalent fractions first and then add or subtract! Look carefully at your denominators

$^{2}/_{10} + {}^{8}/_{100} =$ $^{2}/_{10} = {}^{20}/_{100}$ $^{20}/_{100} + {}^{8}/_{100} = {}^{28}/_{100}$	$^{3}/_{10} + {}^{25}/_{100} =$ $^{3}/_{10} = {}^{30}/_{100}$ $^{30}/_{100} + {}^{25}/_{100} = {}^{55}/_{10}$	$^{6}/_{10} + {}^{45}/_{100} =$ $^{6}/_{10} = {}^{60}/_{100}$ $^{60}/_{100} + {}^{45}/_{100} =$ $^{105}/_{100} = 1\ {}^{5}/_{100}$	$^{2}/_{10} + {}^{5}/_{100} =$ $^{2}/_{10} = {}^{20}/_{100}$ $^{20/100}/ + {}^{5}/_{100} = {}^{25}/_{100}$

Sample Problem: 7/10 + 14/100 = (7/10 is 70/100) 70/100 + 14/100 = 84/100



Oct 24th

[4.M.NF.A.01] I can explain why one fraction is equivalent to another by using visual models.

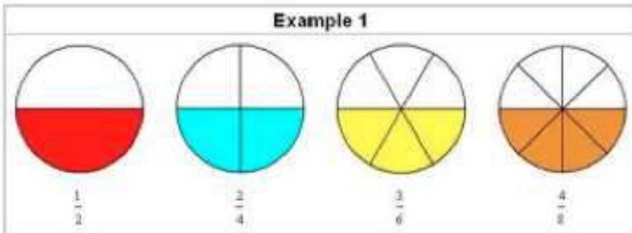
Big Ideas

- Equivalent fractions can be represented in many ways.
- The number and size of the parts differ even though the two fractions are equal.

Common Misconceptions

- Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100

Students can use visual models 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.



$\frac{1}{2}$ $\quad \frac{2}{4} = \frac{2 \times 1}{2 \times 2}$ $\quad \frac{3}{6} = \frac{3 \times 1}{3 \times 2}$ $\quad \frac{4}{8} = \frac{4 \times 1}{4 \times 2}$

Oct 31st

[4.M.NF.A.02] I can compare and justify fractions with unlike denominators.

Big Ideas

- Fractions can be compared using benchmark fractions, common denominators, or common numerators.
- Comparisons are valid only when two fractions are referred to the same whole.
- Using the least common multiple to create like denominators.

Common Misconceptions

- Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100
- Benchmark fractions include common fractions between 0 and 1 such as halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and hundredths.

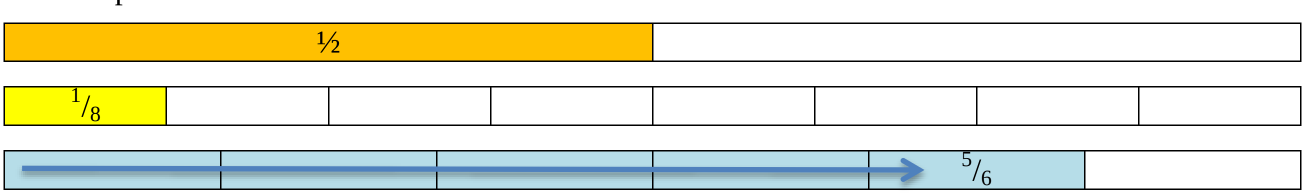
Fractions can be compared using benchmarks, common denominators, or common numerators.
Symbols used to describe comparisons include <, >, =.

Fractions may be compared using ½ as a benchmark

0 $^{1}/_{4}$ $^{1}/_{2}$ $^{3}/_{4}$ 1

0 $^{2}/_{8}$ $^{4}/_{8}$ $^{6}/_{8}$ 1

Possible student thinking by using benchmarks:
$^{1}/_{8}$ is smaller than ½ 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:
$^5/_6 > ½$ because $^3/_6 = ½$ and $^5/_6 > ^3/_6$
Fractions with common denominators may be compared using the numerators as a guide.
$^2/_6 < ^3/_6 < ^5/_6$
Fractions with common numerators may be compared and ordered using the denominators as a guide.

Nov 7th (two parts to this standard)

[4.M.NF.B.03a-b] I can separate a fraction in more than one way by using an equation. I can add and subtract mixed numbers with like denominators. I can solve word problems by adding and subtracting mixed numbers with like denominators.

[4.M.NF.B.03c-d] I can add and subtract mixed numbers with like denominators. I can solve word problems by adding and subtracting mixed numbers with like denominators.

Big Ideas
- Fractions can be broken down into parts in different ways.
- Equations can be used to represent the breakdown of the parts.
- Mixed numbers can be converted into improper fractions.
- Fractions can be added and subtracted.

Common Misconceptions
- When decomposing the fraction it needs to have the same denominator or come from the same whole.
- Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100

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. **Sample Problem**: $^2/_3 = ^1/_3 + ^1/_3$

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.
Sample Problem: $^3/_8 = ^1/_8 + ^1/_8 + ^1/_8$; $^3/_8 = ^1/_8 + ^2/_8$ **Sample Problem**: $2\ ^1/_8 = 1 + 1 + ^1/_8 = ^8/_8 + ^8/_8 + ^1/_8$.

Sample Problem: Ashley, a pet store employee, wants to fit two fish tanks on one table. One fish tank is $^1/_3$ of a foot wide and the other fish tank is $^1/_3$ of a foot wide. When placed next to each other, what is the total width of the two fish tanks? **Answer**: $^1/_3 + ^1/_3 = ^2/_3$ of a foot wide

Sample Problem: Jay's chemistry textbook weighs $8\ ^3/_4$ pounds and his geometry textbook weighs $4\ ^1/_4$ of a pound. How much more does the chemistry textbook weigh than the geometry textbook? **Answer**: 8 ¾ - 4 ¼ = $4\ ^2/_4$ = 4 ½ pounds more

Nov 14th (two parts to this standard)

[4.M.NF.B.04a-c] I can multiply a fraction by a whole number. I can solve word problems involving multiplication of fractions by a whole numbers.

4.M.NF.B.04.ab. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Big Ideas
- Whole numbers can be multiplied by fractions.

- Percentages of a whole # can equal a fraction (2/3 of 18).
- Whole numbers can be multiplied by fractions in word problems.
- Visual models can help solve word problems

Common Misconceptions

- Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 10
- To avoid a misconception, put the whole number over one. Multiply the numerators and denominators. This will help students to prepare for dividing fractions

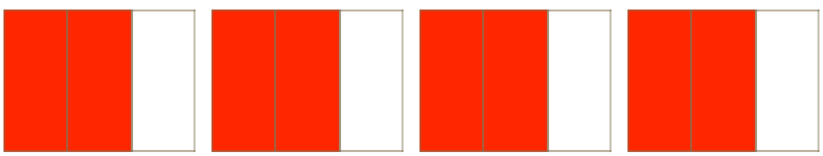
Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns.

Sample Problem: $3 \times ({}^2/_5) = {}^3/_1 \times {}^2/_5 = {}^6/_5$

${}^1/_5$	${}^1/_5$				${}^1/_5$	${}^1/_5$				${}^1/_5$	${}^1/_5$			

$3 \times ({}^2/_5) = {}^2/_5 + {}^2/_5 + {}^2/_5 = {}^6/_5$

Sample Problem: $4 \times {}^2/_3 = {}^4/_1 \times {}^2/_3 = {}^8/_3 = 2\ {}^2/_3$



Nov 21st no additional standards – review for benchmark test

Dec 5th Benchmark #2 Test

Dec 12th

4.M.OA.C.05] I can identify and create a number or shape pattern that follows a given rule.

Big Ideas

- Patterns occur everywhere in nature
- Numbers and shapes in a sequence are related by a rule.
- A rule must work from number to number or shape to shape in a given sequence.

Common Misconceptions

- Students have trouble identifying patterns in multi-step patterns.

Performance Task / Model Product Example

Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations.

Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features.

Example:

Patterns	Rules	Features
3, 8, 13, 18, 23, 28 …	Start with 3 and add 5	The numbers alternately end with a 3 or 8
5, 10, 15, 20 …	Start with 5 and add 5	The numbers are multiples of 5 and end with a 5 or 0. The numbers that end with 5 are products of 5 and an odd number. The numbers that end with 0 are products of 5 and an even number.

Dec 19th

[4.M.G.A.02] I can describe two dimensional figures using different characteristics such as: parallel or perpendicular lines or by angle measurement.

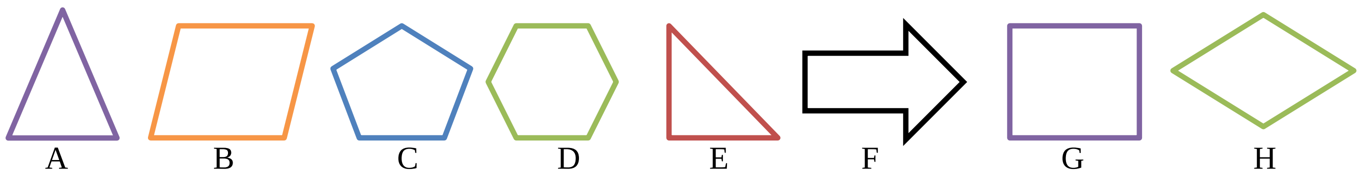
Big Ideas

- Parallel and perpendicular lines can be found in two-dimensional shapes.
- Angles can be found in two-dimensional figures.
- Right triangles can be isosceles or scalene.
- A right triangle has only one 90 degree (right angle).

Common Misconceptions

- Parallel and perpendicular lines are commonly confused by students.
- Right triangles only have one right angle.

Examples of 2D Shapes



- Which shapes have parallel lines? B, D, F, G, and H
- Which shapes have perpendicular lines? E, F, and G
- Which shapes have parallel and perpendicular lines? F and G
- Is there an example of a right triangle? Yes, E
- Is there an equilateral triangle? No
- Is there an isosceles triangle? Yes, A
- Which shapes have an acute angle? A, B, E, F, and H
- Which shapes have an obtuse angle? B, C, D, and H
- Does shape G have 2 sets of perpendicular lines? No, it has 4 sets of perpendicular lines

Additional Standards Month 7

4.M.G.A.01. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Big Ideas

- There are relationships between lines, points, line segments, rays, and angles.
- Lines and rays are abstract.
- Perpendicular lines meet at a 90 degree angle.
- Parallel lines run the same direction, distance apart, and never cross paths

Common Misconceptions

- Parallel and perpendicular lines are commonly confused by students.
- Lines and rays are commonly confused by students.

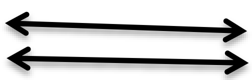
Vocabulary:

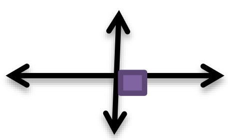

Line – A straight path extending in both directions with NO end points

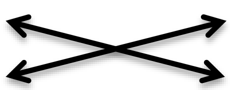

Line Segment – A part of a line that includes two points called endpoints.

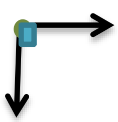

Point – an exact location in space

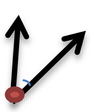

A Ray – A straight path extending in only one direction. A ray has only ONE endpoint.

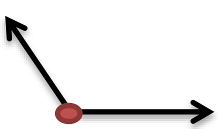

Parallel Lines - Lines that NEVER intersect. They are always the same distance apart


Perpendicular Lines – Two lines that intersect to form four right angles. The two lines always intersect at 90^o


Intersecting Lines – Lines that cross at exactly one point


A Right Angle – An angle that is exactly 90 degrees


An Acute Angle – An angle that is less than 90 degrees


An Obtuse Angle – An angle that is greater than 90 degrees


A Straight Angle – an angle that is 180 degrees, or a straight line.

4.M.G.A.03 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.

4.M.MD.B.04. 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.

4.M.MD.C.06. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Big Ideas

- Angles are made up of two rays.
- The measure of an angle is determined by how many degrees apart the rays are.

- A right angle is exactly 90 degrees.
- A straight angle is exactly 180 degrees.
- Acute angles are between 0 and 89 degrees.
- Obtuse angles are between 91 and 179 degrees.

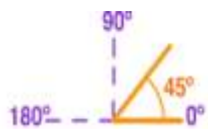
Common Misconceptions

- Make sure your students are all using the appropriate side of the protractor when measuring.

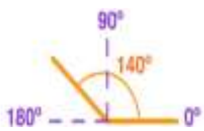
Vocabulary

Degrees are the unit for measuring the size of angles. The abbreviation is °

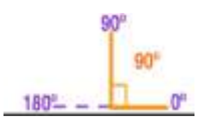
A **protractor** is an instrument used to measure angles.



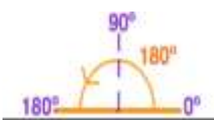
An **Acute Angle** is an angle less than 90°.



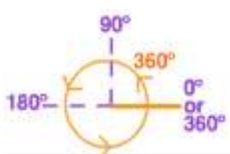
An **obtuse angle** is an angle measuring between 90° and 180°.



A **right angle** is an angle measuring exactly 90°.



An angle measuring 180°. It is also called a **straight angle**.

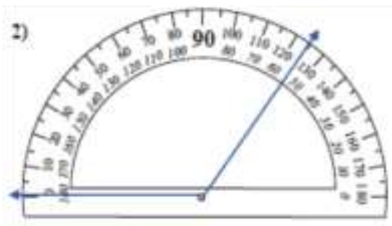


360° Angle – An angle measuring 360°. It is also called a revolution or a complete circle.

Vertex - A vertex is a point where two or more rays or the arms of an angle meet.

Parts of a Protractor

How can I use a protractor to measure an angle?



Should we be looking at the outer scale, which means our angle is between 120° - 130°?

OR

Should we be looking at the inner scale, which means our angle is between 50° - 60°?

- Align one ray with the base line on the protractor.
- Line up the vertex of the angle with the origin on the protractor.
- We need to determine if we need to look at the outer scale or the inner scale. Think: Is this angle smaller or bigger than 90°?
- This angle is between 120° - 130°. Now, we will read the protractor similar to how we read a number line or a clock. Since this angle is between 120° and 130°, we will separate this section into ten equal parts. The angle is on the fifth line. Five lines past 120° is 125°. The measurement of this angle is 125°.

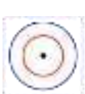
Jan 9th

[4.M.MD.C.05] I can explain the concepts of angle measurement.

Big Ideas
- An angle measurement is congruent regardless of arc length.
- Angles are made up of two rays that share a common endpoint.
- A turn is equivalent to one degree, or 1/360.

Common Misconceptions
- If circles are concentric the size of the angle does not change even if the circles are bigger.
- Concentric circles have the same center where the endpoint of our angle lays.
- The answer will be a degree over 360 $^{n}/_{360}$
- Every circle is 360 degrees. Size doesn't matter!

Vocabulary:

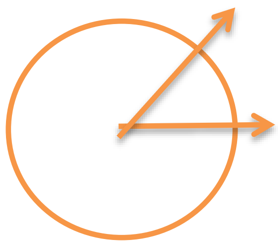


Concentric Circle: Two or more circles that share the same center point.

Arc: Part of the circumferences (edge) of a circle.

Angle: The amount of turn between two straight lines that have a common endpoint (the vertex).

You can write angles as fractions!



An angle represents the amount of turns one of the "rays" has moved. Usually the top "ray".

If you look at this angle. The top ray has rotated 49 times. How could I write this as an angle AND a fraction?

49º $^{49}/_{360}$

If the top ray of this angle has rotated 105 times, what is the measurement of the angle in degrees AND fraction form? **Answer**: 105º $^{105}/_{360}$

If the top ray rotates seventy-three times, what will the measurement of the angle be in degrees and fraction? **Answer**: 73º $^{73}/_{360}$

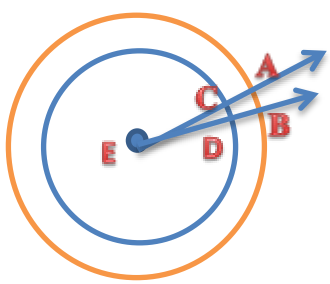
Sample problem: You have a quiche and you want to split it among four people. How many degrees of quiche, and what fraction form, will each person get? **Answer**: Each person will get a 90º piece of quiche $^{90}/_{360}$

Sample problem: You have a pizza that you want to divide into five pieces. How big will each piece be? Write your answer in two forms (degree and fraction). **Answer**: Each person will get a 72º piece of pizza $^{72}/_{360}$

When you want to break something into pieces you use division to help you solve.

But, first, you must know the whole in which you are dividing.

What is the whole amount in a circle? 360^0. Knowing this, you can divide it into pieces and determine the angle amount - which you can then put into fraction form!



This diagram will help students understand that an angle measurement is not related to an area since the area between the 2 rays is different for both circles yet the angle measure is the same.

The angle measurement of angle AEB is equal to the angle measurement of angle CED

Jan 16th

[4.M.MD.A.03] I can use an algorithm (formula) to find the area and perimeter of a rectangle and justify my answer.

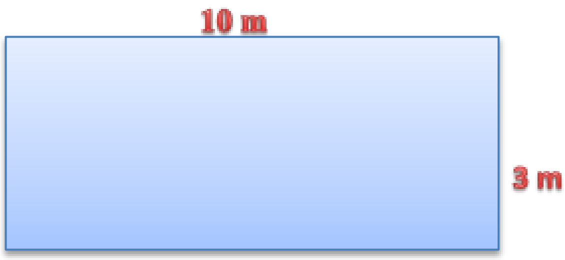
Big Ideas

- The area and perimeter of an object are not always the same.
- Perimeter is the distance around an object.
- Area is the space inside the object
- To find the perimeter you add 2 L + 2 W or 2(L + W).
- To find the area, you multiply one length x one width. (A= L x W)

Common Misconceptions

- Squares are also considered rectangles.
- Area is squared units.
- Perimeter is linear (measured in a straight line)

Students can use 1-inch color tiles or grid paper to create their own rectangles and measure area. They can also measure perimeter using a string to visually see the distance around the object.



Area
A = L x W
A = 10 x 3
A= 30 m squared

Perimeter
P = 2L + 2W
2 (10) + 2 (3) =
20 + 6= 26 m

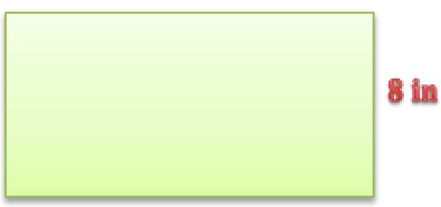
Sample Problem: Erika is buying new carpet for her bedroom. She needs to determine the area of the room to help her determine how much carpet to purchase. Determine the area of Erica's living room.

A = L x W

A = 4 x 4

A = 16 sq yds

Find the missing side:



P = 2L + 2W
40 = 2L + 2 x 8
40 = 2L + 16
-16 -16
$^{24}/_{2} = {}^{2L}/_{2}$
12 in = L

Jan 23rd

[4.M.MD.A.01] I can convert in the same system of measurement, e.g., U.S. Customary, metric system, and time.

Big Ideas

- Working within the same system of measurement, values can be converted to smaller or larger units. (e.g., U.S. Customary, metric, and time)

Common Misconceptions

- Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time.
- 4th Grade students need to know lb, oz, ml, km and sec.

Vocabulary

Weight
1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

Time
60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
52 weeks = 1 year
12 months = 1 year
365 days = 1 year

<u>Converting Within Customary Units</u>

<u>S</u>ally <u>L</u>oves <u>D</u>onuts
(smaller unit → larger unit → DIVIDE)

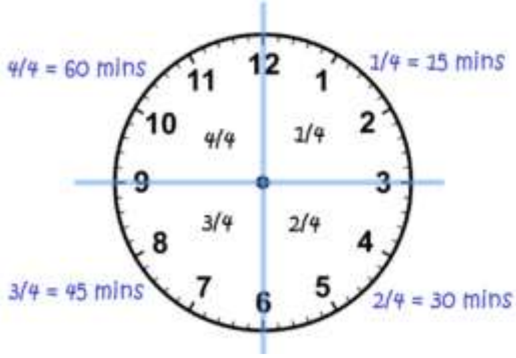
<u>L</u>isa <u>S</u>pends <u>M</u>oney
(larger unit → smaller unit → MULTIPLY)

Metric System – a system of measuring based on meter for length, gram for mass, and liter for capacity.

(K)ing	Kilo-	1000
(H)enry	Hecto-	100
(D)ied	Deca-	10
(W)hile	Standard	1
(D)rinking	Deci-	0.1
(C)holocalte	Centi-	0.01
(M)ilk	Milli-	0.001

Sample Problem: Jamie goes to a concert that is 3 ¼ hours long. How many minutes are equal to 3 ¼ hours?

3 hours x 60 minutes = 180 minutes
+ <u>1/4 hour = 15 minutes</u>
195 minutes



Sample Problem: Brittany sold a bag of oranges that weighed 9 pounds. How many ounces did the bag of oranges weigh? Justify your answer.

Pounds	Ounces
1	16
2	2 x 16 = 32
3	3 x 16 = 48
4	4 x 16 = 64
5	5 x 16 = 80
6	6 x 16 = 96
7	7 x 16 = 112
8	8 x 16 = 128
9	9 x 16 = 144

The 9 pound bag of oranges weighs 144 ounces because when you multiply 9 pounds x 16 ounces you get 144 ounces.

Converting Within Customary Units

Sally Loves Donuts
(smaller unit → larger unit → DIVIDE)

Lisa Spends Money
(larger unit → smaller unit → MULTIPLY)

Sample Problem: Ally's new kitten has a mass of 3 kilograms. How many grams is Ally's new Kitten?

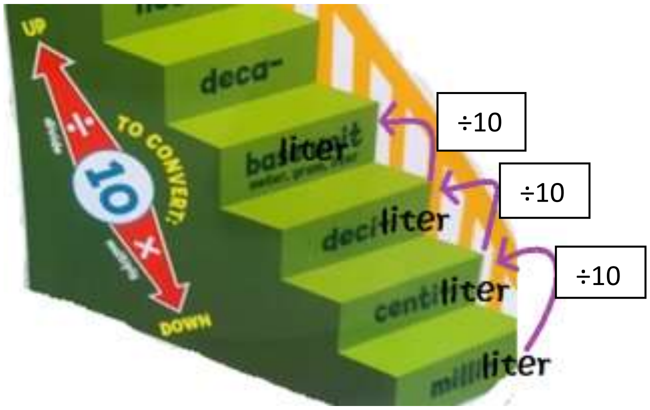
3 kilograms x 10 = 30 hectograms

30 hectograms x 10 = 300 decagrams

300 decagrams x 10 = 3,000 grams

Ally's new kitten weighs 3,000 grams.

Sample Problem: Donna poured 2,500 milliliters of apple juice into a container. How many liters are in Donna's container of apple juice?



2,500 milliliter ÷ 10 = 250 centiliter

250 centiliter ÷ 10 = 25 deciliter

25 deciliter ÷ 10 = 2.5 liters

Feb 6th

[4.M.MD.A.02] I can solve measurement word problems using all four operations.

Big Ideas

- Solving measurement problems using all four operations, e.g. involving distances, time, measurement and money.
- Students can use pictures, drawings, diagrams, and number lines to organize thoughts and solve problems.

Common Misconceptions

- To avoid misconceptions, elapsed time should be used with a T-Chart. For example 2:15 p.m. should not be subtracted from 9:25 a.m.
- Require illustrations to help with problem solving

Division/fractions: Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get? Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.)

Addition: Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran?

Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back?

Multiplication: Mario and his 2 brothers are selling lemonade. Mario brought one and a half liters, Javier brought 2 liters, and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have?

Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container.

Word Problems

- Word problems are simply math problems written out in words.
- You have to find the ***key words*** to help you solve the problem.

- You also have to use the correct information.
- Once you pull out the useful information you create an ***equation*** to solve the problem. An **Equation** - a number problem with an equal sign

Measurement Word Problems

- When looking at measurement word problems, you need to realize that you can write your answer in two different forms.
- The unit in which they are using and a unit you can convert to.

Sample problem: Jack has 2 feet of rope. He wants to cut it into 4 equal parts. How long would each piece be?

| 6 inches | 6 inches | 6 inches | 6 inches |

Draw a picture

Do the math

We know that one foot = 12 inches
So, 2 feet = 24 inches.
When you divide that by four, you would get 6 inches

Our answer can be expressed into two different ways:

1. As feet – Four equal parts would equal 1/2 of a foot
2. As inches – Four equal parts would equal 6 inches each

Sample Problem: Joy played on the computer for 25 min., the Wii for 22 min., and then spent 35 min. watching TV. How long did she spend on all her electronics before going out to play? **Answer**: 25 + 22 + 35 = 82 min. or 1 hr and 22 min

Sample Problem: A pound of butter costs $2.60. Damian bought 3 pounds of butter. If he gave the cashier $20, how much change did he receive? Answer: $2.60 x 3 = $7.80 $20 - $7.78 = **$12.20 change**

Feb 13th review for Benchmark #3 Test

Feb 20th Benchmark 3 Test