

STANDARDS BASED REPORT CARD FOR MATHEMATICS 2015-16

4th Grade

	MP1	MP2	MP3	MP4
OPERATIONS AND ALGEBRAIC THINKING				
A. Use the four operations with whole numbers to solve problems.				
B. Gain familiarity with factors and multiples.				
C. Generate and analyze patterns.				
NUMBER AND OPERATIONS IN BASE TEN				
A. Generalize place value understanding for multi-digit whole numbers.				
B. Use place value understanding and properties of operations to perform multi-digit arithmetic.				
NUMBER AND OPERATIONS—FRACTIONS (with denominators 2, 3, 4, 5, 6, 8, 10, 12, & 100)				
A. Extend understanding of fraction equivalence and ordering.				
B. Build fractions from unit fractions by applying/extending previous understandings of operations on whole #'s.				
C. Understand decimal notation for fractions, and compare decimal fractions.				
MEASUREMENT AND DATA (For 1st standard below, MP2: area & perimeter only; MP3: fractions only)				
A. Solve problems involving measurement & conversion of measurements from a larger unit to a smaller unit.				
B. Represent and interpret data.				
C. Geometric measurement: understand concepts of angle and measure angles.				
GEOMETRY				
A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.				

OPERATIONS AND ALGEBRAIC THINKING

A. Use the four operations with whole numbers to solve problems. MP1

- Interpret a multiplication equation as a comparison (e.g., $35 = 5 \times 7$ as 35 is 5 times as many as 7 and 7 times as many as 5). Represent verbal statements of multiplicative comparisons as multiplication equations.
- 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.
- Solve multistep word probs. (whole #'s & whole # answers) using +, -, x, ÷ incl. probs. w't remainders to be interpreted.** Represent the probs. using equations w't a letter standing for the unknown. Assess answer reasonableness using mental computation & estimation strategies incl. rounding.

B. Gain familiarity with factors and multiples. MP2

- 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, . . . is prime or composite.

C. Generate and analyze patterns. MP2

- 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. *Ex: Ex: For the rule "Add 3" starting number 1, generate terms, observe that the terms alternate between odd & even, explain why.*

NUMBER AND OPERATIONS IN BASE TEN MP1

A. Generalize place value understanding for multi-digit whole numbers.

- 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 $700 \div 70 = 10$ by applying concepts of place value and division.
- 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.
- Use place value understanding to round multi-digit whole numbers to any place.

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

- Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- 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 & explain the calculation by using equations, rectangular arrays, and/or area models.
- Find whole-number quotients & remainders with up to 4-digit dividends & 1-digit divisors, using strategies based on place value, prop. of operations, &/or the relationship between multiplication & division. Illustrate & explain the calculation by using equations, rectangular arrays, &/or area models.

NUMBER AND OPERATIONS—FRACTIONS (with denominators 2, 3, 4, 5, 6, 8, 10, 12, & 100) MP3

A. Extend understanding of fraction equivalence and ordering.

- Explain why fraction $\frac{a}{b}$ is equivalent to fraction $\frac{n \times a}{n \times b}$ by using visual fraction models, with attention to how the number & size of the parts differ even though the fractions themselves are the same size. Use this principle to recognize & generate equivalent fractions.
- Compare 2 fractions w't different numerators/denominators, e.g., by creating common denominators/numerators, or comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize comparisons are valid only when the 2 fractions refer to the same whole. Record the results with symbols $>$, $=$, or $<$, & justify.

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

- Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$.
 - Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
 - Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation and justify, e.g., using a visual fraction model. *Ex: $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$; $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$; $2 \frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$.*
 - 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.
 - Solve word probs. involving $+/-$ of fractions referring to the same whole & having like denominators (using visual models & equations).
- Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
 - Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. *Ex: use visual model to represent $\frac{5}{4}$ as $5 \times (\frac{1}{4})$, recording the conclusion as $\frac{5}{4} = 5 \times (\frac{1}{4})$.*
 - Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express $3 \times (\frac{2}{5})$ as $6 \times (\frac{1}{5})$, recognizing this product as $\frac{6}{5}$. (In general, $n \times (\frac{a}{b}) = \frac{n \times a}{b}$.)*
 - Solve word probs. involving multiplication of a fraction by a whole #, e.g., by using visual fraction models & equations to represent the problem. *Ex: 5 people at a party eats $\frac{3}{8}$ of a pound of roast beef. How many lbs. of roast beef are needed? Between what 2 whole #'s does your answer lie?*

C. Understand decimal notation for fractions, and compare decimal fractions.

- Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use to add two fractions with denominators 10 & 100. *Ex: $\frac{3}{10} = \frac{30}{100}$, so $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$. (Although students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. addition & subtraction with unlike denominators is not a requirement in gr. 4.)*
- Use decimal notation for fractions w't denominators 10 or 100. *Ex: Rewrite 0.62 as $\frac{62}{100}$; describe a length as 0.62 meters; locate 0.62 on a # line.*
- 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.

MEASUREMENT AND DATA

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. MP2

- Know relative sizes of measurement units within one system including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.** Within a single system of measurement, express larger unit measurements using smaller unit. Record equivalents in a two column table. *Ex: know 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 & inches listing number pairs (1, 12), (2, 24), (3, 36), ...*
- 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.
- 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 & the length, by viewing the area formula as a multiplication equation with an unknown factor.*

B. Represent and interpret data. MP4

- Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). Solve probs. involving fraction addition/subtraction by using info in line plots. *Ex: Use a line plot to find & interpret the difference in length between the longest & shortest specimens in an insect collection.*

C. Geometric measurement: understand concepts of angle and measure angles. MP4

- Recognize angles as geometric shapes formed wherever two rays share a common endpoint; understand concepts of angle measurement:
 - An \angle is measured w't reference to a circle whose center is the common endpoint of the rays, by considering the fraction of the circular arc between the points where the 2 rays intersect the circle. An \angle that turns through $\frac{1}{360}$ of a circle is called a "1-degree \angle " & can be used to measure \angle 's.
 - An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
- Measure angles in whole-number degrees using a protractor. Sketch angle of specified measure.
- Recognize \angle measure as additive. If 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 add./sub. probs. to find unknown \angle 's on a diagram in real world/math probs, e.g., using an equation w't a symbol for the unknown \angle .

GEOMETRY MP4

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

- Draw points, lines, line segments, rays, angles (right, acute, obtuse), & perpendicular & parallel lines. Identify them in 2-dimensional figures.
- 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.
- 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.