# Grade 4 Tennessee Academic Standards for Mathematics

2020-2021

## Fluency Expectations for Grades 2-5

**Second Grade** – Fluently add and subtract within 30 using mental strategies. By the end of 2nd grade, know from memory all sums of two one-digit numbers and related subtraction facts.

**Third Grade** - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. By the end of 3rd grade, know from memory all products of two one-digit numbers and related division facts.

**Fourth Grade** – Fluently add and subtract within 1,000,000 using appropriate strategies and algorithms.

**Fifth Grade** - Fluently multiply multi-digit whole numbers (up to three-digit by four-digit factors) using appropriate strategies and algorithms.

**Major content of the grade is indicated by the green highlighting of the cluster heading and standard's coding.**

| | Major Content | | Supporting Content |
|---|---|---|---|

## Operations and Algebraic Thinking (OA)

| Cluster Headings | Content Standards |
|---|---|
| **A. Use the four operations with whole numbers to solve problems.** (See Table 1 – Addition and Subtraction Situations and Table 2 – Multiplication and Division Situations) | **4.OA.A.1** Interpret a multiplication equation as a comparison (e.g., interpret 35 = 5 x 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.<br><br>**4.OA.A.2** Multiply or divide to solve contextual problems involving multiplicative comparison, and distinguish multiplicative comparison from additive comparison. *For example, school A has 300 students and school B has 600 students: to say that school B has two times as many students is an example of multiplicative comparison; to say that school B has 300 more students is an example of additive comparison.*<br><br>**4.OA.A.3** Solve multi-step contextual 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. |
| **B. 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 a prime or composite. |
| **C. 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.* |

## Number and Operations in Base Ten (NBT)

| Cluster Headings | Content Standards |
|---|---|
| **A. Generalize place value understanding for multi-digit whole numbers.** | **4.NBT.A.1** Recognize that in a multi-digit whole number (less than or equal to 1,000,000), a digit in one place represents 10 times as much as it represents in the place to its right. *For example, recognize that 7 in 700 is 10 times bigger than the 7 in 70 because 700 + 70 = 10 and 70 x 10 = 700.*<br><br>**4.NBT.A.2** Read and write multi-digit whole numbers (less than or equal to 1,000,000) using standard form, word form, and expanded form (e.g. the expanded form of 4256 is written as 4 x 1000 + 2 x 100 + 5 x 10 + 6 x 1). Compare two multi-digit numbers based on meanings of the digits in each place and use the symbols >, =, and < to show the relationship.<br><br>**4.NBT.A.3** Round multi-digit whole numbers to any place (up to and including the hundred-thousand place) using understanding of place value. |

## Number and Operations in Base Ten (NBT) continued…

| Cluster Headings | Content Standards |
|---|---|
| **B. Use place value understanding and properties of operations to perform multi-digit arithmetic.** (See Table 3 – Properties of Operations) | **4. NBT.B.4** Fluently add and subtract within 1,000,000 using appropriate strategies and algorithms.<br><br>**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.<br><br>**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. |

## Number and Operations – Fractions (NF)

| Cluster Headings | Content Standards |
|---|---|
| **A. Extend understanding of fraction equivalence and comparison.** | **4.NF.A.1** Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{a \times n}{b \times n}$ or $\frac{a \div n}{b \div n}$ 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. *For example*, $\frac{3}{4} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$.<br><br>**4.NF.A.2** Compare two fractions with different numerators and different denominators by creating common denominators or common numerators or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Use the symbols >, =, or < to show the relationship and justify the conclusions. |
| **B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.** (See Table 1 – Addition and Subtraction Situations and Table 2 – Multiplication and Division Situations for whole number situations that can be applied for fractions.) | **4.NF.B.3** Understand a fraction $\frac{a}{b}$ with a > 1 as a sum of fractions $\frac{1}{b}$. *For example,* $\frac{4}{5} = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$.<br>a. Understand addition and subtraction of fractions as joining & separating parts referring to the same whole.<br>b. Decompose a fraction into a sum of fractions with the same denominator in more than one way (e.g., $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$; $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$; $2\frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$), recording each decomposition by an equation. Justify decompositions by using a visual fraction model.<br>c. Add & subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction and/or by using properties of operations and the relationship between addition and subtraction.<br>d. Solve contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators.<br><br>**4.NF.B.4** Apply and extend previous understandings of multiplication as repeated addition to multiply a whole number by a fraction.<br>a. Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. *For example, use a visual fraction model to represent* $\frac{5}{4}$ *as the product of 5 x* $\frac{1}{4}$ *recording the conclusion by the equation* $\frac{5}{4} = 5 \times \frac{1}{4}$.<br>b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ and use this understanding to multiply a whole number by a fraction. *For example, use a visual fraction model to express 3 x* $\frac{2}{5}$ *as 6 x* $\frac{1}{5}$*, recognizing this product as* $\frac{6}{5}$. *(In general, n x* $\frac{a}{b} = \frac{(n \times a)}{b} = (n \times a) \times \frac{1}{b}$*.)*<br>c. Solve contextual problems involving multiplication of a whole number by a fraction (e.g., by using visual fraction models and equations to represent the problem). *For example, if each person at a party will eat* $\frac{3}{8}$ *of a pound of roast beef, and there will be 4 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* |

## Number and Operations – Fractions (NF) continued…

| Cluster Headings | Content Standards |
|---|---|
| **C. Understand decimal notation for fractions and compare decimal fractions.** | **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. For example, express, $\frac{3}{10}$ as $\frac{30}{100}$ and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$.<br><br>**4.NF.C.6** Read and write decimal notation for fractions with denominators 10 or 100. Locate these decimals on a number line.<br><br>**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. Use the symbols >, =, or < to show the relationship and justify the conclusions. |

## Measurement and Data (MD)

| Cluster Headings | Content Standards |
|---|---|
| **A. Estimate and solve problems involving measurement.** | **4.MD.A.1** Measure and estimate to determine relative sizes of measurement units within a single system of measurement involving length, liquid, volume, and mass/weight of objects using customary and metric units.<br><br>**4.MD.A.2** Solve one- or two-step real-world problems involving whole number measurements with all four operations within a single system of measurement including problems involving simple fractions.<br><br>**4.MD.A.3** Know and 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.* |
| **B. Represent and interpret data.** | **4.MD.B.4** Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). Use operations on fractions for this grade to solve problems involving 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.* |
| **C. 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.<br>a. Understand that 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.<br>b. Understand that an angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees and represents a fractional portion of the circle.<br><br>**4.MD.C.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.<br><br>**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 (G)

| Cluster Headings | Content Standards |
|---|---|
| **A. 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, straight, reflex), and perpendicular and parallel lines. Identify these in two-dimensional figures.<br><br>**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.<br><br>**4.G.A.3** Recognize and draw lines of symmetry for two-dimensional figures. |