West Virginia Mathematics

Grade 4

Adopted 2024

Mathematical Habits of Mind

MHM1. Make sense of problems and persevere in solving them. MHM1

MHM2. Reason abstractly and quantitatively. MHM2

MHM3. Construct viable arguments and critique the reasoning of others. MHM3

MHM4. Model with mathematics. MHM4

MHM5. Use appropriate tools strategically. MHM5

MHM6. Attend to precision. MHM6

MHM7. Look for and make use of structure. MHM7

MHM8. Look for and express regularity in repeated reasoning. MHM8

Grade 4

Operations and Algebraic Thinking

1. Cluster Use the four operations with whole numbers to solve problems. 4.OAT.1
    1. Interpret a multiplication equation as a comparison of two expressions (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 expressions and equations. M.4.1
    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) and distinguish multiplicative comparison from additive comparison. M.4.2
    3. Solve multi-step 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. M.4.3
2. Gain familiarity with factors and multiples. 4.OAT.2
    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. M.4.4

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3. Generate and analyze patterns. 4.OAT.3

    5. Generate a number pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself (e.g., 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). M.4.5

Number and Operations in Base Ten

1. Generalize place value understanding for multi-digit whole numbers. 4.NOBT.1

    6. 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 (e.g., recognize that 700 ÷ 70 = 10 by applying concepts of place value and division). M.4.6

    7. 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. Order numbers based on place value. M.4.7

    8. Use place value understanding to round multi-digit whole numbers to any place. M.4.8

2. Use place value understanding and properties of operations to perform multi-digit arithmetic. 4.NOBT.2

    9. Fluently (efficiently and accurately) add and subtract multi-digit whole numbers using the standard algorithm. M.4.9

    10. Multiply a whole number of up to four digits by a one-digit whole number, multiply two two-digit numbers, using strategies based on place value and the properties of operations and illustrate and explain the calculation by using equations, rectangular arrays, area models, and/or partial products. M.4.10

    11. 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, area models, and/or partial quotients. M.4.11

Number and Operations- Fractions

1. Extend understanding of fraction equivalence and ordering. 4.NOF.1

    12. Explain why a fraction a/b is equivalent to another fraction 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. M.4.12

    13. Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or common numerators, or by comparing to a benchmark fraction such as ½). 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 by using a visual fraction model. M.4.13

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2. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. 4.NOF.2

    14. Understand the fraction a/b, with a > 1, as the sum of a of the fractions 1/b. M.4.14

        a. Add and subtract fractions with like denominators. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. M.4.14.A

        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 by using a visual fraction model (e.g., 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). M.4.14.B

        c. Add and subtract mixed numbers with like denominators by replacing each mixed number with an equivalent fraction greater than one and/or by using properties of operations and the relationship between addition and subtraction. Identify the two whole numbers a mixed number is between. M.4.14.C

        d. 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. M.4.14.D

    15. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. M.4.15

        a. Understand a fraction a/b as a multiple of 1/b, (e.g., use a visual fraction model to represent 5/4 as the product 5 × (¼), recording the conclusion by the equation 5/4 = 5 × (¼)). M.4.15.A

        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 (e.g., 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). M.4.15.B

        c. Solve word problems involving multiplication of a fraction by a whole number by using visual fraction models and equations to represent the problem (e.g., 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?). M.4.15.C

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3. Understand decimal notation for fractions and compare decimal fractions. 4.NOF.3

    16. 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 (e.g., express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100). M.4.16

    17. Use decimal notation for fractions with denominators 10 or 100 (e.g., rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram). M.4.17

    18. 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 by using a visual model. M.4.18

Measurement and Data

1. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. 4.MD.1

    19. Know relative sizes of measurement units within a system of units, including the metric system (km, m, cm; kg, g; l, ml), the customary system (lb., oz.), and time (hr., min., sec.). Within one system of measurement, express measurements in a larger unit in terms of a smaller unit. Express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table (e.g., 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), ...). M.4.19

    20. 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. M.4.20

    21. Apply the area and perimeter formulas for rectangles in real-world and mathematical problems by viewing the area formula as a multiplication equation with an unknown factor (e.g., find the width of a rectangular room given the area of the flooring and the length). M.4.21

2. Represent and interpret data. 4.MD.2

    22. Make a line plot to display a data set of measurements in fractions of a unit (½, ¼, 1/8). Solve problems involving addition and subtraction of fractions with like denominators by using information presented in line plots (e.g., from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection). M.4.22

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3. Geometric measurement: understand concepts of angles and measure angles. 4.MD.3

    23. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: M.4.23

        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 for measuring angles. M.4.23.A

        b. An angle that turns through b one-degree angles is said to have an angle measure of b degrees. M.4.23.B

    24. Measure angles in whole-number degrees using a protractor and sketch angles of specified measure. M.4.24

    25. 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). M.4.25