Maryland Mathematics

Grade 5

Number and Operation Sense NOS

A UNDERSTAND THE PLACE VALUE SYSTEM. 5.NOS.A

1. Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and of what it represents in the place to its left. 5.NOS.A.1
2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10. 5.NOS.A.2
3. Read, write, and compare decimals to thousandths. 5.NOS.A.3
   a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form (e.g. 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × ( ) + 9 × ( ) + 2 × ( )). 5.NOS.A.3.A
   b. Estimate decimal quantities by reasoning about their location on a number line, their relationship to benchmark numbers (e.g. 0, 0.25, 0.5, 0.75, 1) and rounding to any place. 5.NOS.A.3.B
   c. Compare two decimals to thousandths by reasoning about the values of the digits and the location on the number line. Record the results of comparisons with the symbols , =, . 5.NOS.A.3.C

B PERFORM OPERATIONS ON MULTI-DIGIT WHOLE NUMBERS AND WITH DECIMALS TO HUNDREDTHS. 5.NOS.B

4. Fluently multiply multi-digit whole numbers. 5.NOS.B.4
   a. Apply estimation strategies to estimate products. 5.NOS.B.4.A
   b. Use computational strategies (e.g., partial products, doubling and halving) efficiently to multiply. 5.NOS.B.4.B
   c. Use a standard algorithm to multiply. 5.NOS.B.4.C
   d. Determine and explain when a strategy or algorithm is most efficient. 5.NOS.B.4.D

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5 Divide multi-digit whole numbers with up to four-digit dividends and two-digit divisors. 5.NOS.B.5

- a Apply estimation strategies to estimate quotients. 5.NOS.B.5.A
- b Use partial quotients efficiently to divide. 5.NOS.B.5.B
- c Use properties of operations and/or the inverse relationship between multiplication and division to divide. 5.NOS.B.5.C
- d Represent and explain the computation by connecting rectangular arrays, area models, and/or equations to the meaning of division. 5.NOS.B.5.D

6 Apply and extend previous understanding of addition and subtraction of whole numbers to add and subtract decimals to hundredths. 5.NOS.B.6

- a Apply estimation strategies to estimate sums and differences of decimals. 5.NOS.B.6.A
- b Use concrete models, drawings, strategies based on place value (e.g., partial sums), properties of operations and/or the inverse relationship between addition and subtraction to add and subtract decimals. 5.NOS.B.6.B
- c Use an algorithm to add and subtract decimals. 5.NOS.B.6.C
- d Determine and explain when a strategy or algorithm is most efficient. 5.NOS.B.6.D

7 Apply and extend previous understanding of multiplication and division of whole numbers to multiply and divide decimals to hundredths in context. 5.NOS.B.7

- a Apply estimation strategies to estimate products and quotients. 5.NOS.B.7.A
- b Use concrete models, drawings, and arrays to multiply and divide. 5.NOS.B.7.B
- c Use strategies based on place value (e.g., partial products, partial quotients) to multiply and divide. 5.NOS.B.7.C
- d Use properties of operations and/or the inverse relationship between multiplication and division to multiply and divide. 5.NOS.B.7.D
- e Represent and explain the computation by connecting concrete models, drawings, and/or equations to the meaning of multiplication and division. 5.NOS.B.7.E

C USE EQUIVALENT FRACTIONS AS A STRATEGY TO ADD AND SUBTRACT FRACTIONS. 5.NOS.C

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8 Add and subtract fractions with unlike denominators. 5.NOS.C.8

a Estimate sums and differences by reasoning about benchmark numbers and assess reasonableness of answers (e.g., will be more than 1 because both fractions are greater than). 5.NOS.C.8.A

b Apply and extend whole number addition and subtraction strategies (e.g. counting on, making a whole, partial sums, compensation, properties of operations, the inverse relationship between addition and subtraction) to add and subtract fractions. 5.NOS.C.8.B

c Use equivalent fractions to produce an equivalent sum or difference of fractions with like denominators (e.g. . In general,). 5.NOS.C.8.C

9 Solve problems in context involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations to represent the problem. 5.NOS.C.9

D APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION TO MULTIPLY AND DIVIDE FRACTIONS. 5.NOS.D

10 Interpret a fraction as division of the numerator by the denominator ( ) in context using visual fraction models and equations to represent the problem (e.g., interpret as the result of dividing 3 by 4 so when 3 wholes are shared equally among 4 people each person has a share of size). 5.NOS.D.10

11 Apply and extend previous understandings of multiplication to multiply a whole number by a fraction ( ). 5.NOS.D.11

a Estimate products by reasoning about benchmark numbers and assess reasonableness of answers (e.g., will be less than 2 because I am creating a fractional part of 2). 5.NOS.D.11.A

b Multiply a whole number by a fraction (e.g., interpret as of b when is greater than or less than 1). 5.NOS.D.11.B

12 Apply and extend previous understandings of multiplication to multiply a fraction by a fraction. 5.NOS.D.12

a Estimate products by reasoning about benchmark numbers and assess reasonableness of answers (e.g., will be less than because I will have one half of). 5.NOS.D.12.A

b Apply and extend whole number multiplication strategies (e.g. area models). 5.NOS.D.12.B

c Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. 5.NOS.D.12.C

13 Apply and extend previous understandings of multiplication to multiply a fraction by a fraction, with one or both factors greater than 1. 5.NOS.D.13

a Estimate products by reasoning about benchmark numbers and assess reasonableness of answers. 5.NOS.D.13.A

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b Apply and extend whole number multiplication strategies (e.g. area model, partial products). 5.NOS.D.13.B

14 Interpret multiplication as scaling (sizing) in context. 5.NOS.D.14

a Compare the size of a product to the size of one factor based on the size of the other factor, without performing the indicated multiplication. 5.NOS.D.14.A

b Explain why multiplying a given number by a fraction greater than a 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relate the principle of fraction equivalence to the Identity Property of Multiplication. 5.NOS.D.14.B

15 Solve problems in contexts involving multiplication of fractions and mixed numbers, (e.g., by using visual fraction models or equations to represent the problem). 5.NOS.D.15

16 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions in context. 5.NOS.D.16

a Apply estimation strategies to estimate quotients and assess reasonableness of answers. 5.NOS.D.16.A

b Use visual fraction models and equations to interpret division of a unit fraction by a non-zero whole number and compute quotients. 5.NOS.D.16.B

c Use visual fraction models and equations to interpret division of a whole number by a unit fraction and compute quotients. 5.NOS.D.16.C

d Represent and explain the computation by connecting visual fraction models and/or equations to the meaning of division with unit fractions. 5.NOS.D.16.D

Algebraic Thinking AT

A WRITE AND INTERPRET NUMERICAL EXPRESSIONS. 5.AT.A

1 Interpret and evaluate numerical expressions with grouping symbols (e.g. parentheses, brackets, or braces). 5.AT.A.1

2 Write expressions that record calculations with numbers and interpret numerical expressions without evaluating them. 5.AT.A.2

B ANALYZE PATTERNS AND RELATIONSHIPS. 5.AT.B

3 Generate and analyze number patterns. 5.AT.B.3

a Generate a number pattern that follows a given rule and identify relationships between the numbers within the pattern. 5.AT.B.3.A

b Generate two numerical patterns using two given rules and identify relationships between corresponding terms. 5.AT.B.3.B

c Use tables, ordered pairs, and graphs to represent the relationship between quantities. 5.AT.B.3.C

Geometric Reasoning and Measurement GR

A UNDERSTAND RELATIONSHIPS BETWEEN MEASUREMENT UNITS. 5.GR.A

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1 Apply the relationship between measurement units within a given measurement system to convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m) and use these conversions in solving multi-step problems. 5.GR.A.1

B CLASSIFY TWO-DIMENSIONAL FIGURES BASED ON PROPERTIES. 5.GR.B

2 Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (e.g., all rectangles have four right angles and squares are rectangles, so all squares have four right angles). 5.GR.B.2

3 Classify two-dimensional figures based on properties. 5.GR.B.3

a Classify triangles based on properties (e.g., angle measure, side lengths). 5.GR.B.3.A

b Classify quadrilaterals in a hierarchy based on properties (e.g., side lengths, angle measures, presence of parallel or perpendicular sides). 5.GR.B.3.B

C UNDERSTAND CONCEPTS OF VOLUME AND RELATE VOLUME TO MULTIPLICATION. 5.GR.C

4 Identify volume as an attribute of three-dimensional figures and measure volume by counting cubic units (e.g., non-standard equal-sized units, cubic centimeters, cubic inches, and cubic feet) that fill a figure without gaps or overlaps. 5.GR.C.4

5 Relate volume to the operations of multiplication and addition and solve problems in context. 5.GR.C.5

a Find the volume of a right rectangular prism with whole-number side lengths by filling it with unit cubes in layers and show that the volume is the same as would be found by multiplying the edge lengths, or by multiplying the height by the area of the base. Represent products of three whole numbers as volumes, (e.g., to represent the associative property of multiplication). 5.GR.C.5.A

b Apply the formulas V = (l)(w)(h) and V = (B)(h) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve problems in the context. 5.GR.C.5.B

c Determine the volumes of composite figures by decomposing them into non-overlapping right rectangular prisms and adding their volumes together to solve problems in context 5.GR.C.5.C

D GRAPH POINTS ON A COORDINATE PLANE TO SOLVE CONTEXTUAL AND MATHEMATICAL PROBLEMS. 5.GR.D

6 Define the coordinate system as a pair of perpendicular lines called axes that intersect at the origin. Use understanding that the coordinate values represent the distance from the origin on the x-axis and y-axis to graph and name coordinate points in the first quadrant using ordered pairs. 5.GR.D.6

7 Represent problems by graphing points in the first quadrant of the coordinate plane and interpreting coordinate values of points in the context of the situation. 5.GR.D.7

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Reasoning with Data and Statistics DS

A REPRESENT AND INTERPRET DATA. 5.DS.A

1 Ask and answer questions by collecting, organizing and summarizing data, recognizing the importance of context when analyzing data. 5.DS.A.1

a Create scaled data visualization (e.g. bar graphs for categorical data; line plots with fraction units of halves, fourths, and eighths for numerical data) to display data and communicate relationships or support a claim. 5.DS.A.1.A

b Summarize data presented in scaled visualizations (e.g. bar graphs, circle graphs, line plots, line graphs) by identifying the mode, the range, and any gaps in data and draw conclusions. 5.DS.A.1.B

c Evaluate whether a data visualization accurately represents the data and allows for accurate interpretation given the context. 5.DS.A.1.C