Grade 5

In grade 5, instructional time will emphasize five areas:

(1) multiplying and dividing multi-digit whole numbers, including using a standard algorithm;
(2) adding and subtracting fractions and decimals with procedural fluency, developing an understanding of multiplication and division of fractions and decimals;
(3) developing an understanding of the coordinate plane and plotting pairs of numbers in the first quadrant;
(4) extending geometric reasoning to include volume and
(5) extending understanding of data to include the mean.

Number Sense and Operations

MA.5.NSO.1 Understand the place value of multi-digit numbers with decimals to the thousandths place.

MA.5.NSO.1.1	Express how the value of a digit in a multi-digit number with decimals to the thousandths changes if the digit moves one or more places to the left or right.
MA.5.NSO.1.2	Read and write multi-digit numbers with decimals to the thousandths using standard form, word form and expanded form. *Example:* The number sixty-seven and three hundredths written in standard form is 67.03 and in expanded form is $60 + 7 + 0.03$ or $(6 \times 10) + (7 \times 1) + \left(3 \times \frac{1}{100}\right)$.
MA.5.NSO.1.3	Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations. *Example:* The number 20.107 can be expressed as $2\ tens\ +\ 1\ tenth\ +\ 7\ thousandths$ or as $20\ ones\ +\ 107\ thousandths$.

MA.5.NSO.1.4	Plot, order and compare multi-digit numbers with decimals up to the thousandths. *Example:* The numbers 4.891; 4.918 and 4.198 can be arranged in ascending order as 4.198; 4.891 and 4.918. *Example:* $0.15 < 0.2$ because $fifteen\ hundredths$ is less than $twenty\ hundredths$, which is the same as $two\ tenths$.

Benchmark Clarifications:
Clarification 1: When comparing numbers, instruction includes using an appropriately scaled number line and using place values of digits.
Clarification 2: Scaled number lines must be provided and can be a representation of any range of numbers.
Clarification 3: Within this benchmark, the expectation is to use symbols ($<$, $>$ or $=$).

MA.5.NSO.1.5	Round multi-digit numbers with decimals to the thousandths to the nearest hundredth, tenth or whole number. *Example:* The number 18.507 rounded to the nearest tenth is 18.5 and to the nearest hundredth is 18.51.

MA.5.NSO.2 Add, subtract, multiply and divide multi-digit numbers.

MA.5.NSO.2.1	Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.5.NSO.2.2	Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions. *Example:* The quotient $27 \div 7$ gives 3 with remainder 6 which can be expressed as $3\frac{6}{7}$.

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is not to use simplest form for fractions.

MA.5.NSO.2.3	Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.

MA.5.NSO.2.4 Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value.

Example: The quotient of 23 and 0.42 can be estimated as a little bigger than 46 because 0.42 is less than one-half and 23 times 2 is 46.

Benchmark Clarifications:
Clarification 1: Estimating quotients builds the foundation for division using a standard algorithm.
Clarification 2: Instruction includes the use of models based on place value and the properties of operations.

MA.5.NSO.2.5 Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.

Example: The number 12.3 divided by 0.01 can be thought of as $?\times 0.01 = 12.3$ to determine the quotient is $1{,}230$.

Benchmark Clarifications:
Clarification 1: Instruction focuses on the place value of the digit when multiplying or dividing.

Fractions

MA.5.FR.1 Interpret a fraction as an answer to a division problem.

MA.5.FR.1.1 Given a mathematical or real-world problem, represent the division of two whole numbers as a fraction.

Example: At Shawn's birthday party, a two-gallon container of lemonade is shared equally among 20 friends. Each friend will have $\frac{2}{20}$ of a gallon of lemonade which is equivalent to one-tenth of a gallon which is a little more than 12 ounces.

Benchmark Clarifications:
Clarification 1: Instruction includes making a connection between fractions and division by understanding that fractions can also represent division of a numerator by a denominator.
Clarification 2: Within this benchmark, the expectation is not to simplify or use lowest terms.
Clarification 3: Fractions can include fractions greater than one.

MA.5.FR.2 Perform operations with fractions.

MA.5.FR.2.1 Add and subtract fractions with unlike denominators, including mixed numbers and fractions greater than 1, with procedural reliability.

Example: The sum of $\frac{1}{12}$ and $\frac{1}{24}$ can be determined as $\frac{1}{8}, \frac{3}{24}, \frac{6}{48}$ or $\frac{36}{288}$ by using different common denominators or equivalent fractions.

Benchmark Clarifications:
Clarification 1: Instruction includes the use of estimation, manipulatives, drawings or the properties of operations.
Clarification 2: Instruction builds on the understanding from previous grades of factors up to 12 and their multiples.

MA.5.FR.2.2 Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability.

Benchmark Clarifications:
Clarification 1: Instruction includes the use of manipulatives, drawings or the properties of operations.
Clarification 2: Denominators limited to whole numbers up to 20.

MA.5.FR.2.3 When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating.

Benchmark Clarifications:
Clarification 1: Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.

MA.5.FR.2.4 Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction.

Benchmark Clarifications:
Clarification 1: Instruction includes the use of manipulatives, drawings or the properties of operations.
Clarification 2: Refer to Situations Involving Operations with Numbers (Appendix A).

Algebraic Reasoning

MA.5.AR.1 Solve problems involving the four operations with whole numbers and fractions.

MA.5.AR.1.1 Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context.

Benchmark Clarifications:
Clarification 1: Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.

MA.5.AR.1.2 Solve real-world problems involving the addition, subtraction or multiplication of fractions, including mixed numbers and fractions greater than 1.

Example: Shanice had a sleepover and her mom is making French toast in the morning. If her mom had $2\frac{1}{4}$ loaves of bread and used $1\frac{1}{2}$ loaves for the French toast, how much bread does she have left?

Benchmark Clarifications:
Clarification 1: Instruction includes the use of visual models and equations to represent the problem.

MA.5.AR.1.3 Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction.

Example: A property has a total of $\frac{1}{2}$ acre and needs to be divided equally among 3 sisters. Each sister will receive $\frac{1}{6}$ of an acre.

Example: Kiki has 10 candy bars and plans to give $\frac{1}{4}$ of a candy bar to her classmates at school. How many classmates will receive a piece of a candy bar?

Benchmark Clarifications:
Clarification 1: Instruction includes the use of visual models and equations to represent the problem.

MA.5.AR.2 Demonstrate an understanding of equality, the order of operations and equivalent numerical expressions.

MA.5.AR.2.1 Translate written real-world and mathematical descriptions into numerical expressions and numerical expressions into written mathematical descriptions.

Example: The expression $4.5 + (3 \times 2)$ in word form is $four\ and\ five\ tenths$ plus the quantity 3 times 2.

Benchmark Clarifications:
Clarification 1: Expressions are limited to any combination of the arithmetic operations, including parentheses, with whole numbers, decimals and fractions.
Clarification 2: Within this benchmark, the expectation is not to include exponents or nested grouping symbols.

MA.5.AR.2.2 Evaluate multi-step numerical expressions using order of operations.

Example: Patti says the expression $12 \div 2 \times 3$ is equivalent to 18 because she works each operation from left to right. Gladys says the expression $12 \div 2 \times 3$ is equivalent to 2 because first multiplies 2×3 then divides 6 into 12. David says that Patti is correctly using order of operations and suggests that if parentheses were added, it would give more clarity.

Benchmark Clarifications:
Clarification 1: Multi-step expressions are limited to any combination of arithmetic operations, including parentheses, with whole numbers, decimals and fractions.
Clarification 2: Within this benchmark, the expectation is not to include exponents or nested grouping symbols.
Clarification 3: Decimals are limited to hundredths. Expressions cannot include division of a fraction by a fraction.

MA.5.AR.2.3 Determine and explain whether an equation involving any of the four operations is true or false.

Example: The equation $2.5 + (6 \times 2) = 16 - 1.5$ can be determined to be true because the expression on both sides of the equal sign are equivalent to 14.5.

Benchmark Clarifications:
Clarification 1: Problem types include equations that include parenthesis but not nested parentheses.
Clarification 2: Instruction focuses on the connection between properties of equality and order of operations.

MA.5.AR.2.4 Given a mathematical or real-world context, write an equation involving any of the four operations to determine the unknown whole number with the unknown in any position.

Example: The equation $250 - (5 \times s) = 15$ can be used to represent that 5 sheets of paper are given to s students from a pack of paper containing 250 sheets with 15 sheets left over.

Benchmark Clarifications:
Clarification 1: Instruction extends the development of algebraic thinking where the unknown letter is recognized as a variable.
Clarification 2: Problems include the unknown and different operations on either side of the equal sign.

MA.5.AR.3 Analyze patterns and relationships between inputs and outputs.

MA.5.AR.3.1 Given a numerical pattern, identify and write a rule that can describe the pattern as an expression.

Example: The given pattern $6, 8, 10, 12$ ... can be describe using the expression $4 + 2x$, where $x = 1, 2, 3, 4$ ... ; the expression $6 + 2x$, where $x = 0, 1, 2, 3$ ... or the expression $2x$, where $x = 3, 4, 5, 6$ ....

Benchmark Clarifications:
Clarification 1: Rules are limited to one or two operations using whole numbers.

MA.5.AR.3.2 Given a rule for a numerical pattern, use a two-column table to record the inputs and outputs.

Example: The expression $6 + 2x$, where x represents any whole number, can be represented in a two-column table as shown below.

Input (x)	0	1	2	3
Output	6	8	10	12

Benchmark Clarifications:
Clarification 1: Instruction builds a foundation for proportional and linear relationships in later grades.
Clarification 2: Rules are limited to one or two operations using whole numbers.

Measurement

MA.5.M.1 Convert measurement units to solve multi-step problems.

MA.5.M.1.1 Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement.

Example: There are 60 minutes in 1 hour, 24 hours in 1 day and 7 days in 1 week. So, there are $60 \times 24 \times 7$ minutes in one week which is equivalent to 10,080 minutes.

Benchmark Clarifications:
Clarification 1: Within the benchmark, the expectation is not to memorize the conversions.
Clarification 2: Conversions include length, time, volume and capacity represented as whole numbers, fractions and decimals.

MA.5.M.2 Solve problems involving money.

MA.5.M.2.1 Solve multi-step real-world problems involving money using decimal notation.

Example: Don is at the store and wants to buy soda. Which option would be cheaper: buying one 24-ounce can of soda for $1.39 or buying two 12-ounce cans of soda for 69¢ each?

Geometric Reasoning

MA.5.GR.1 Classify two-dimensional figures and three-dimensional figures based on defining attributes.

MA.5.GR.1.1 Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category.

Benchmark Clarifications:
Clarification 1: Triangles include scalene, isosceles, equilateral, acute, obtuse and right; quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids.

MA.5.GR.1.2 Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones and spheres.

Benchmark Clarifications:
Clarification 1: Defining attributes include the number and shape of faces, number and shape of bases, whether or not there is an apex, curved or straight edges and curved or flat faces.

MA.5.GR.2 Find the perimeter and area of rectangles with fractional or decimal side lengths.

MA.5.GR.2.1 Find the perimeter and area of a rectangle with fractional or decimal side lengths using visual models and formulas.

Benchmark Clarifications:
Clarification 1: Instruction includes finding the area of a rectangle with fractional side lengths by tiling it with squares having unit fraction side lengths and showing that the area is the same as would be found by multiplying the side lengths.
Clarification 2: Responses include the appropriate units in word form.

MA.5.GR.3 Solve problems involving the volume of right rectangular prisms.

MA.5.GR.3.1 Explore volume as an attribute of three-dimensional figures by packing them with unit cubes without gaps. Find the volume of a right rectangular prism with whole-number side lengths by counting unit cubes.

Benchmark Clarifications:
Clarification 1: Instruction emphasizes the conceptual understanding that volume is an attribute that can be measured for a three-dimensional figure. The measurement unit for volume is the volume of a unit cube, which is a cube with edge length of 1 unit.

MA.5.GR.3.2 Find the volume of a right rectangular prism with whole-number side lengths using a visual model and a formula.

Benchmark Clarifications:
Clarification 1: Instruction includes finding the volume of right rectangular prisms by packing the figure with unit cubes, using a visual model or applying a multiplication formula.
Clarification 2: Right rectangular prisms cannot exceed two-digit edge lengths and responses include the appropriate units in word form.

MA.5.GR.3.3 Solve real-world problems involving the volume of right rectangular prisms, including problems with an unknown edge length, with whole-number edge lengths using a visual model or a formula. Write an equation with a variable for the unknown to represent the problem.

Example: A hydroponic box, which is a rectangular prism, is used to grow a garden in wastewater rather than soil. It has a base of 2 feet by 3 feet. If the volume of the box is 12 cubic feet, what would be the depth of the box?

Benchmark Clarifications:
Clarification 1: Instruction progresses from right rectangular prisms to composite figures composed of right rectangular prisms.
Clarification 2: When finding the volume of composite figures composed of right rectangular prisms, recognize volume as additive by adding the volume of non-overlapping parts.
Clarification 3: Responses include the appropriate units in word form.

MA.5.GR.4 Plot points and represent problems on the coordinate plane.

MA.5.GR.4.1 Identify the origin and axes in the coordinate system. Plot and label ordered pairs in the first quadrant of the coordinate plane.

Benchmark Clarifications:
Clarification 1: Instruction includes the connection between two-column tables and coordinates on a coordinate plane.
Clarification 2: Instruction focuses on the connection of the number line to the x- and y-axis.
Clarification 3: Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.

MA.5.GR.4.2 Represent mathematical and real-world problems by plotting points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.

Example: For Kevin's science fair project, he is growing plants with different soils. He plotted the point $(5, 7)$ for one of his plants to indicate that the plant grew 7 inches by the end of week 5.

Benchmark Clarifications:
Clarification 1: Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.

Data Analysis and Probability

MA.5.DP.1 Collect, represent and interpret data and find the mean, mode, median or range of a data set.

MA.5.DP.1.1 Collect and represent numerical data, including fractional and decimal values, using tables, line graphs or line plots.

Example: Gloria is keeping track of her money every week. She starts with $\$10.00$, after one week she has $\$7.50$, after two weeks she has $\$12.00$ and after three weeks she has $\$6.25$. Represent the amount of money she has using a line graph.

Benchmark Clarifications:
Clarification 1: Within this benchmark, the expectation is for an estimation of fractional and decimal heights on line graphs.
Clarification 2: Decimal values are limited to hundredths. Denominators are limited to 1, 2, 3 and 4. Fractions can be greater than one.

MA.5.DP.1.2 Interpret numerical data, with whole-number values, represented with tables or line plots by determining the mean, mode, median or range.

Example: Rain was collected and measured daily to the nearest inch for the past week. The recorded amounts are $1, 0, 3, 1, 0, 0$ and 1. The range is 3 inches, the modes are 0 and 1 inches and the mean value can be determined as $\frac{(1+0+3+1+0+0+1)}{7}$ which is equivalent to $\frac{6}{7}$ of an inch. This mean would be the same if it rained $\frac{6}{7}$ of an inch each day.

Benchmark Clarifications:

Clarification 1: Instruction includes interpreting the mean in real-world problems as a leveling out, a balance point or an equal share.
