

Mathematics Benchmarks for Grade 5

Mathematical Content
Strand: <i>Operations and Algebraic Thinking (OA)</i>
Write and interpret numerical expressions.
Use parentheses, brackets, or braces in numerical expressions
Evaluate numerical expressions that use parentheses, brackets, or braces
Write simple expressions that record calculations with numbers
Interpret simple numerical expressions that record calculations with numbers without evaluating them
Analyze patterns and relationships.
Generate two numerical patterns using two given rules
Identify relationships that are evident between corresponding terms in two numerical patterns using two given rules
Form ordered pairs consisting of corresponding terms in two numerical patterns using two given rules
Graph on a coordinate plane the ordered pairs consisting of corresponding terms in two numerical patterns using two given rules
Strand: <i>Number and Operations in Base Ten (NBT)</i>
Understand the place value system.
Show 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
Show that in a multi-digit number, a digit in one place represents $\frac{1}{10}$ of what it represents in the place to its left
Determine patterns in the number of zeros of the product when multiplying a number by powers of 10
Determine 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
Read decimals to thousandths using base-ten numerals, number names, and expanded form
Write decimals to thousandths using base-ten numerals, number names, and expanded form
Record the results of comparisons between two decimals to thousandths based on meanings of the digits in each place using the symbols $>$, $=$, and $<$

Round decimals to any place
Perform operations with multi-digit whole numbers and with decimals to hundredths.
Multiply multi-digit whole numbers fluently using the standard algorithm
Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors
Show the calculation of whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors
Add, subtract, multiply, and divide decimals to hundredths
Relate the strategy for decimal computation to a written method
Explain the reasoning for using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction for decimal computation
Strand: <i>Number and Operations - Fractions (NF)</i>
Use equivalent fractions as a strategy to add and subtract fractions.
Add and subtract fractions with unlike denominators by replacing given fractions with equivalent fractions in order to produce an equivalent sum and difference of fractions with like denominators
Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators
Assess the reasonableness of solutions to word problems arrived at by mentally adding and subtracting fractions referring to the same whole
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Interpret a fraction as division of the numerator by the denominator
Solve word problems involving division of whole numbers expressing answers in the form of fractions or mixed numbers
Interpret the product $(a/b) \times q$ as "a" parts of a partition of q into b equal parts
Interpret the product $(a/b) \times q$ as the result of a sequence of operations $a \times q \div b$
Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths
Compare the area of a rectangle found by tiling it with unit squares of the appropriate unit fraction side lengths to the area of a rectangle found by multiplying the side lengths

Mathematics Benchmarks for Grade 5

Find the area of a rectangle by multiplying fractional side lengths
Represent fraction products as rectangular areas
Use scaling or resizing to compare the size of a product to the size of one factor on the basis of the size of the other factor
Use scaling or resizing to explain why multiplying a given number by a fraction greater than one results in a product greater than the given number
Use scaling or resizing to explain why multiplying a given number by a fraction less than one results in a product smaller than the given number
Use scaling or resizing to relate the principle of fraction equivalence to the effect of multiplication
Solve real world problems involving multiplication of fractions and mixed numbers
Compute quotients by dividing unit fractions by non-zero whole numbers
Compute quotients by dividing whole numbers by unit fractions
Solve real world problems involving division of unit fractions by non-zero whole numbers
Solve real world problems involving division of whole numbers by unit fractions
Strand: Measurement and Data (MD)
Convert like measurement units within a given measurement system.
Convert different-sized standard measurement units within a given measurement system
Solve multi-step, real world problems by converting different-sized standard measurement units within a given measurement system
Represent and interpret data.
Make a line plot to display a data set of measurements in fractions of a unit
Solve problems involving information presented in line plots by using operations on fractions
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Show that volume can be measured by one cubic unit with a side length 1 unit, called a "unit cube"

Show that volume of n cubic units is made up of n unit cubes without gaps or overlaps
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units
Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes
Compare the volume of a right rectangular prism with whole-number side lengths, found by packing it with unit cubes, to the volume found by multiplying the edge lengths, to the volume found by multiplying the height by the area of the base
Represent threefold whole-number products as volumes
Solve real world and mathematical problems by finding the volume of right rectangular prisms with whole number edge lengths using the formula $V = l \times w \times h$
Solve real world and mathematical problems by finding the volume of right rectangular prisms with whole number edge lengths using the formula $V = b \times h$
Demonstrate that volume is additive by finding volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts
Solve real world problems by adding the volumes of non-overlapping parts to find the volume of a solid figure composed of two non-overlapping right rectangular prisms
Strand: Geometry (G)
Graph points on the coordinate plane to solve real-world and mathematical problems.
Define a coordinate system using a pair of perpendicular number lines that intersect with the 0 and a given point located by using an ordered pair of numbers
Identify that in an ordered pair of numbers located in a plane, the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis
Identify that in an ordered pair of numbers located in a plane, the names of the two axes and the coordinates correspond
Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane

Mathematics Benchmarks for Grade 5

Solve real world and mathematical problems by interpreting coordinate values of points in the first quadrant of the coordinate plane
Classify two-dimensional figures into categories based on their properties.
Compare the attributes belonging to a category of two-dimensional figures to the attributes of all subcategories of that category
Classify two-dimensional figures in a hierarchy based on properties
Mathematical Practice
Strand: Solve Problems (MP1)
1. Make sense of problems and persevere in solving them.
Make sense of problems and persevere in solving them
Strand: Reason (MP2)
2. Reason abstractly and quantitatively.
Reason abstractly and quantitatively
Strand: Construct Arguments (MP3)
3. Construct viable arguments and critique the reasoning of others.
Construct viable arguments and critique the reasoning of others
Strand: Model (MP4)
4. Model with mathematics.
Model with mathematics
Strand: Use Tools (MP5)
5. Use appropriate tools strategically.
Use appropriate tools strategically
Strand: Attend to Precision (MP6)
6. Attend to precision.
Attend to precision
Strand: Use Structure (MP7)
7. Look for and make use of structure.
Look for and make use of structure
Strand: Express Regularity (MP8)
8. Look for and express regularity in repeated reasoning.
Look for and express regularity in repeated reasoning