

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

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Grade 5 – Operations on Decimals and Numerical Expressions – Unit 1

Rationale

A focus of the unit 1 is to understand place value to the thousandths place. This concept builds on students' grade 4 understandings of decimals to the hundredths place. After examining the quantitative relationships that exist between the digits in place value positions of a multi-digit number, learners apply their previous understandings of adding and subtracting to add and subtract decimals.

While learners read, write, and compare decimals to the thousandths place using base-ten numerals, number names, and expanded form, the focus of this unit is addition and subtraction of decimals to the hundredths place. The additional and supporting concepts and skills engage learners in analyzing the structure of numerical expressions. Learners evaluate and write numerical expressions with grouping symbols, write numerical expressions from a description, and interpret numerical expressions.

Note: Double asterisks (**) indicate that the example(s) included within the New Jersey Student Learning Standard may be especially informative when considering the Student Learning Objective.

Grade 5 – Unit 1, Module A

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
 5.NBT.A.1 Recognize 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 1/10 of what it represents in the place to its left.	■ recognize in a multi-digit number that a digit is 10 times the value of the digit to its right ■ recognize in a multi-digit number that a digit is 1/10 the value of the digit to its left
 5.NBT.A.3 Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.	■ 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 ■ compare two decimals to thousandths based on place value understanding ■ record comparisons of two decimals to thousandths using $>$, $<$ or $=$

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NBT.A.4 Use place value understanding to round decimals to any place.	round decimals to any place using place value understanding

Grade 5 – Unit 1, Module B

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	- add and subtract decimals to hundredths using concrete models or drawings - add and subtract decimals to hundredths using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction - relate the strategy to the concrete model or drawing, and explain the reasoning used
○ 5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	- evaluate numerical expressions with parentheses, brackets, and braces, including expressions containing fractions and decimals) - use parentheses, brackets, or braces to group parts of a numerical expression
○ 5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i>	- write simple numerical expressions from a description that record calculations with numbers - interpret numerical expressions to compare their values without evaluating them

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Decimal Multiplication & Division and Volume Concepts – Unit 2

Rationale

This unit focuses on the concepts of volume, decimal multiplication and division, and fluency with whole number multiplication. The unit begins with learners analyzing and explaining patterns in the number of zeros and the placement of the decimal point in the context of multiplying by powers of 10. They continue work building fluency with multiplication of whole numbers using the standard algorithm. These concepts lay the foundation for introducing learners to multiplication of decimals to hundredths. As with other operations, learners represent these concepts with models and drawings, before using other various strategies. Similarly, learners divide whole numbers and use concrete models, drawings, and various strategies to divide decimals to hundredths.

In the final module of this unit, learners build upon earlier work in grade 3 tiling rectangular figures to develop the concept of area. Now in grade 5, learners pack rectangular prisms with unit cubes to develop the concept of volume. They recognize volume as an attribute of solid figures, understand foundational concepts of volume measurement, and measure volumes by counting unit cubes of various standard and non-standard units. They relate volume to the operations of multiplication and addition and solve real world and mathematical problems by applying volume formulas $V = l \times w \times h$ and $V = B \times h$ to rectangular prisms with whole number edge lengths. To conclude the unit, learners recognize volume as additive and use the concept to determine volumes of composite solid figures composed of right rectangular prisms.

Grade 5 – Unit 2, Module A

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NBT.A.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.MD.A.1 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, real world problems.	■ explain patterns in the number of zeros of the product when multiplying by powers of 10 ■ explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10 ■ denote powers of 10 by using whole-number exponents ■ convert among different-sized standard measurement units within a given measurement system ■ use conversions in solving multi-step, real world problems
■ 5.NBT.B.5 Fluently multiply multi-digit whole numbers using the standard algorithm.	■ multiply multi-digit whole numbers using the standard algorithm working towards accuracy and efficiency

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	▪ multiply decimals to hundredths using models or drawings ▪ multiply decimals to hundredths using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction ▪ relate the strategy to the concrete model or drawing, and explain the reasoning used

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Unit 2, Module B

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.	▪ find whole-number quotients with up to four-digit dividends and two-digit divisors using strategies based on place value ▪ find whole-number quotients with up to four-digit dividends and two-digit divisors using strategies based on properties of operations or the relationship between multiplication and division ▪ illustrate and explain the division calculation by using equations, rectangular arrays, and/or area models
■ 5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. **	▪ divide decimals to hundredths using models or drawings ▪ divide decimals to hundredths using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction ▪ relate the strategy to the concrete model or drawing, and explain the reasoning used

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Unit 2, Module C

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	▪ a cube with side length 1 unit is called a “unit cube”, has “one cubic unit” of volume, and can be used to measure volume ▪ a solid figure which can be packed without gaps or overlaps using (n) unit cubes has a volume of n cubic units
■ 5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and non-standard units.	▪ measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and non-standard units
■ 5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	▪ find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths ▪ represent volumes as the product of three whole numbers
■ 5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. b. Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.	▪ apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	▪ recognize volume as additive and find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Fractions – Unit 3

Rationale

Unit 3 focuses on fraction ideas and introduces a number of fractions concepts. Learners build upon many fraction concepts developed in earlier grades. They use fraction equivalence from grades 3 and 4 to add and subtract fractions with unlike denominators. Learners solve word problems involving addition and subtraction of fractions, using benchmark fractions and number sense of fractions to estimate mentally and to assess the reasonableness of their answers.

Next, learners extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. Building on their grade 3 work with area, they find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths. They show that the area is the same as would be found by multiplying the side lengths and represent fraction products as rectangular areas.

In the final module of this unit, learners build upon earlier work with multiplication and division. They interpret multiplication as scaling and compare the size of the product to the size of the factors. They come to understand and explain that multiplying a given factor by a number greater than 1 leads to a product that is greater than the given factor. Learners solve real world problems involving multiplication of fractions and represent problems using visual fraction models and equations.

To conclude this unit, learners are introduced to a new interpretation of fraction. They interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). They solve word problems involving division of whole numbers that lead to answers in fraction form. Learners then extend these previous understandings of division to divide unit fractions by whole numbers and to divide whole numbers by unit fractions.

Grade 5 – Unit 3, Module A

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
5.NF.A.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. <i>For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.)</i>	- when adding or subtracting fractions, replacing given fractions with equivalent fraction produces an equivalent sum or difference of fractions with like denominators - add and subtract fractions with unlike denominators, including mixed numbers, by replacing given fractions with equivalent fraction

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NF.A.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <i>For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.</i>	▪ solve word problems involving addition and subtraction of fractions including those with unlike denominators referring to the same whole ▪ benchmark fractions and number sense can be used in estimating and assessing the reasonableness of answers to word problems involving addition and subtraction of fractions

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Unit 3, Module B

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product $(a/b) \times q$ as a part of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</i> b. 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. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	▪ apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction ▪ interpret the product $(a/b) \times q$ as a part of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$ ** ▪ interpret the product of a fraction and a fraction as $(a/b) \times (c/d) = ac/bd$ ** ▪ tile a rectangle using the appropriate fractional unit square in order to find the area of a rectangle that has fractional side lengths ▪ show that the area found by tiling would be that same as multiplying the side lengths ▪ multiply fractional side lengths to find areas of rectangles ▪ represent fraction products as rectangular areas
5.NF.B.5 Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	▪ interpret multiplication as scaling (resizing) by comparing the size of a product to the size of one factor without performing the multiplication ▪ explain why multiplying a given number by a fraction greater than one results in a product greater than one and why multiplying a given number by a fraction less than one results in a product smaller than the given number ▪ multiplying a fraction a/b by n/n ($a/b = (n \times a)/(n \times b)$) has the same effect as multiplying a/b by 1 and creates an equivalent fraction

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	■ real world problems involving multiplication of fractions and mixed numbers
■ 5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. <i>For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?</i>	■ interpret a fraction as division of the numerator by the denominator using visual fraction models or equations ■ solve word problems involving division of whole numbers resulting in a fraction or mixed number quotient
■ 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i> b. Interpret division of a whole number by a unit fraction, and compute such quotients. <i>For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.</i>	■ compute and interpret the quotients of a unit fraction by a non-zero whole number ** ■ compute and interpret the quotients of a non-zero whole number by a unit fraction **

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
■ 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, how much chocolate will each person get if 3 people share $\frac{1}{2}$ lb. of chocolate equally? How many $\frac{1}{3}$-cup servings are in 2 cups of raisins?</i>	▪ solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions**
□ 5.MD.B.2 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. <i>For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</i>	▪ 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 with fractions to solve problems involving information presented in line plots

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – The Coordinate System and Classifying Two-Dimensional Figures – Unit 4

Rationale

The focus of Unit 4 is defining a coordinate system and understanding the relationship between coordinates and axes. Learners define the first quadrant of the coordinate system and represent real world and mathematical problems by graphing points in that quadrant. Learners also form ordered pairs that they have generated using two given rules to generate two numerical patterns using two given rules. They analyze and identify apparent relationships between corresponding terms. After revisiting their earlier work writing simple numerical expressions, learners extend their understanding of classifying figures into categories to understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. They use this new understanding of categories and subcategories to classify two-dimensional figures in a hierarchy based on their properties.

Grade 5 – Unit 4, Module A

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that 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, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	▪ a coordinate system is defined by a pair of perpendicular lines called axes with the intersection of the lines, the origin, occurring at 0 on each line ▪ a given point in the coordinate plane is located using an ordered pair of numbers called coordinates ▪ the first number in an ordered pair 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. ▪ the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate)
5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	▪ represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane ▪ interpret coordinate values of points in the context of the real world and mathematical problems

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
○ 5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. <i>For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</i>	▪ generate two numerical patterns using two given rules and identify relationships between corresponding terms in the patterns ▪ form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane
○ 5.O.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	▪ evaluate numerical expressions with parentheses, brackets, and braces, including expressions containing fractions and decimals) ▪ use parentheses, brackets, or braces to group parts of a numerical expression
○ 5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i>	▪ write simple numerical expressions from a description that record calculations with numbers ▪ interpret numerical expressions to compare their values without evaluating them

New Jersey Student Learning Standards for Mathematics and Student Learning Objectives

Grade 5 – Unit 4, Module B

Standard	Student Learning Objectives We are learning to ... / We are learning that ...
5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. <i>For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</i>	the attributes belonging to a category of two-dimensional figures also belong to all subcategories
5.G.B.4. Classify two-dimensional figures in a hierarchy based on properties.	classify two-dimensional figures in a hierarchy based on properties