



## Mathematics - LV 5 (with QuickTables)

### Correlation of the ALEKS course Mathematics LV 5 to the Common Core State Standards for Grade 5 (2010)

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#### 5.OA: Operations & Algebraic Thinking

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- = ALEKS course topic that addresses the standard
- TD = Teacher Directed

##### Write and interpret numerical expressions.

5.OA.A.1: Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

- Introduction to parentheses
- Order of operations with whole numbers and grouping symbols

5.OA.A.2: Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *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.*

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##### Analyze patterns and relationships.

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. *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.*

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#### 5.NBT: Number & Operations in Base Ten

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##### Understand the place value system.

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.

- Comparing place values of digits in a whole number: Problem type 1

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.

- Multiplication by 10, 100, and 1000
- Power of 10: Positive exponent

- Multiplication of a decimal by a power of ten
- Division of a decimal by a power of ten

5.NBT.A.3: Read, write, and compare decimals to thousandths.

5.NBT.A.3.A: Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g.,  $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$ .

- Writing a decimal number less than 1 given its name
- Writing a decimal number greater than 1 given its name
- Writing a decimal number given its name: Advanced

5.NBT.A.3.B: Compare two decimals to thousandths based on meanings of the digits in each place, using  $>$ ,  $=$ , and  $<$  symbols to record the results of comparisons.

- Introduction to ordering decimals

5.NBT.A.4: Use place value understanding to round decimals to any place.

- Rounding decimals

### **Perform operations with multi-digit whole numbers and with decimals to hundredths.**

5.NBT.B.5: Fluently multiply multi-digit whole numbers using the standard algorithm.

- Multiplying 2-digit and 1-digit numbers without regrouping
- Multiplying 2-digit and 1-digit numbers with regrouping: Problem type 1
- Multiplying 2-digit and 1-digit numbers with regrouping: Problem type 2
- Multiplying multi-digit and 1-digit numbers with regrouping
- Introduction to multiplication of large numbers
- Multiplication of large numbers
- Multiplication with trailing zeros: Problem type 2

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.

- Division without regrouping
- Division with regrouping: 1-digit divisor, 2-digit dividend
- Quotient with remainder: 1-digit divisor, 2-digit dividend
- Writing a division sentence for equal groups
- Writing a division sentence for equal groups and a remainder
- Whole number division: 2-digit by 2-digit, no remainder
- Division with trailing zeros: Problem type 1
- Division with regrouping: 1-digit divisor, 3-digit or 4-digit dividend
- Quotient with remainder: 1-digit divisor, 3-digit or 4-digit dividend
- Division involving quotients with intermediate zeros: Problem type 1
- Division involving quotients with intermediate zeros: Problem type 2
- Division with remainder involving quotients with intermediate zeros: Problem type 1
- Division with trailing zeros: Problem type 2
- Whole number division: 3-digit by 2-digit, no remainder
- Division with no remainder and a two-digit divisor: Problem type 2
- Division with remainder and a two-digit divisor: Problem type 1
- Division with remainder and a two-digit divisor: Problem type 2

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.

- Addition of decimals: Vertically aligned
- Decimal addition with 2 numbers
- Decimal addition with 3 numbers
- Subtraction of aligned decimals
- Decimal subtraction: Basic
- Decimal subtraction: Advanced
- Decimal addition and subtraction with 3 or more numbers
- Multiplying a decimal less than 1 by a whole number
- Multiplying a decimal by a whole number
- Multiplying decimals less than 1: Problem type 1
- Decimal multiplication: Problem type 1
- Division of a decimal by a whole number
- Division of a decimal by a 1-digit decimal: Problem type 1
- Division of a decimal by a 2-digit decimal

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## 5.NF: Number & Operations-Fractions

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### Use equivalent fractions as a strategy to add and subtract fractions.

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. *For example,  $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$ . (In general,  $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$ .)*

- Writing unit fractions with a common denominator to add or subtract
- Writing fractions with a common denominator to add or subtract
- Addition or subtraction of fractions with different denominators
- Addition and subtraction of 3 fractions with different denominators
- Addition or subtraction of mixed numbers with different denominators without renaming
- Addition of mixed numbers with different denominators and renaming
- Subtraction of mixed numbers with different denominators and renaming
- Addition and subtraction of 3 mixed numbers with different denominators

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. *For example, recognize an incorrect result  $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$ , by observing that  $\frac{3}{7} < \frac{1}{2}$ .*

- Word problem involving addition or subtraction of fractions with the same denominator
- Word problem involving addition or subtraction of fractions with different denominators

### Apply and extend previous understandings of multiplication and division.

5.NF.B.3: Interpret a fraction as division of the numerator by the denominator ( $\frac{a}{b} = a \div b$ ). 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. *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?*

- Division of whole numbers given in fractional form

5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

5.NF.B.4.A: Interpret the product  $(a/b) \times q$  as  $a$  parts of a partition of  $q$  into  $b$  equal parts; equivalently, as the result of a sequence of operations  $a \times q \div b$ . *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,  $(a/b) \times (c/d) = ac/bd$ .)*

- Product of a fraction and a whole number: Problem type 1
- Product of a fraction and a whole number: Problem type 2
- Introduction to fraction multiplication
- Fraction multiplication
- Modeling multiplication of proper fractions

5.NF.B.4.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.

- Modeling multiplication of proper fractions
- Area of a rectangle with fractional side lengths
- Area of a rectangle involving mixed number and fractional side lengths

5.NF.B.5: Interpret multiplication as scaling (resizing), by:

5.NF.B.5.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.

- Determining if a quantity is increased or decreased when multiplied by a fraction

5.NF.B.5.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.

- Introduction to finding equivalent fractions: Multiplying
- Writing a fraction with denominator 10 as a fraction with denominator 100
- Equivalent fractions
- Determining if a quantity is increased or decreased when multiplied by a fraction

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.

- Word problem involving multiplying a fraction and a whole number
- Word problem involving fractions and multiplication

5.NF.B.7: Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

5.NF.B.7.A: Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *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  $(1/12) \times 4 = 1/3$ .*

- Division involving a whole number and a unit fraction

5.NF.B.7.B: Interpret division of a whole number by a unit fraction, and compute such quotients. *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  $20 \times (1/5) = 4$ .*

- Division involving a whole number and a unit fraction

5.NF.B.7.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. *For example, how much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $1/3$ -cup servings are in 2 cups of raisins?*

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## 5.MD: Measurement & Data

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### Convert like measurement units within a given measurement system.

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.

- Conversion table with U.S. Customary length
- U.S. Customary length conversion with whole number values
- Conversions involving measurements in feet and inches
- Conversion table with U.S. Customary weight
- Conversion table with U.S. Customary volume
- U.S. Customary volume conversion with whole number values
- U.S. Customary weight conversions with whole number values
- U.S. Customary unit conversion with whole number values: Two-step conversion
- U.S. Customary unit conversion with mixed number values: One-step conversion
- U.S. Customary unit conversion with mixed number values: Two-step conversion
- Conversion table with metric distance
- Metric distance conversion with whole number values
- Metric distance conversion with decimal values
- Conversion table with metric mass or volume
- Metric mass or volume conversion with whole number values
- Metric conversion with decimal values: Two-step problem
- Time unit conversion with whole number values

### Represent and interpret data.

5.MD.B.2: Make a line plot to display a data set of measurements in fractions of a unit ( $1/2$ ,  $1/4$ ,  $1/8$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots. *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.*

- Constructing a line plot with fractional values: Fourths

### Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

- 5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.MD.C.3.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.
- Volume of a rectangular prism made of unit cubes
- 5.MD.C.3.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.
- Volume of a rectangular prism made of unit cubes
- 5.MD.C.4: Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
- Volume of a rectangular prism made of unit cubes
- 5.MD.C.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.MD.C.5.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.
- Writing equivalent expressions for the volume of a rectangular prism
- 5.MD.C.5.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.
- Volume of a rectangular prism
  - Word problem involving the volume of a rectangular prism
- 5.MD.C.5.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.
- Volume of a piecewise rectangular prism
  - Word problem involving the volume of a piecewise rectangular prism

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## 5.G: Geometry

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### **Graph points on the coordinate plane to solve real-world and mathematical problems.**

- 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).
- Reading a point in quadrant 1
  - Plotting a point in quadrant 1
- 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.

- Reading a point in quadrant 1
- Plotting a point in quadrant 1

### **Classify two-dimensional figures into categories based on their properties.**

5.G.B.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

- Shared attributes among categories of quadrilaterals
- Identifying parallelograms, rectangles, and squares
- Properties of quadrilaterals
- Classifying parallelograms

5.G.B.4: Classify two-dimensional figures in a hierarchy based on properties.

- Naming polygons
- Classifying scalene, isosceles, and equilateral triangles by side lengths
- Classifying scalene, isosceles, and equilateral triangles by side lengths or angles
- Shared attributes among categories of quadrilaterals
- Identifying parallelograms, rectangles, and squares
- Properties of quadrilaterals
- Classifying parallelograms

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## **Standards for Mathematical Practices**

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### **1: Make sense of problems and persevere in solving them.**

- Ordering large numbers
- Using equal groups to find a total
- Writing addition and multiplication sentences for equal groups
- Using multiplication to find the number of squares
- Word problem with multiplication of whole numbers
- Word problem with division of whole numbers
- Introduction to multiplication with a trailing zero
- Word problem with multiplication and addition or subtraction of whole numbers
- Word problem on quotient and remainder
- Word problem with division of whole numbers and rounding: Problem type 1
- Word problem with division of whole numbers and rounding: Problem type 2
- Ordering decimals
- Addition with money
- Subtraction with money
- Word problem with multiplication of a decimal and a whole number
- Word problem with multiple decimal operations: Problem type 1
- Word problem with multiple decimal operations: Problem type 2
- Order of operations with whole numbers
- Order of operations with whole numbers and grouping symbols
- Function tables with one-step rules
- Word problem involving metric mass or volume: Addition or subtraction
- Word problem involving metric mass or volume: Multiplication or division

- Relating the area of a rectangle to multiplying its side lengths
- Finding the area of a composite figure on a grid
- Area of a piecewise rectangular figure
- Word problem on finding the area of a piecewise rectangular figure
- Volume of a piecewise rectangular prism
- Word problem involving the volume of a piecewise rectangular prism

## **2: Reason abstractly and quantitatively.**

- Multiplicative comparison involving groups of objects
- Writing a division sentence for equal groups
- Writing a division sentence for equal groups and a remainder
- Writing a mixed number and an improper fraction for a shaded region
- Product of a unit fraction and a whole number
- Evaluating an algebraic expression: Whole number addition or subtraction
- Evaluating an algebraic expression: Whole number multiplication or division
- Evaluating an algebraic expression: Whole numbers with two operations
- Additive property of equality with whole numbers
- Introduction to solving an equation with multiplication or division
- Function tables with one-step rules
- Reading a point in quadrant 1
- Plotting a point in quadrant 1
- Interpreting a tally table
- Constructing a line plot

## **3: Construct viable arguments and critique the reasoning of others.**

- Using equal groups to find a total
- Writing addition and multiplication sentences for equal groups
- Introduction to multiplication using an area model
- Multiplying a multi-digit and a 1-digit number using an area model
- Understanding equivalent fractions: Problem type 1
- Understanding equivalent fractions: Problem type 2
- Modeling and writing equivalent fractions
- Describing an increasing or decreasing pattern from a table of values
- Function tables with one-step rules
- Finding the next terms of an arithmetic sequence with whole numbers
- Finding the next terms of a geometric sequence with whole numbers
- Finding patterns in shapes
- Shared attributes among categories of quadrilaterals
- Identifying parallelograms, rectangles, and squares

## **4: Model with mathematics.**

- Word problem with addition or subtraction of whole numbers
- Word problem with multiplication of whole numbers
- Word problem with division of whole numbers
- Word problem involving multiplicative or additive comparison
- Word problem with multiplication or division of whole numbers
- Word problem on unit rates associated with ratios of whole numbers: Whole number answers
- Word problem with multiplication and addition or subtraction of whole numbers
- Word problem on quotient and remainder
- Addition with money



- Subtraction with money
- Word problem with multiple decimal operations: Problem type 1
- Word problem with multiple decimal operations: Problem type 2
- Writing a mixed number and an improper fraction for a shaded region
- Word problem involving addition or subtraction of fractions with the same denominator
- Word problem involving addition or subtraction of fractions with different denominators
- Word problem involving addition or subtraction of mixed numbers with different denominators
- Word problem involving multiplying a fraction and a whole number
- Modeling multiplication of proper fractions
- Word problem involving fractions and multiplication
- Reading a point in quadrant 1
- Word problem involving metric mass or volume: Addition or subtraction
- Word problem involving metric mass or volume: Multiplication or division
- Metric distance conversion with whole number values
- Metric mass or volume conversion with whole number values
- Volume of a rectangular prism made of unit cubes

### **5: Use appropriate tools strategically.**

- Estimating a sum of whole numbers: Problem type 1
- Estimating a difference of whole numbers: Problem type 1
- Using equal groups to find a total
- Writing addition and multiplication sentences for equal groups
- Using multiplication to find the number of squares
- Area of a rectangle on a grid
- Introduction to unit fractions
- Introduction to non-unit fractions
- Writing a decimal and a fraction for a shaded region
- Understanding equivalent fractions: Problem type 1
- Modeling and writing equivalent fractions
- Writing a mixed number and an improper fraction for a shaded region
- Reading a point in quadrant 1
- Measuring length to the nearest inch
- Measuring length to the nearest quarter or half inch
- Measuring length to the nearest centimeter
- Relating the area of a rectangle to multiplying its side lengths
- Volume of a rectangular prism made of unit cubes

### **6: Attend to precision.**

- Introduction to inequalities
- Area of a rectangle with one-digit side lengths
- Multiplication with trailing zeros: Problem type 2
- Estimating a product
- Quotient with remainder: 1-digit divisor, 2-digit dividend
- Division with trailing zeros: Problem type 1
- Estimating a quotient
- Word problem on quotient and remainder
- Word problem with division of whole numbers and rounding: Problem type 2
- Introduction to ordering decimals
- Decimal addition with 3 numbers
- Estimating a decimal sum or difference

- Multiplication of a decimal by a power of ten
- Multiplying a decimal by a whole number
- Division of a decimal by a power of ten
- Division of a decimal by a whole number
- Division of a decimal by a 2-digit decimal
- Introduction to fraction multiplication
- Fraction multiplication
- Measuring length to the nearest inch
- Measuring length to the nearest quarter or half inch
- Measuring length to the nearest centimeter
- Finding the missing length in a figure
- Word problem involving the area of a rectangle: Problem type 1
- Finding the area of a composite figure on a grid
- Introduction to area of a piecewise rectangular figure
- Area of a piecewise rectangular figure
- Word problem on finding the area of a piecewise rectangular figure
- Volume of a rectangular prism
- Volume of a piecewise rectangular prism

### **7: Look for and make use of structure.**

- Whole number place value: Problem type 1
- Whole number place value: Problem type 2
- Numeral translation: Problem type 1
- Numeral translation: Problem type 2
- Expanded form: 2 and 3-digit numbers
- Expanded form: 4 and 5-digit numbers
- Expanded form with zeros
- Rounding to tens or hundreds
- Rounding to hundreds or thousands
- Rounding to thousands, ten thousands, or hundred thousands
- Addition without regrouping using place values
- Adding 3 numbers with two, three, and four-digits
- Introduction to properties of addition
- Fact families for addition and subtraction
- Relating multiplication and division facts
- Fact families for multiplication and division
- Introduction to multiplication with a trailing zero
- Multiplication with trailing zeros: Problem type 1
- Multiples: Problem type 1
- Multiples: Problem type 2
- Using the distributive property to multiply two whole numbers
- Introduction to properties of multiplication
- Introduction to parentheses
- Understanding multiplication of a one-digit number with a larger number
- Modeling multiplication of proper fractions
- Introduction to order of operations
- Order of operations with whole numbers
- Order of operations with whole numbers and grouping symbols
- Describing an increasing or decreasing pattern from a table of values
- Function tables with one-step rules
- Finding the next terms of an arithmetic sequence with whole numbers
- Finding the next terms of a geometric sequence with whole numbers

- Finding patterns in shapes
- Properties of quadrilaterals

**8: Look for and express regularity in repeated reasoning.**

- Using equal groups to find a total
- Multiplication as repeated addition
- Writing addition and multiplication sentences for equal groups
- Relating multiplication and division facts
- Multiplication by 10, 100, and 1000
- Multiples: Problem type 1
- Multiples: Problem type 2
- Using the distributive property to multiply two whole numbers
- Writing expressions using exponents
- Introduction to exponents
- Power of 10: Positive exponent
- Addition of decimals: Vertically aligned
- Decimal addition with 3 numbers
- Subtraction of aligned decimals
- Multiplying decimals less than 1: Problem type 1
- Decimal multiplication: Problem type 1
- Divisibility rules for 2, 5, and 10
- Describing an increasing or decreasing pattern from a table of values
- Finding the next terms of an arithmetic sequence with whole numbers
- Finding the next terms of a geometric sequence with whole numbers
- Finding patterns in shapes