Math: Operations and Algebraic Thinking: Expressions and Equations

Students:	DesCartes Statements:

Students:	**RIT Over 280:** • Describes a relationship or a real-world situation represented by a quadratic equation

Students:	**RIT 271-280:** • Describes a relationship or a real-world situation represented by a quadratic equation

Students:

RIT 261-270:
- Estimates the limit of a given infinite sequence (e.g., given the sequence 1/n, as n gets larger)
- Factors polynomials by identifying a common monomial and then factoring the trinomial
- Rewrites a complex formula to solve for a specific variable
- Simplifies monomials
- Simplifies polynomial expressions using power laws
- Simplifies rational expressions with exponents
- Simplifies rational expressions with negative exponents
- Solves polynomial inequalities
- Solves quadratic equations by completing the square
- Solves quadratic equations using the quadratic formula
- Solves real-world systems of linear equations
- Uses graphs to solve systems of linear inequalities
- Uses the compound interest equation to solve problems

Students:

RIT 251-260
- Applies algebraic methods to solve complex real-world and theoretical problems
- Describes and uses a variable with whole numbers, multiplication, and division in a contextual situation
- Determines the length of the side of a square, given the area
- Divides a polynomial by a monomial
- Evaluates expressions by substituting with rational numbers
- Factors polynomials by identifying common factors
- Factors polynomials using difference of squares
- Factors trinomials in the form $x^2 + bx + c$
- Identifies discriminants and roots
- Multiplies a polynomial by a polynomial
- Multiplies binomials
- Rewrites a complex formula to solve for a specific variable
- Simplifies algebraic expressions with integer exponents
- Simplifies monomials
- Simplifies polynomial expressions
- Simplifies rational expressions with exponents
- Solves linear equations using rational numbers
- Solves polynomial equations (e.g., $ax = b + cx$, $a(x + b) = c$, $ax + b = cx + d$, $a(bx + c) = d(ex + f)$, $a/x = b$)
- Solves polynomial equations with integers as exponents
- Solves problems with scientific notation
- Solves quadratic equations by completing the square
- Solves quadratic equations by factoring
- Solves real-world systems of linear equations
- Solves single variable linear inequalities with the variable in only one member using number lines
- Solves single variable linear inequalities with variable in both members using number lines
- Uses algebraic methods to solve systems of linear equations
- Uses expressions to represent situations that involve variable quantities with exponents
- Uses fractional and negative exponents as optional ways of representing problem situations (e.g., $27^{2/3} = (27^{1/3})^2 = 9$)
- Uses graphs to solve systems of linear equations
- Uses graphs to solve systems of linear inequalities
- Uses polynomial equations to solve area and perimeter problems
- Uses reasoning strategies to solve problems
- Uses substitution as a first step in solving systems of linear equations
- Uses the Multiplication Property of Equality as a first step in solving systems of linear equations
- Writes equivalent forms of algebraic equations using multiplication and division

Students:	**RIT 241-250:** • Applies algebraic methods to solve a variety of real-world and theoretical problems • Applies algebraic methods to solve real-world problems • Converts from Celsius to Fahrenheit, given conversion ratios • Describes and uses a variable with whole numbers, multiplication, and division in a contextual situation • Describes the relationship or a real-world situation represented by a simple linear inequality (e.g., 1- or 2-step) • Determines the prime factorization of a number using powers • Evaluates expressions by substituting with rational numbers • Evaluates expressions using the order of operations, including exponents (using integers) • Evaluates expressions using the order of operations, including exponents (whole numbers only) • Evaluates numerical expressions using the order of operations (using integers) • Factors polynomials using difference of squares • Factors trinomials in the form $x^2 + bx + c$ • Multiplies binomials • Simplifies polynomial expressions • Simplifies rational expressions with scientific notation • Solves 2-step open sentences with missing factors (variables on both sides of the sentence) • Solves complex real-world problems involving capacity • Solves linear equations using rational numbers • Solves linear equations with fractions • Solves linear inequalities using graphs • Solves open sentences with fractions • Solves problems involving capacity in the metric system and converts to larger or smaller units • Solves problems involving consecutive numbers • Solves problems involving simple interest rates without the formula • Solves problems with scientific notation • Solves real-world problems involving rate of pay with time and a half • Solves simple one-step inequality open sentences • Solves single variable linear inequalities with the variable in only one member using number lines • Uses algebraic methods to solve systems of linear equations • Uses basic operations on algebraic expressions (uses correct order of operations) • Uses expressions to represent situations that involve variable quantities with exponents • Uses linear equations to represent situations involving variable quantities • Uses polynomial equations to solve complex real-world problems (e.g., using distributive property, variables on both sides) • Uses reasoning strategies to solve problems • Writes a decimal in scientific notation • Writes a whole number in scientific notation
Students:	**RIT 231-240:** • Applies algebraic methods to solve real-world problems • Applies rules for multiplying and dividing powers • Calculates the power of a number (e.g., $8 = 2^3$) • Converts from Celsius to Fahrenheit, given conversion ratios • Describes and uses a variable with whole numbers, multiplication, and division in a contextual situation • Describes the relationship or a real-world situation represented by a simple linear inequality (e.g., 1- or 2-step) • Determines slope from a linear equation • Determines the prime factorization of a number • Divides rational expressions in a/b form • Evaluates expressions containing powers (e.g., $3^2 \times 2^3$) • Evaluates expressions using the order of operations, including exponents (whole numbers only) • Evaluates numerical expressions using the order of operations (using integers) • Evaluates numerical expressions using the order of operations (whole numbers only) • Expresses a simple linear equation from a contextual situation • Expresses a simple linear inequality from a contextual situation • Recognizes commutative, associative, distributive, symmetric, transitive, and reflexive properties • Represents relationships of quantities in the form of an expression • Solves 2-step linear equations • Solves 2-step open sentences with missing factors (variables on both sides of the sentence) • Solves difficult real-world problems involving decimals (e.g., multiple multiplications, conversions) • Solves linear equations using rational numbers • Solves linear equations with fractions • Solves linear equations with integers • Solves problems involving capacity in the metric system and converts to larger or smaller units • Solves problems with scientific notation

- Solves real-world problems involving rate of pay and rate of pay with time and a half
- Solves simple linear inequalities using graphs
- Solves simple one-step inequality open sentences
- Uses basic operations on algebraic expressions (combining like terms)
- Uses basic operations on algebraic expressions (expanding - monomial by a binomial)
- Uses basic operations on algebraic expressions (substituting for unknown exponents)
- Uses basic operations on algebraic expressions (substituting for unknowns)
- Uses basic operations on algebraic expressions (uses correct order of operations)
- Uses expressions to represent situations that involve variable quantities with exponents
- Uses graphs to solve simple systems of linear equations
- Uses polynomial equations to solve complex real-world problems (e.g., using distributive property, variables on both sides)
- Uses the distributive property
- Writes a whole number in scientific notation
- Writes equivalent forms of algebraic expressions (e.g., $(x + 3)/2 = x/2 + 3/2$)

Students:	RIT 221-230: - Applies algebraic methods to solve real-world problems - Applies algebraic methods to solve theoretical problems - Applies systems-of-linear-equations methods to solve theoretical problems - Calculates the value of a power (e.g., $2^3 = 8$) - Demonstrates an understanding of properties (e.g., commutative, associative, distributive, properties of 0) - Describes the relationship or a real-world situation represented by a simple linear inequality (e.g., 1- or 2-step) - Expresses a simple linear equation from a contextual situation - Recognizes commutative, associative, distributive, symmetric, transitive, and reflexive properties - Represents relationships of quantities in the form of an expression - Solves 1-step and 2-step linear equations - Solves 2-step open sentences with missing factors - Solves difficult real-world problems involving decimals (e.g., multiple multiplications, conversions) - Solves linear equations in a real-world context using a given formula - Solves linear equations with decimals and with integers - Solves open sentences with calculations on both sides of the sentence - Solves open sentences with decimals - Solves problems involving simple interest rates with the formula - Solves real-world problems involving rate of pay - Solves real-world problems using reasoning strategies - Uses a table of input/output values to represent patterns - Uses basic operations on algebraic expressions (expanding - monomial by a binomial) - Uses basic operations on algebraic expressions (substituting for unknowns) - Uses basic operations on algebraic expressions (uses correct order of operations) - Uses graphs to solve simple systems of linear equations - Uses powers to represent 10, 100, 1000, 10,000, and 100,000 - Uses the distributive property - Writes a number expressed in scientific notation in standard form - Writes equivalent forms of algebraic equations using addition and subtraction - Writes equivalent forms of algebraic expressions (e.g., $(x + 3)/2 = x/2 + 3/2$)
Students:	RIT 211-220: - Applies algebraic methods to solve theoretical problems - Calculates the value of a power (e.g., $2^3 = 8$) - Demonstrates an understanding of the associative property of multiplication - Demonstrates an understanding of the distributive property of multiplication by decomposing a term - Solves 1-step linear equations - Solves 2-step open sentences with missing factors - Solves open sentences using the distributive property - Solves open sentences with calculations on both sides of the sentence - Solves real-world problems using reasoning strategies - Solves simple open sentences with missing factors (numbers over 100) - Translates a 2-step problem to a symbolic expression or equation - Understands equivalence & extends the concept to number sentences involving variables (e.g., $8 + 2 = [] + 2$) - Uses a table of input/output values to represent patterns - Uses algebraic reasoning to solve problems involving equality relationships - Uses powers to represent 10, 100, 1000, 10,000, and 100,000 - Uses rounding to estimate answers to 2-step problems involving money (using decimals) - Uses simple linear equations to represent problem situations

| Students: | RIT 201-210:
| | - Demonstrates an understanding of the commutative property of addition
| | - Describes a realistic situation using information given in a linear equation
| | - Evaluates numerical expressions using grouping symbols (whole numbers only)
| | - Solves 1-step open sentences with missing addends (numbers over 100)
| | - Solves 2-step open sentences with missing addends
| | - Solves open sentences with basic-facts calculations on both sides of the sentence
| | - Solves real-world problems using reasoning strategies
| | - Solves simple open sentences with missing factors (numbers 100 and under)
| | - Solves whole number subtraction word problems with numbers over 1000
| | - Translates a 2-step problem to a symbolic expression or equation
| | - Understands equivalence & extends the concept to number sentences involving variables (e.g., $8 + 2 = [] + 2$)
| | - Uses algebraic reasoning to solve problems involving equality relationships
| | - Uses rounding to estimate answers to 2-step problems involving money (using decimals)
| | - Uses simple linear equations to represent problem situations

Students:

RIT 191-200:
- Computes half price (multiplication/division)
- Demonstrates an understanding of the zero property of multiplication
- Evaluates numerical expressions using grouping symbols (whole numbers only)
- Solves 1-step open sentences with missing addends (numbers 100 and under)
- Solves 1-step open sentences with missing addends (numbers over 100)
- Solves 2-step open sentences with missing addends
- Solves real-world whole number problems involving subtraction with numbers under 1000
- Solves simple open sentences with missing factors (numbers 100 and under)
- Solves whole number subtraction word problems with numbers over 1000
- Uses algebraic reasoning to solve problems involving equality relationships
- Writes equivalent forms of whole numbers 11 to 20 using addition (e.g., $14 = 7 + 7$)

Students:

RIT 181-190:
- Demonstrates an understanding of the zero property of multiplication
- Solves 1-step open sentences with missing addends (numbers 100 and under)
- Solves basic facts addition and subtraction open sentences using diagrams and models (e.g., using balances)
- Solves linear equations with basic facts - 1-step addition using a letter for the variable
- Solves real-world whole number problems involving subtraction with numbers under 1000
- Writes a number sentence for a simple problem solving situation
- Writes equivalent forms of whole numbers 11 to 20 using addition (e.g., $14 = 7 + 7$)

Students:

RIT 171-180:
- Represents a basic facts addition problem with a number sentence
- Solves basic facts open sentences - multiplication and division
- Solves basic-facts open sentences - addition and subtraction
- Solves linear equations with basic facts - 1-step addition using a letter for the variable
- Writes a number sentence for a simple problem solving situation
- Writes equivalent forms of whole number expressions (e.g., $15 + 5 = 10 + 10$)

Students:

RIT 161-170:
- Solves basic-facts open sentences - addition and subtraction