

Math DesCartes: Numbers and Operations

Skills: Operation Sense – Meaning of Operations

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| Students: | <p>DesCartes Skills: (Highlight the skills related to your chosen standard/concept)</p> <p>RIT 261-270:</p> <ul style="list-style-type: none"> • Uses technology to organize, record, and communicate mathematical ideas • Performs operations on complex numbers and expresses the results in simplest form • Simplifies rational expressions with negative exponents | |
| | <p>RIT 251-260:</p> <ul style="list-style-type: none"> • Uses equivalent representations to understand new mathematical content • Applies the most appropriate problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses technology to organize, record, and communicate mathematical ideas • Uses reasoning strategies to solve problems • Uses the components of mathematical modeling (e.g., problem formulation, mathematical model, solution within the model, interpretation of solution within the model, validation in original real-world problem situation) • Identifies the commutative property of multiplication • Uses the additive inverse property with rational numbers • Performs operations on complex numbers and expresses the results in simplest form • Simplifies rational expressions with exponents • Solves problems with scientific notation | <p>operations, including exponents (using integers)</p> <ul style="list-style-type: none"> • Identifies the associative property of addition • Uses the multiplicative inverse property with rational numbers • Simplifies rational expressions with exponents • Estimates the square roots of numbers • Solves multiple-step problems involving proportions • Solves problems involving a fractional increase • Simplifies rational expressions with scientific notation • Solves problems with scientific notation |
| | <p>RIT 241-250:</p> <ul style="list-style-type: none"> • Uses equivalent representations to understand new mathematical content • Applies the most appropriate problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses technology to organize, record, and communicate mathematical ideas • Uses reasoning strategies to solve problems • Uses the components of mathematical modeling (e.g., problem formulation, mathematical model, solution within the model, interpretation of solution within the model, validation in original real-world problem situation) • Evaluates expressions using the order of operations, including exponents (whole numbers only) • Uses a number line to determine the distance between a positive and negative number • Evaluates numerical expressions using the order of operations (using integers) • Evaluates expressions using the order of | <p>RIT 231-240:</p> <ul style="list-style-type: none"> • Uses equivalent representations to understand new mathematical content • Uses pictures to represent problems • Applies the most appropriate problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses technology to organize, record, and communicate mathematical ideas • Organizes information from a paragraph to solve a problem • Analyzes complex problems to separate into simpler parts • Uses the components of mathematical modeling (e.g., problem formulation, mathematical model, solution within the model, interpretation of solution within the model, validation in original real-world problem situation) • Models algorithms using place value concepts (addition and subtraction with whole numbers) • Models algorithms using place value concepts (multiplication and division with whole numbers) • Evaluates numerical expressions using the order of operations (whole numbers only) • Evaluates expressions using the order of operations, including exponents (whole numbers only) • Predicts the relative size of the answer when dividing a smaller whole number by a larger whole number • Uses models to multiply and divide fractions and connect the actions to algorithms • Uses models to multiply and divide fractions and mixed fractions and connect the actions to algorithms • Describes the effects of multiplying a number by a number between 0 and 1 • Evaluates numerical expressions using the order of operations (using integers) • Identifies the distributive property • Uses the distributive property • Calculates the power of a number (e.g., $8 = 2^3$) |

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| <ul style="list-style-type: none"> • Evaluates expressions containing powers (e.g., $3^2 \times 2^3$) • Applies rules for multiplying and dividing powers • Calculates the positive square root of a perfect square • Solves problems involving equivalent fractions (analysis) • Solves problems involving ratios • Solves multiple-step problems involving proportions • Solves problems with scientific notation • Simplifies rational expressions with absolute value | <ul style="list-style-type: none"> • Uses the distributive property • Calculates the value of a power (e.g., $2^3 = 8$) • Solves problems involving ratios • Solves 1-step problems involving proportions |
| <p>RIT 221-230:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand complex problems • Restates the problem from various perspectives • Identifies the question from a problem solving situation • Determines the required information for solving a difficult problem and whether any further information is needed • Determines the additional information required to solve problems • Uses pictures to represent problems • Applies a variety of problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses technology to generate and analyze data to solve problems • Organizes information from a paragraph to solve a problem • Applies what was learned to a new and/or more complex problem • Solves real-world problems using reasoning strategies • Applies a problem solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Models algorithms using place value concepts (addition and subtraction with whole numbers) • Models algorithms using place value concepts (multiplication and division with whole numbers) • Solves real-world multiple-step problems involving whole numbers • Predicts the relative size of the answer when adding whole numbers • Predicts the relative size of the answer when subtracting whole numbers • Predicts the relative size of the answer when dividing whole numbers • Demonstrates an understanding of the commutative property of multiplication with complex problems (e.g., parenthesis, 3 factors) • Demonstrates an understanding of multiple properties • Uses a number line to determine the midpoint between a positive and negative number | <p>RIT 211-220:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand complex problems • Restates the problem from various perspectives • Determines the required information for solving a difficult problem and whether any further information is needed • Determines the additional information required to solve problems • Uses pictures to represent problems • Uses diagrams to represent problems • Determines the operation needed from a complex problem • Applies a variety of problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses technology to generate and analyze data to solve problems • Uses manipulatives and models to demonstrate thinking processes • Solves real-world problems using reasoning strategies • Applies a problem solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Models whole number multiplication and division algorithms (e.g., uses physical materials to show 4 groups of 3 objects) • Evaluates a numerical expression involving more than one operation • Solves real-world problems involving 2-step multiple operations, whole numbers only • Solves real-world multiple-step problems involving whole numbers • Predicts the relative size of the answer when adding whole numbers • Predicts the relative size of the answer when subtracting whole numbers • Predicts the relative size of the answer when computing with 10's, 100's, 1000's • Predicts the relative size of the answer when multiplying whole numbers • Demonstrates an understanding of the inverse relationship between addition and subtraction • Demonstrates an understanding of the commutative property of multiplication with simple problems • Demonstrates an understanding of the associative property of multiplication • Demonstrates an understanding of the distributive property of multiplication by decomposing a term • Recognizes multiplication and division fact families |

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| <ul style="list-style-type: none"> • Uses the commutative property of addition with rational numbers • Demonstrates an understanding that division by 0 is undefined • Calculates the value of a power (e.g., $2^3 = 8$) • Solves problems involving equivalent fractions • Solves 1-step problems involving proportions | <ul style="list-style-type: none"> • Demonstrates an understanding of symmetric property applied to basic addition and subtraction facts (e.g., $10 = 2 + 8$ is the same as $2 + 8 = 10$ or $7 = 10 - 3$ is the same as $10 - 3 = 7$) • Demonstrates an understanding of the commutative property of multiplication with simple problems • Demonstrates an understanding of symmetric property applied to multiplication (e.g., $8 \times 4 = 32$ is the same as $32 = 8 \times 4$) • Recognizes multiplication and division fact families • Uses models to add and subtract fractions and connect the actions to algorithms • Uses the commutative property of addition with rational numbers |
| <p>RIT 201-210:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand more difficult problems • Restates the problem in own words • Selects the information necessary to solve a simple problem and determines whether any further information is needed • Draws pictures to represent whole number problems • Uses manipulatives to represent problems • Writes a number sentence for a simple problem solving situation (analysis) • Determines the operation needed to solve a real-world problem • Uses a variety of problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses calculators as problem solving tools (e.g., to explore patterns, to validate solutions) • Uses technology to gather, analyze, and communicate mathematical information • Uses manipulatives and models to demonstrate thinking processes • Solves real-world problems using reasoning strategies • Uses a problem solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Adds and subtracts whole numbers using place value • Uses a number line to model multiplication (whole numbers) • Models whole number multiplication and division algorithms (e.g., uses physical materials to show 4 groups of 3 objects) • Evaluates numerical expressions using grouping symbols (whole numbers only) • Evaluates a numerical expression involving more than one operation • Solves real-world problems involving 2-step multiple operations, whole numbers only • Identifies the missing symbol to compare 2 expressions (e.g., $<$ or $>$) • Identifies the missing operation symbol - 2-step number sentence • Demonstrates an understanding of the associative property of addition • Demonstrates an understanding of the commutative property of addition • Demonstrates an understanding of the zero property of addition (identity) | <p>RIT 191-200:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand more difficult problems • Restates the problem in own words • Selects the information necessary to solve a simple problem and determines whether any further information is needed • Draws pictures to represent whole number problems • Determines the operation needed from a simple problem • Determines the operation needed to solve a real-world problem • Uses a variety of problem solving strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses calculators as problem solving tools (e.g., to explore patterns, to validate solutions) • Uses technology to gather, analyze, and communicate mathematical information • Uses a problem solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Uses a number line to construct subtraction facts with subtrahends and minuends through 20 (whole numbers) • Adds and subtracts whole numbers using place value • Uses repeated subtraction for division • Models whole number multiplication and division algorithms (e.g., shows multiplication as repeated addition and division as repeated subtraction) • Evaluates numerical expressions using grouping symbols (whole numbers only) • Identifies the missing operation symbol - 2-step number sentence • Demonstrates an understanding of the commutative property of multiplication with simple problems • Demonstrates an understanding of the zero property of multiplication • Demonstrates an understanding of the multiplicative property of 1 (identity) |

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| | <ul style="list-style-type: none"> • Uses models to add and subtract fractions and connect the actions to algorithms | | <p>evaluating the solution for reasonableness</p> <ul style="list-style-type: none"> • Uses a number line to construct addition facts with sums through 20 (whole numbers) • Uses models to calculate whole number sums through 999 • Uses models to calculate differences through 100 (whole numbers) • Uses models to calculate differences through 1000 (whole numbers) • Identifies the missing operation symbol - 1-step number sentence • Recognizes addition and subtraction fact families through 18 • Demonstrates an understanding that vertical and horizontal representations are equivalent |
| | <p>RIT 181-190:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand simple problems • Draws pictures to represent whole number problems • Uses manipulatives to represent whole number problems • Determines the operation needed from a simple problem • Writes a number sentence for a simple problem solving situation • Uses a structured model to solve problems using a variety of strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses appropriate technology to solve problems • Follows a model of problem solving that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Uses a number line to construct subtraction facts with subtrahends and minuends through 20 (whole numbers) • Uses models to calculate differences through 1000 (whole numbers) • Uses sharing for division • Models whole number multiplication and division algorithms (e.g., shows multiplication as repeated addition and division as repeated subtraction) • Models multiplication and division algorithms using arrays (whole numbers) • Identifies the missing operation symbol - 2-step number sentence • Recognizes addition and subtraction fact families through 18 • Demonstrates an understanding of the zero property of multiplication • Demonstrates an understanding of the inverse relationship between multiplication and division | | <p>RIT 161-170:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand simple problems • Uses a structured model to solve problems using a variety of strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Follows a model of problem solving that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness • Uses a number line to construct addition facts with sums through 20 (whole numbers) • Uses models to calculate whole number sums through 99 • Uses models to calculate whole number sums through 999 • Uses models to construct subtraction facts with differences through 10 (whole numbers) • Uses models to calculate differences through 100 (whole numbers) • Identifies the missing operation symbol - 1-step number sentence |
| | <p>RIT 171-180:</p> <ul style="list-style-type: none"> • Analyzes another student's explanation to understand simple problems • Determines the operation needed from a simple problem • Writes a number sentence for a simple problem solving situation • Uses a structured model to solve problems using a variety of strategies (e.g., draws a picture, looks for patterns, makes a table or organized list, makes a problem simpler, uses process of elimination, uses trial and error, works backwards, uses models) • Uses appropriate technology to solve problems • Follows a model of problem solving that incorporates understanding the problem, making a plan, carrying out the plan, and | | <p>RIT Below 161:</p> <ul style="list-style-type: none"> • Uses models to construct whole number addition facts with addends through 10 • Uses models to calculate whole number sums through 99 |

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Lesson Title:

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| Standard/Concept for All: |
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| Introduction: (Get Attention; Connect to Prior Knowledge) |
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| For Students Ready for a Challenge: Lesson/Activity: Resources: Means of Assessment: |
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| For Most Students: Lesson/Activity: Resources: Means of Assessment: |
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| For Students Needing Extra Support: Lesson/Activity: Resources: Means of Assessment: |
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| Closure/Summary for All: |
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