

Chart of Student Competencies

Number and Operations

Grade Level: 4 Names of Developers: Mary Beth Feldmann, Barbara Purdon
Leanne Adkins, Leanna Banks, and Kara Pendleton

Topic	Dates Taught	Dates Assessed
<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• understand the place-value structure of the base-ten number system and be able to estimate, represent, compare, & order whole numbers (0 to 1,000,000) and decimals (to hundredths).• develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on a number line, and as divisions of whole numbers.• describe the properties of odd and even numbers, composite and prime numbers, multiples, and factors.• use models, manipulatives, benchmarks, and equivalent forms to estimate, represent, and determine the size of fractions.		
<p>Understand meanings of operations and how they relate to one another</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• understand the various meanings of multiplication and division.• understand the effects of multiplying and dividing whole numbers.• understand the effects of adding and subtracting fractions with like denominators, using manipulatives and/or diagrams.		
<p>Compute fluently and make reasonable estimates</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• add, subtract, multiply, & divide whole numbers.• develop and use strategies to estimate computations and to judge the reasonableness of those results.• develop and use strategies to estimate computations involving fractions and decimals (to the hundredths) in situations		

relevant to the students' experience.		
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Chart of Student Competencies

Number and Operations

Grade Level: 5 Names of Developers: Mary Beth Feldmann, Barbara Purdon
 Leanne Adkins, Leanna Banks, and Kara Pendleton

Topic	Dates Taught	Dates Assessed
Understand numbers, ways of representing numbers, relationships among numbers, and number systems The student should be able to: <ul style="list-style-type: none"> • understand the place-value structure of the base-ten number system and be able to represent, compare, and order whole numbers (0 to 100,000,000) and decimals (to thousandths). • read, write, rename, compare, and model whole numbers, fractions (e.g., $1/2 = 3/6$, $1/2 > 1/8$) mixed numbers (e.g., $1 \frac{1}{2}$) and decimals (to the thousandths.) • recognize and generate equivalent forms of commonly used fractions, decimals, percents, and whole numbers. • describe classes of numbers according to characteristics such as factors, multiples, odd and even numbers, prime and composite numbers, and GCF and LCM. • develop multiple representations of numbers (e.g., drawings, manipulatives, and symbols.) • develop an understanding of estimation of the size of whole numbers and fractions. 		
Understand meanings of operations and how they relate to one another The student should be able to: <ul style="list-style-type: none"> • understand and use properties of operations, such as the distributive property of multiplication over addition. • identify and use relationships between operations to solve problems, (e.g., use division as the inverse of multiplication to solve problems.) • understand the various meanings of properties of operations such as the commutative, associative, identity properties 		

<p>of addition and multiplication, and the zero property of multiplication.</p> <ul style="list-style-type: none">• develop meaning for the relationships between operations to solve problems with fractions with unlike denominators.		
<p>Compute fluently and make reasonable estimates</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• develop and use appropriate estimation strategies with whole numbers and fractions, and judge the reasonableness of the results.• select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil computation according to the context and nature of the computation and the appropriate use of the selected tool.• add and subtract simple fractions with common denominators and decimals to the thousandths using manipulatives or symbolic notation.		

Chart of Student Competencies

Number and Operations

Grade Level: 6 Names of Developers: Mary Beth Feldmann, Barbara Purdon
 Leanne Adkins, Leanna Banks, and Kara Pendleton

Topic	Dates Taught	Dates Assessed
<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> • develop meaning for fractions, decimals, percents (greater than 100 and less than 1) and ratios. • compare, order, and represent numbers in equivalent forms through 1,000,000,000 and ten-thousandths (e.g., models, diagrams, symbols, and on a number line.) • develop an understanding of place value of large numbers (up to 1 billion) and small numbers, decimals (to ten-thousandths) and integers. • use prime, composite, prime factorization, multiples, factors, estimation, and divisibility rules to solve problems. • develop meaning of ratio (describe and compare 2 sets of data using ratios and appropriate notations: 3:5, 3/5, 3 to 5.) 		
<p>Understand meanings of operations and how they relate to one another</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> • understand the meaning and effects of operations with whole numbers, fractions, decimals, and with introduction to integers (e.g., initially understand the use of integers for noting relative changes or values.) • use the properties of operations (associative, commutative, and distributive) to simplify computations with fractions, decimals, and initial use with integers. • develop meaning for the inverse relationship of operations to solve problems (addition and 		

subtraction, multiplication and division, squaring and finding square roots.)		
<p>Compute fluently and make reasonable estimates</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• develop a variety of appropriate methods (e.g., mental math, calculators/computers, paper and pencil) to estimate and compute using large and small quantities (from 1 billion to ten-thousandths) including fractions, decimals, and initial use of integers.• develop fluency when completing algorithms with fractions, decimals, integers, and rational numbers, and judge the reasonableness of the answer.• develop and use strategies for solving problems which involve ratios, proportions, and percentages (greater than 100% and smaller than 1%.)		

Chart of Student Competencies

Number and Operations

Grade Level: 7 Names of Developers: Mary Beth Feldmann, Barbara Purdon
 Leanne Adkins, Leanna Banks, and Kara Pendleton

Topic	Dates Taught	Dates Assessed
<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> • develop number sense for pi as one example of an irrational number. • understand and use ratios and proportions to represent quantitative relationships. • develop an understanding of large numbers (billions) & recognize and appropriately use exponential, scientific, and calculator notation. • compute percentages of numbers and compare, order, estimate, and determine equivalent relationships among fractions, decimals, and percentages. 		
<p>Understand meanings of operations and how they relate to one another</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> • extend understanding of operations ($=$, $-$, $+$, \times, \div) to include percents and integers. • explain and apply properties such as the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals. • understand the meaning and effects of whole number exponents (squaring) to simplify computations and solve problems. • develop understanding of the meaning and effects of operations with decimals, integers, fractions, and percents (including percents greater than 100% and less than 1%.) 		

<p>Compute fluently and make reasonable estimates</p> <p>The student should be able to:</p> <ul style="list-style-type: none">• add, subtract, multiply and divide rational numbers (fractions, decimals, percents, integers) both concretely and symbolically (mental, paper and pencil, calculators) to solve problems.• develop proportional thinking and explain methods such as rates, scaling, and similarity to solve problems involving proportion.		

Chart of Student Competencies

Number and Operations

Grade Level: 8 Names of Developers: Mary Beth Feldmann, Barbara Purdon
 LeanneAdkins, Leanna Banks, and Kara Pendleton

Topic	Dates Taught	Dates Assessed
Understand numbers, ways of representing numbers, relationships among numbers, and number systems The student should be able to: <ul style="list-style-type: none"> • compare and order rational and irrational numbers and find their approximate location on a number line. • represent numbers and operations in a variety of equivalent forms using models, diagrams, and symbols (number lines, 10 by 10 grids, rectangular arrays, number sentences.) • understand and apply how whole numbers, natural numbers, integers, fractions, decimals, percents, and irrational numbers (square roots and pi) relate to each other (e.g. convert between forms of rational numbers, compare, order.) • develop an understanding of estimation of the size of rational numbers. 		
Understand meanings of operations and how they relate to one another The student should be able to: <ul style="list-style-type: none"> • determine the inverse relationship between addition and subtraction, multiplication and division, and squaring and taking the square root of a number. • work flexibly with decimals, integers, fractions, and percents (including percents greater than 100% and less than 1%) to solve problems. • use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to show 		

relationships and justify steps in problem solving.		
<p>Compute fluently and make reasonable estimates</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> • use percentages and proportions in consumer applications (e.g., simple interest, percentages of increase or decrease, discounts, unit pricing, and sale pricing.) • develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results. • develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use. 		

References

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Kentucky Program of Studies. Kentucky Department of Education. Retrieved June 13, 2002 from the World Wide Web:
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Principles and Standards for School Mathematics. (2000). National Council of Teachers of Mathematics. Reston, VA: NCTM.