

**Chart of Student Competencies  
Number and Operations  
Oak Hills Local School District  
Cincinnati, Ohio  
Grades 4-9  
Debbie Steward**

**Chart of Student Competencies  
Number and Operations**

Grade Level: 4<sup>th</sup>

Name of Developer: Debbie Steward

<b>Topic</b>	<b>Dates Taught</b>	<b>Dates Assessed</b>
Understand numbers, ways of representing numbers, relationships among numbers, and number systems		

<p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Identify and generate equivalent forms of fractions and decimals</li> <li>• Use place value structure of the base-ten number system to read, write, represent and compare whole numbers through millions and decimals through thousandths</li> <li>• Identify and represent factors and multiples of whole numbers through 100, and classify numbers as prime or composite</li> <li>• Use models and points of reference to compare commonly used fractions</li> <li>• Round whole numbers to a given place value</li> </ul>		
<p>Understand meanings of operations and how they relate to one another</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Recognize that division may be used to solve different types of problem situations and interpret the meaning of remainders</li> <li>• Use associative and distributive properties to simplify and perform computations</li> </ul>		
<p>Compute fluently and make reasonable estimates</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Solve problems involving counting money and making change, using both coins and paper bills</li> <li>• Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies</li> <li>• Use physical models, visual representations and paper and pencil to add and subtract decimals and commonly used fractions with like denominators</li> <li>• Develop and explain strategies for performing computations mentally</li> <li>• Analyze and solve multi-step problems involving additions, subtractions, multiplication, and division using an organized approach, and verify and interpret results with respect to the original problem</li> <li>• Use a variety of methods and appropriate tools for computing with whole numbers</li> <li>• Demonstrate fluency in adding and subtracting whole numbers and in multiplying and dividing whole numbers by 1 and 2 digit numbers and multiples of ten</li> </ul>		

\*All language taken from the new Ohio State Standards which are based on the NCTM's Principles and Standards.

### Chart of Student Competencies Number and Operations

Grade Level: 5<sup>th</sup>

Name of Developer: Debbie Steward

Topic	Dates Taught	Dates Assessed
Understand numbers, ways of representing numbers,		

relationships among numbers, and number systems <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>• Use various forms of “one” to demonstrate the equivalence of fractions</li> <li>• Identify and generate equivalent forms of fractions, decimals, and percents</li> <li>• Recognize and identify perfect squares and their roots</li> <li>• Represents and compare numbers less than 0 by extending the number line and using familiar applications</li> <li>• Use models and visual representation to develop the concept of ratio as part to part and part to whole</li> <li>• Round decimals to a given place value and round fractions to the nearest half</li> </ul>		
Understand meanings of operations and how they relate to one another <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>• Use commutative, associative, distributive, identify and inverse properties to simplify and perform computations</li> <li>• Identify and use relationships between operations to solve problems</li> <li>• Use order of operations including use of parentheses, to simplify numerical expressions</li> <li>• Explain how place value is related to addition and subtraction of decimals</li> </ul>		
Compute fluently and make reasonable estimates <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>• Justify why fractions need common denominators to be added or subtracted</li> <li>• Use physical models, points of reference, an equivalent forms to add and subtract commonly used fractions with like and unlike denominators</li> <li>• Estimate the results of computations involving whole numbers, fractions and decimals, using a variety of strategies</li> </ul>		

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### Chart of Student Competencies Number and Operations

Grade Level: 6<sup>th</sup>

Name of Developer: Debbie Steward

Topic	Dates Taught	Dates Assessed
Understand numbers, ways of representing numbers, relationships among numbers, and number systems <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>• Decompose and recompose whole numbers using</li> </ul>		

<p>factors and exponents</p> <ul style="list-style-type: none"> <li>• Find and use the prime factorization of composite numbers</li> <li>• Explain why a number is referred to as being “rational” and recognize that the expression <math>a/b</math> can mean <math>a</math> parts of size <math>1/b</math> each, <math>a</math> divided by <math>b</math>, or the ratio of <math>a</math> to <math>b</math></li> <li>• Describe what it means to find a specific percent of a number, using real-life examples</li> <li>• Recognize that a quotient may be larger than the dividend when the divisor is a fraction</li> </ul>		
<p>Understand meanings of operations and how they relate to one another</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Use the order of operations, including the use of exponents, decimals and rational numbers, to simplify numerical expressions</li> <li>• Give examples of how ratios are used to represent comparisons</li> <li>• Use simple expressions involving integers to represent and solve problem</li> <li>• Represent multiplication and division situations involving fractions and decimals with models and visual representations</li> </ul>		
<p>Compute fluently and make reasonable estimates</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Use models and pictures to relate concepts of ratio, proportion and percent, including percent less than 1 and greater than 100</li> <li>• Perform fraction and decimal computations and justify their solution</li> <li>• Develop and analyze algorithms for computing with fractions and decimals, and demonstrate fluency in their use</li> <li>• Estimate reasonable solutions to problem situations involving fractions and decimals</li> <li>• Use proportional reasoning, ratios, and percents to represent problem situations and determine the reasonableness of solutions</li> <li>• Determine the percent of a number and solve related problems</li> </ul>		

\*All language taken from the new Ohio State Standards which are based on the NCTM’s Principles and Standards.

### Chart of Student Competencies Number and Operations

Grade Level: 7<sup>th</sup>

Name of Developer: Debbie Steward

Topic	Dates Taught	Dates Assessed
<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p><b>The student should be able to:</b></p>		

<ul style="list-style-type: none"> <li>• Demonstrate an understand of place value using powers of 10 and write large numbers in scientific notation</li> <li>• Explain the meaning of exponents that are negative or 0</li> <li>• Describe differences between rational and irrational numbers</li> <li>• Simplify numerical expressions involving integers and use integers to solve real-life problem</li> <li>• Solve problems using the appropriate form of a rational number</li> </ul>		
<p>Understand meanings of operations and how they relate to one another</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Use order of operations and properties to simplify numerical expression involving integers, fractions, and decimals</li> <li>• Explain the meaning and effect of adding, subtraction, multiplying and dividing integers</li> </ul>		
<p>Compute fluently and make reasonable estimates</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Develop and analyze algorithms for computing with percents and integers, and demonstrate fluency in their use</li> <li>• Represent and solve problem situations that can be modeled by and solved using concepts of absolute value, exponents, and square roots</li> </ul>		

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### Chart of Student Competencies Number and Operations

Grade Level: 8<sup>th</sup>

Name of Developer: Debbie Steward

Topic	Dates Taught	Dates Assessed
<p>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p><b>The student should be able to:</b></p> <ul style="list-style-type: none"> <li>• Use scientific notation to express large numbers and small numbers between 0 and 1</li> <li>• Recognize that natural numbers, whole</li> </ul>		

numbers, integers, rational numbers and irrational numbers are subset of the real number system		
Understand meanings of operations and how they relate to one another <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>Apply order of operations to simplify expressions and perform computations involving integer exponents and radicals</li> <li>Explain and use the inverse and identify properties and use inverse relationships</li> </ul>		
Compute fluently and make reasonable estimates <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>Determine when an estimate is sufficient and when an exact answer is needed in problem situations, and evaluate estimates in relation to actual answers</li> <li>Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent and judge the reasonableness of solutions</li> <li>Find the square root of perfect squares, and approximate the square root of non-perfect squares as consecutive integers between which the root lies</li> <li>Add, subtract, multiply, divide and compare numbers written in scientific notation</li> </ul>		

\*All language taken from the new Ohio State Standards which are based on the NCTM's Principles and Standards.

### Chart of Student Competencies Number and Operations

Grade Level: 9<sup>th</sup>

Name of Developer: Debbie Steward

Topic	Dates Taught	Dates Assessed
Understand numbers, ways of representing numbers, relationships among numbers, and number systems <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>Compare, order and determine equivalent forms for rational and irrational numbers</li> </ul>		
Understand meanings of operations and how they relate to one another <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>Identify and justify whether properties (closure, identity, inverse, commutative, and associative) hold for a given set and</li> </ul>		

operations <ul style="list-style-type: none"> <li>• Explain the effects of operations such as multiplication or division, and of computing powers and roots on the magnitude of quantities</li> </ul>		
Compute fluently and make reasonable estimates <b>The student should be able to:</b> <ul style="list-style-type: none"> <li>• Demonstrate fluency in computation using real numbers</li> <li>• Estimate the solutions for problem situations involving square and cube roots</li> </ul>		

\*All language taken from the new Ohio State Standards which are based on the NCTM's Principles and Standards.

#### References

NCTM Principles and Standards <http://standards.nctm.org/>

Ohio Academic Content Standards for Math <http://www.ode.state.oh.us/>