

Numbers Up! Volcanic Panic

Correlation with the
NCTM Principles and Standards

Mathematics

Number and Operations Standard

NCTM Level: Pre-K – 2

Numbers Up! Levels 1-11 (Ages 4-7)

In pre-kindergarten through grade 2 all students should:

Understand numbers and number systems

- Count with understanding and recognize “how many” in sets of objects;
- Use multiple models to develop initial understandings of place value and the base-ten number system;
- Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections;
- Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers;
- Connect number words and numerals to the quantities they represent, using various representations;
- Understand and represent commonly used fractions such as $\frac{1}{4}$, $\frac{1}{3}$ and $\frac{1}{2}$;
- Order a given set of selected numbers;
- Begin to understand and use ordinal numbers in different contexts.

Understand meanings of operations and how they relate to one another

- Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations;
- Understand the effects of adding and subtracting whole numbers;
- Understand situations that entail multiplication and division, such as equal groups of objects and sharing equally;
- Develop and use strategies for whole-number computations, with a focus on addition and subtraction;
- Develop fluency with basic number combinations for addition and subtraction.

Connections

- Recognize and use connections among mathematical ideas;
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
- Recognize and apply mathematics in contexts outside mathematics.

Representations

- Select, apply and translate among mathematical representations to solve problems.

NCTM Level: Grades 3 – 5

Numbers Up! Levels 12-17 (Ages 7-10)

In grades 3 – 5 all students should:

Understand numbers and number systems

- Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals;
- Recognize equivalent representations for the same number and generate them by composing and decomposing numbers;
- Develop understanding of fractions as parts of unit wholes, as locations on number lines, and as divisions of whole numbers;
- Use models, benchmarks, and equivalent forms to judge the size of fractions;
- Recognize and generate equivalent forms of commonly used fractions, decimals and percents;
- Describe classes of numbers according to characteristics such as the nature of their factors.

Understand meanings of operations and how they relate to one another

- Understand various meanings of multiplication and division;
- Understand the effects of multiplying and dividing whole numbers;
- Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;
- Understand and use properties of operations, such as the distributivity of multiplication over addition.

Compute fluently and make reasonable estimates

- Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30×50 ;
- Develop fluency in adding, subtracting, multiplying and dividing whole numbers;
- Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results;
- Develop and use strategies to estimate computations involving fractions and decimals in situations relevant to the students' experience;
- Use visual models, benchmarks and equivalent forms to add and subtract commonly used fractions and decimals.

Problem-solving

- Solve problems that arise in mathematics and other contexts;
- Apply and adapt a variety of appropriate strategies to solve problems.

Connections

- Recognize and use connections among mathematical ideas;
- Understand how mathematical ideas connect and build on one another to produce a coherent whole;
- Recognize and apply mathematics in context outside mathematics.

Representations

- Select, apply and translate among mathematical representations to solve problems.

NCTM Level: Grades 6 – 8

Numbers Up! Levels 18-26 (Ages 10-14)

In grades 6 – 8 all students should:

Understand numbers and number systems

- Work flexibly with fractions, decimals and percents to solve problems;
- Compare and order fractions, decimals and percents efficiently and find their approximate locations on a number line;
- Develop meaning for percents greater than 100 and less than 1;
- Understand and use ratios and proportions to represent quantitative relationships;
- Develop an understanding of large numbers and recognize and appropriately use exponential and scientific notation;
- Use factors, multiples, prime numbers and prime factorization to solve problems;
- Develop meanings for integers and represent and compare quantities with them.

Understand meanings of operations and how they relate to one another

- Understand the meaning and effects of arithmetic operations with fractions, decimals and integers;
- Use 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 and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems.

Compute fluently and make reasonable estimates

- Select appropriate methods and tools for computing with fractions and decimals;
- Develop and analyze algorithms for computing with fractions, decimals and integers and develop fluency with their use;
- Develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results;
- Develop methods for solving problems involving proportions, such as scaling and finding equivalent ratios.

Problem-solving

- Build new mathematical knowledge through problem-solving;
- Solve problems that arise in mathematical and other contexts;
- Apply and adapt a variety of appropriate strategies to solve problems;
- Monitor and reflect on the process of mathematical problem solving.

NCTM Level: Grades 9 – 12

Numbers Up! Levels 25-26 (Ages 14-15+)

In grades 9 – 12 all students should:

Understand numbers and, ways of representing numbers and number systems

- Develop a deeper understanding of very large and very small numbers and of various representations of them;
- Compare and contrast the properties of numbers and number systems.

Understand meanings of operations and how they relate to one another

- Judge the effects of such operations as multiplication, division, and computing powers and roots on the magnitudes of quantities.

Compute fluently and make reasonable estimates

- Develop fluency in operations with real numbers using computation or visual calculations for simple cases.

Problem-solving

- Solve problems that arise in mathematics and in other contexts;
- Apply and adapt a variety of appropriate strategies to solve problems.

Reasoning

- Make and investigate mathematical conjectures.

Connections

- Recognize and use connections among mathematical ideas;
- Recognize and apply mathematics in contexts outside of mathematics.