

# **Jefferson County Public Schools World Class Mathematics Standards Working Document**

**Units of bullets may be re-organized based  
on materials selected.**

**Collaboratively developed by:  
Jefferson County Public Schools  
Jefferson County Teachers Association  
Pearson Achievement Solutions  
American Institutes for Research**

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GE Foundation**

## **What makes the new GE Foundation Mathematics Standards “World Class”?**

The new GE Foundation Mathematics Standards can accurately be referred to as “world class” because they incorporate the elements of the mathematics standards found in the world’s highest performing countries, such as Japan, Singapore and the Netherlands. That is, these standards reflect:

- a careful coherence of the development of mathematical understanding within and between grades;
- the “chunking” of mathematical content into 8 focused units of instruction at each grade level that provide greater depth and richness of instruction;
- a reduction in the repetitiveness and redundancy of typical mathematics standards, resulting in an average of 38 unit objectives per grade;
- an effective balance of skills, concepts and applications within every unit;
- an expectation that students will master the content within each unit as opposed to being merely exposed to the content; and
- a sequence of content that results in all students reaching algebra in 8<sup>th</sup> grade.

However, world class standards are only as good as the entire mathematics program that is designed to implement and ensure mastery of these standards. Accordingly, these standards must be accompanied by the development of instructional materials, assessments and professional development that are closely aligned with these standards and that enable schools and districts to hold students, teachers and administrators accountable for success – defined as all students prepared for further schooling and work, without the need for remedial instruction.

Finally, to ensure that these standards do in fact warrant the description “world class,” two panels of nationally recognized experts were assembled to review and validate these standards. These panels consisted of:

- Hyman Bass, University of Michigan;
- John Dossey, Illinois State University, retired;
- Sue Eddins, retired mathematics chair at the Illinois Mathematics and Science Academy;
- James Hiebert, University of Delaware;
- Roger Howe, Yale University;
- Steven Leinwand, principal research analyst at the American Institutes for Research;
- Mary Lindquist, former president of the National Council of Teachers of Mathematics; and
- James Stigler, UCLA and Pearson Achievement Solutions.

**These standards delineate the specific mathematical content that students are expected to master. It is understood, although not always stated explicitly in these standards, that the effective instruction of this mathematics requires attention to problem solving and the application of these skills and concepts, on-going opportunities for students to communicate their understanding orally and in writing, the use of multiple representations of the core concepts, a focus on mathematical reasoning and sense-making, and frequent attention to the connections among mathematical ideas.**

**Units or bullets may be re-organized within a grade level based on materials selected.**

**Grade K**

**Grade: K**

**Strand: Number**

**Unit Name: Number Representations and Counting (0-10)**

**Core Concepts and Understandings:**

Understand that whole numbers represent quantities.

Develop concepts of one-to-one correspondence, ordinal and cardinal numbers, and number comparisons.

**Unit Standard:**

The student will count, read, write, use multiple representations of, and compare and order whole numbers (0 to 10) and use these numbers in real world and mathematical situations.

**Unit Objectives:**

- The student will describe and construct representations of whole numbers 0 to 10 and count up to 10 objects forward and backward.
- The student will order and compare whole numbers 0 to 10.
- The student will read and write whole numbers 0 to 10.
- The student will identify coins (pennies and nickels) and will find the value of a group of coins by counting.

**Grade: K**

**Strand: Operation**

**Unit Name: Addition and Subtraction 0-10**

**Strand: Number**

**Core Unit Concepts and Understandings:**

Begin to develop an understanding of meaning of addition and subtraction as joining/combining and separating/removing respectively.

Understand that numbers can be composed and decomposed.

Understand that addition of a given number is the inverse to subtraction of that same number.

**Unit Standard:**

The student will represent addition as joining quantities and combining parts of the whole.

The student will represent subtraction as separating quantities and parts of the whole. The student will apply both operations for sums within 10.

**Unit Objectives:**

- The student will demonstrate an understanding of addition by using objects or drawing pictures to find sums to 10.
- The student will demonstrate an understanding of subtraction by using objects or drawing pictures to find differences to 10.
- The student will connect the operation of addition to the actions of joining or combining.
- The student will connect the operation of subtraction to the actions of separating or removing.
- The student will compose and decompose sets of objects up to 10.
- The student will model the operations of addition and subtraction in the context of mathematics and real-world situations.
- The student will add and subtract using numerals.

**Grade: K**

**Strand: Measurement**

**Unit Name: Size Comparisons**

**Core Unit Concepts and Understandings:**

Understand that objects can be compared on the basis of attributes such as length, weight and size.

**Unit Standard:**

The student will compare sizes of two or three objects.

**Unit Objectives:**

- The student will compare two or three objects by length, weight, and size.
- The student will use the transitive property to make comparisons.
- The student will use words or pictures to describe the position of an object as related to another object, e.g., above, below, in, out.

**Grade: K**

**Strand: Number**

**Unit Name: Number Representations and Counting (10-20)**

**Core Concepts and Understandings:**

Understand that whole numbers represent quantities.

Continue to develop concepts of one-to-one correspondence, ordinal and cardinal numbers, and number comparisons.

Begin to develop understanding of a place value.

**Unit Standard:**

The student will count, read, write, use multiple representations of, and compare and order whole numbers (10 to 20) and use these numbers in real world and mathematical situations.

**Unit Objectives:**

- The student will describe and construct representations of whole numbers 10 to 20 and count up to 20 objects forward and backward.
- The student will order and compare whole numbers 10 to 20.
- The student will read and write whole numbers 10 to 20.
- The student will describe how the base 10 number system relates to place value for tens and ones (for example, that 16 is 1 ten and 6 more).
- The student will identify coins (pennies, nickels, and dimes) and will find the value of a group of coins by counting.

**Strand: Operation**

**Grade: K**

**Unit Name: Addition and Subtraction 10-20**

**Strand: Number**

**Core Unit Concepts and Understandings:**

Begin to develop an understanding of meaning of addition and subtraction as joining/combining and separating/removing respectively.

Understand that numbers can be composed and decomposed.

Understand that addition of a given number is the inverse to subtraction of that same number.

**Unit Standard:**

The student will represent addition as joining quantities and combining parts of the whole.

The student will represent subtraction as separating quantities and parts of the whole. The student will apply both operations for sums within 20 through counting.

**Unit Objectives:**

- The student will demonstrate an understanding of addition by using objects or drawing pictures to find sums to 20.
- The student will demonstrate an understanding of subtraction by using objects or drawing pictures to find differences to 20.

- The student will connect the operation of addition to the actions of joining or combining.
- The student will connect the operation of subtraction to the actions of separating or removing.
- The student will compose and decompose sets of objects up to 20.
- The student will model the operations of addition and subtraction in the context of mathematics and real-world situations.
- The student will add and subtract using numerals.

**Grade: K**

**Strand: Geometry**

**Unit Name: Describe and Compare Shapes**

**Core Unit Concepts and Understandings:**

Understand that shapes can be described, analyzed and classified on the basis of their attributes.

**Unit Standard:**

The student will identify and give examples of two-dimensional and three-dimensional figures such as circles, triangles, squares, and rectangles.

**Unit Objectives:**

- The student will recognize and identify circles, triangles, squares, and rectangles.
- The student will draw and compare circles, triangles, squares, and rectangles.
- The student will describe, compare and contrast circles, triangles, squares and rectangles in terms of size, sides and vertices (corners).

**Grade: K**

**Strand: Statistics**

**Unit Name: Data Representation - Pictographs**

**Core Unit Concepts and Understandings:**

Understand that information that can be collected, sorted, classified, quantified, represented graphically, and analyzed.

**Unit Standard:**

The student will interpret, construct, and draw conclusions from pictographs with a scale of one.

**Unit Objectives:**

- The student will interpret pictographs with a scale of one.
- The student will draw and justify conclusions from pictographs with a scale of one.
- The student will construct pictographs with a scale of one.
- The student will describe the advantages and disadvantages of using pictographs to represent data.

**Grade: K**

**Strand: Algebraic Thinking**

**Unit Name: Patterns and Sorting**

**Core Unit Concepts and Understandings:**

Understand that rules can be used to generate and analyze sequences.

**Unit Standard:**

Students will identify, sort, and classify objects, including numbers. They will identify and create sequences of numbers and shapes, and describe possible rules that could generate the sequences.

**Unit Objectives:**

- The student will identify, create and extend simple real-world patterns (for example, color, shapes).
- The student will identify the missing object in a simple pattern.
- The student will sort and classify objects and describe the attribute upon which they are sorted or classified.

# Grade 1

## Grade: 1

### Strand: Number

#### Unit Name: Number Representations (0-100)

##### Core Unit Concepts and Understandings:

Start to develop an understanding of the base-ten place value system.

##### Unit Standard:

The student will count, read and write, use multiple representations (including points on the number line), and compare and order whole numbers 0-100, and use these numbers in real world and mathematical situations.

##### Unit Objectives:

- The student will identify, describe and construct multiple representations (including expanded forms, number lines, hundreds charts, and symbols) of whole numbers 0 to 100.
- The student will count (with and without objects) forward and backward from given numbers less than 100.
- The student will order and compare whole numbers 0 to 100.
- The student will read and write whole numbers 0 to 100.
- The student will describe how the base-10 number system relates to place value for tens and ones and will find 10 more or 10 less than a given number.
- The student will use rounding to estimate quantities to the nearest 10.

## Grade: 1

### Strand: Operation

#### Unit Name: Addition and Subtraction (0-20)

##### Core Unit Concepts and Understandings:

Understand the meaning of addition and subtraction in terms of part-part-whole.

Understand that addition of a given number is inverse to subtraction of that same number.

Understand that addition and subtraction of a fixed number to/from any number represents a translation on a number line.

##### Unit Standard:

The student will represent addition as joining or combining quantities and subtraction as separating quantities and as parts of the whole, as comparisons, and as translations on a number line. They will apply these operations for sums within 20.

##### Unit Objectives:

- The student will compose and decompose sets of objects and numbers up to 20 using objects, pictures and numerals.
- The student will use addition to find out how much or how many there are together.
- The student will use subtraction to find out how much is left (take away), how many more or how many fewer (compare), and to find missing addends.
- The student will use fact families to relate addition and subtraction.
- The student will use words and pictures to solve problems using addition and subtraction in real-world and mathematical situations, including coins and money.
- The student will represent and solve simple number sentences with a missing value.

## Grade: 1

### Strand: Measurement

#### Unit Name: Length

##### Core Unit Concepts and Understandings:

Understand the role of a unit in measurement.





























































