

**National Council of Teachers of Mathematics (NCTM)**  
**Standards and Expectations Linked to the**  
***Fantasy Sports and Mathematics*' Series**  
**(Grades 5 and up)**

**Note: The portion of any standard that is in italics is not covered.**

**Number and Operations Standard for Grades 3–5**

Understand numbers, ways of representing numbers, relationships among 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;
- develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers;
- recognize and generate equivalent forms of commonly used fractions, decimals, and percents;
- explore numbers less than 0 by extending the number line and through familiar applications.

Understand meanings of operations and how they relate to one another:

- understand the effects of multiplying and dividing whole numbers;
- understand and use properties of operations, such as the distributivity of multiplication over addition.

Compute fluently and make reasonable estimates:

- develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

**Algebra Standard for Grades 3–5**

Understand patterns, relations, and functions:

- represent and analyze patterns and functions, using words, tables, and graphs.

Represent and analyze mathematical situations and structures using algebraic symbols:

- represent and analyze mathematical situations and structures using algebraic symbols;
- identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers;
- represent the idea of a variable as an unknown quantity using a letter or a symbol;
- express mathematical relationships using equations.

### **Measurement Standard for Grades 3–5**

- understand such attributes as length, area, weight, *volume*, and *size of angle* and select the appropriate type of unit for measuring each attribute;
- carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;
- select and apply appropriate standard units and tools to measure length, area, *volume*, weight, *time*, *temperature*, and *the size of angles*;
- develop, understand, and use formulas to find the area of rectangles *and related triangles and parallelograms*.

### **Data Analysis and Probability Standard for Grades 3–5**

- represent data using tables and graphs such as *line plots*, bar graphs, and line graphs.

Select and use appropriate statistical methods to analyze data:

- propose and justify conclusions and predictions that are based on data *and design studies to further investigate the conclusions or predictions*.

Understand and apply basic concepts of probability:

- predict the probability of outcomes of simple experiments and test the predictions;
- understand that the measure of the likelihood of an event can be represented by a number from 0 to 1.

### **Problem Solving Standard for Grades Prekindergarten - 12**

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems;
- monitor and reflect on the process of mathematical problem solving.

### **Reasoning and Proof Standard for Grades Prekindergarten - 12**

- recognize reasoning and proof as fundamental aspects of mathematics;
- make and investigate mathematical conjectures;

### **Communication Standard for Grades Prekindergarten - 12**

- organize and consolidate their mathematical thinking through communication;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- use the language of mathematics to express mathematical ideas precisely.

### **Connections Standard for Grades Prekindergarten - 12**

- 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 of mathematics.

### **Representation Standard for Grades Prekindergarten – 12**

- create and use representations to organize, record, and communicate mathematical ideas;
- select, apply, and translate among mathematical representations to solve problems.

### **Number and Operations Standard for Grades 6–8**

Understand numbers, ways of representing numbers, relationships among 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;
- understand and use ratios and proportions to represent quantitative relationships;
- develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and *calculator* notation;
- use factors, multiples, prime factorization, and *relatively prime numbers* to solve problems;
- develop meaning 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:

- *develop* and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use.

### **Algebra Standard for Grades 6–8**

Understand patterns, relations, and functions:

- develop an initial conceptual understanding of different uses of variables;
- recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.

## **Measurement Standard for Grades 6–8**

Understand measurable attributes of objects and the units, systems, and processes of measurement:

- understand both metric and customary systems of measurement;
- understand relationships among units and convert from one unit to another within the same system;

Apply appropriate techniques, tools, and formulas to determine measurements:

- select and apply techniques and tools to accurately find length, area, *volume*, and angle measures to appropriate levels of precision;
- develop and use formulas to determine the circumference of circles and the *area of triangles, parallelograms, trapezoids*, and circles and *develop strategies to find the area of more-complex shapes*;
- solve problems involving scale factors, using ratio and proportion.

## **Data Analysis and Probability Standard for Grades 6–8**

- select, create, and use appropriate graphical representations of data, including histograms, *box plots*, and scatterplots.

## **Number and Operations Standard for Grades 9–12**

- develop an understanding of permutations and combinations as counting techniques.

## **Algebra Standard for Grades 9–12**

Understand patterns, relations, and functions:

- understand *relations* and functions *and select, convert flexibly among, and use various representations for them*;

Represent and analyze mathematical situations and structures using algebraic symbols:

- use symbolic algebra to represent and explain mathematical relationships.

## **Data Analysis and Probability Standard for Grades 9–12**

- understand histograms, *parallel box plots*, and scatterplots and use them to display data.

