

Mathematics Standards Addressed

Number and Operations Standards Grades Pre-K–2

In pre-kindergarten through grade 2 all students should—

- count with understanding and recognize "how many" in sets of objects;
- connect number words and numerals to the quantities they represent, using various physical models and representations;

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 groupings of objects and sharing equally.

Compute fluently and make reasonable estimates

- 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;
- use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.

Understand patterns, relations, and functions

- sort, classify, and order objects by size, number, and other properties;
- recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another;
- analyze how both repeating and growing patterns are generated.

Use mathematical models to represent and understand quantitative relationships

- model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols

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Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

- recognize, name, build, draw, compare, and sort two- and three-dimensional shapes;
- describe attributes and parts of two- and three-dimensional shapes;
- investigate and predict the results of putting together and taking apart two- and three-dimensional shapes.

Use visualization, spatial reasoning, and geometric modeling to solve problems

- create mental images of geometric shapes using spatial memory and spatial visualization;
- recognize and represent shapes from different perspectives;
- relate ideas in geometry to ideas in number and measurement;
- recognize geometric shapes and structures in the environment and specify their location.

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

- recognize the attributes of length, volume, weight, area, and time;
- compare and order objects according to these attributes;
- understand how to measure using nonstandard and standard units;
- select an appropriate unit and tool for the attribute being measured.

Apply appropriate techniques, tools, and formulas to determine measurements

- measure with multiple copies of units of the same size, such as paper clips laid end to end;
- use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single yardstick;
- use tools to measure;
- develop common referents for measures to make comparisons and estimates.

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

- pose questions and gather data about themselves and their surroundings;
- sort and classify objects according to their attributes and organize data about the objects;
- represent data using concrete objects, pictures, and graphs.

Select and use appropriate statistical methods to analyze data

- describe parts of the data and the set of data as a whole to determine what the data show.



Number and Operations Standards Grades 3–5

In grades 3–5 all students should—

Understand patterns, relations, and functions

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent and analyze patterns and functions, using words, tables, and graphs.

Use mathematical models to represent and understand quantitative relationships

- model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

- identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes;
- classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids;
- investigate, describe, and reason about the results of subdividing, combining, and transforming shapes;
- explore congruence and similarity;
- make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.

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

- understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;
- understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems;
- carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;
- understand that measurements are approximations and how differences in units affect precision;



Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

- design investigations to address a question and consider how data-collection methods affect the nature of the data set;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

Develop and evaluate inferences and predictions that are based on 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

- describe events as likely or unlikely and discuss the degree of likelihood using such words as *certain*, *equally likely*, and *impossible*;
- predict the probability of outcomes of simple experiments and test the predictions;



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