BRAINtastic! Math

Correlation with the

NCTM Principles and Standards

Mathematics

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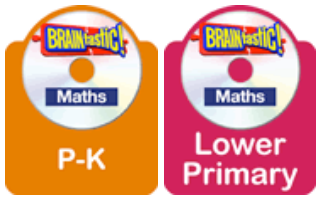
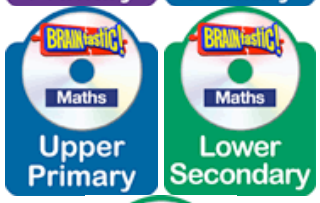
NCTM Level Correlation with *BRAINtastic! Math*

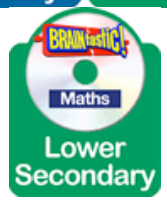


NCTM Level: Pre-K – 2
Pre-K – 2 correlates with *BRAINtastic! Math P-K, BRAINtastic! Math Lower Primary 1* and *BRAINtastic! Math Lower Primary 2*.

NCTM Level: Grade 3 – 5
Grades 3 – 5 correlates with *BRAINtastic! Math Middle Primary 1, BRAINtastic! Math Middle Primary 2* and *BRAINtastic! Math Upper Primary 1*.



NCTM Level: Grades 6 – 8
Grades 6 – 8 correlates with *BRAINtastic! Math Upper Primary 2* and *BRAINtastic! Math Lower Secondary*.



NCTM Level: Grades 9 – 12
Grades 9 – 12 correlate with *BRAINtastic! Math Lower Secondary*.

Number and Operations Standard

NCTM Level: Pre-K – 2

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 1/4, 1/3 and 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: Grade 3 – 5

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 x 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

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

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.

Algebra Standard

NCTM Level: Pre-K – 2

In pre-kindergarten through grade 2 all students should:

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.

Represent and analyze mathematical situations and structures using algebraic symbols

- Use concrete and pictorial representations to develop an understanding of invented and conventional symbolic notations.

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

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

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;

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.

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 change in a variety of contexts

- Investigate how change in one variable relates to change in a second variable;
- Identify, describe, and compare situations with constant or varying rates of change.

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 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 6 – 8

In grades 6 – 8 all students should:

Understand patterns, relationships, and functions

- Represent, analyze, and generalize a variety of patterns with tables, graphs and words, and, when possible, symbolic rules;
- Relate and compare different forms of representation for a relationship;
- Identify functions as linear or non-linear and contrast their properties from tables, graphs, or equations.

Represent and analyze mathematical situations and structures using algebraic symbols

- Develop an initial conceptual understanding of different uses of variables;
- Explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;

- Use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;
- Recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.

Use mathematical models to represent and understand quantitative relationships

- Model and solve contextualized problems using various representations, such as graphs, tables, and equations.

Analyze change in various contexts

- Use graphs to analyze the nature of changes in quantities in linear relationships.

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.

Connections

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

Representation

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

NCTM Level: Grades 9 – 12

In grades 9 – 12 all students should:

Understand patterns, relations and functions

- Generalize patterns using explicitly defined functions;
- Understand relations and functions;
- Understand and perform transformations such as arithmetically combining, composing and inverting commonly used functions;
- Understand and compare the properties of classes of functions, including exponential, polynomial, rational and logarithmic functions.

Represent and analyze mathematical situations and structures using algebraic symbols

- Understand the meaning of equivalent forms of expressions, equations, inequalities, and relations;
- Write equivalent forms of equations and solve them with fluency;

- Use symbolic algebra to represent and explain mathematical relationships;
- Use a variety of symbolic representations for functions and relations;
- Judge the meaning and reasonableness of the results of symbol manipulations.

Use mathematical models to represent and understand quantitative relationships

- Use symbolic expressions, including iterative and recursive forms, to represent relationships arising from various contexts;
- Draw reasonable conclusions about a situation being modelled.

Analyze change in various contexts

- Approximate and interpret rates of change from graphical and numerical data.

Problem-solving

- 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.

Reasoning and Proof

- Recognize reasoning and proof as fundamental aspects of mathematics;
- Make and investigate mathematical conjectures;
- Use and evaluate mathematical arguments and proofs;

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 of mathematics.

Representations

- Complete and use representations that organize, record and communicate mathematical ideas;
- Apply mathematical representations to solve problems;
- Use representations to model and interpret physical, social and mathematical phenomena.

Geometry Standard

NCTM Level: Pre-K – 2

In pre-kindergarten through grade 2 all students should:

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

- Recognize, name, compare, and sort 2D and 3D shapes;
- Describe attributes and parts of 2D and 3D shapes;
- Investigate and predict the results of putting together and taking apart 2D and 3D shapes.

Specify locations and describe spatial relationships using coordinate geometry and other representational systems

- Describe, name, and interpret relative positions in space, and apply ideas about relative position;
- Describe, name, and interpret direction and distance in navigating space and apply ideas about direction and distance;
- Find and name locations with simple relationships such as near to and in coordinate systems such as maps.

Apply transformations and use symmetry to analyze mathematical situations

- Recognize and apply slides, flips and turns;
- Recognize and create shapes that have symmetry.

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.

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

In grades 3 – 5 all students should:

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

- Identify, compare, and analyze attributes of 2D and 3D shapes and develop vocabulary to describe the attributes;
- Classify 2D and 3D 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.

Specify locations and describe spatial relationships using coordinate geometry and other representational systems

- Describe location and movement using common language and geometric vocabulary;
- Make and use coordinate systems to specify locations and describe paths;
- Find the distance between points along horizontal and vertical lines of a coordinate system.

Apply transformations and use symmetry to analyze mathematical situations

- Predict and describe the results of sliding, flipping, and turning 2D shapes;
- Describe a motion or series of motions that will show that two shapes are congruent;
- Identify and describe line and rotational symmetry in 2D and 3D shapes and designs.

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

- Build and draw geometric objects;
- Identify a 2D representation of a 3D object;
- Use geometric models to solve problems in other areas of mathematics such as number and measurement;
- Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in everyday life.

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 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 6 – 8

In grades 6 – 8 all students should:

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

- Precisely describe, classify, and understand relationships among different types of 2D and 3D objects using their defining properties;
- Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

Specify locations and describe spatial relationships using coordinate geometry and other representational systems

- Use coordinate geometry to represent and examine the properties of geometric shapes;
- Use coordinate geometry to examine special geometric shapes, such as regular polygons, or those with parallel or perpendicular sides.

Apply transformations and use symmetry to analyze mathematical situations

- Describe sizes, positions, and orientations of shapes under informal transformations, such as flips, slides, and turns;
- Examine the congruence, similarity, and line or rotational symmetry of objects using transformations;

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

- Use 2D representations of 3D objects to visualize and solve problems such as those involving surface area and volume;
- Use visual tools such as networks to represent and solve problems;
- Use geometric models to represent and explain numerical and algebraic relationships.

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.

Connections

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

Representation

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

NCTM Level: Grades 9 – 12

In grades 9 – 12 all students should:

Analyze characteristics and properties of two- and three- dimensional geometric shapes.

- Analyze properties and determine attributes of two- and three- dimensional objects;
- Explore relationships (including congruence and similarity) among classes of two- and three- dimensional objects, make and test conjectures about them, and solve problems involving them;
- Use trigonometric relationships to determine lengths and angle measures.

Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

- Use Cartesian coordinates and other coordinate systems, such as navigational systems, to analyze geometric situations;
- Investigate conjectures and solve problems involving two-dimensional objects represented with Cartesian coordinates.

Apply transformations and use symmetry to analyze mathematical situations

- Understand and represent translations, reflections and rotations of objects in the plane by using images and coordinates.
- Use various representations to help understand the effects of simple transformations and their compositions.

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

- Visualize three-dimensional objects and spaces from different perspectives and analyze their cross sections;
- Use geometric models to gain insights into, and answer questions in, other areas of mathematics;

Problem-solving

- Solve problems that arise in mathematics and in other contexts;
- Experience and reflect on the process of mathematical problem solving;
- Apply and adapt a variety of appropriate strategies to solve problems.

Reasoning and Proof

- Recognize reasoning and proof as fundamental aspects of mathematics;
- Make and investigate mathematical conjectures;
- Develop and evaluate mathematical arguments and proofs;
- Select and use various types of reasoning and methods of proof.

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 of mathematics.

Representations

- Create and use representations that organize, record and communicate mathematical ideas;
- Apply mathematical representations to solve problems.

Measurement Standard

NCTM Level: Pre-K – 2

In pre-kindergarten through grade 2 all students should:

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 standard and non-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 the same size;
- Develop common referents for measures to make comparisons and estimates.

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

In grades 3 – 5 all students should:

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;
- Explore what happens to measurements of a 2D shape such as its perimeter and area when the shape is changed in some way.

Apply appropriate techniques, tools, and formulas to determine measurements

- Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;
- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, and the sizes of angles;
- Select and use benchmarks to estimate measurements;
- Develop, understand, and use formulas to find the areas of rectangles and related triangles and parallelograms;
- Develop strategies to determine the surface areas and volumes of rectangular solids.

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 x 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 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 6 – 8

In grades 6 – 8 all students should:

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;
- Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume;

Apply appropriate techniques, tools, and formulas to determine measurements

- Use common benchmarks to select appropriate methods for estimating 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 develop strategies to find the area of more complex shapes
- Develop strategies to find the surface area and volume of selected prisms, pyramids and cylinders;
- Solve simple problems involving rates and derived measurements for such attributes as velocity and density.

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.

Connections

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

Representation

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

NCTM Level: Grades 9 – 12

In grades 9 – 12 all students should:

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

- Make decisions about units and scales that are appropriate for problem situations involving measurement.

Apply appropriate techniques, tools and formulas to determine measurements

- Develop tools to express precision (significant figures and scientific notation)
- Understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres and cylinders.

Problem-solving

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

Reasoning

- Make and investigate mathematical conjectures;
- Select and use various types of reasoning.

Connections

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

Representation

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

Data Analysis and Probability Standard

NCTM Level: Pre-K – 2

In pre-kindergarten through grade 2 all students should:

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

- 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.

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

In grades 3 – 5 all students should:

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

- Represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- Recognize the difference between presenting categorical and numerical data.

Select and use appropriate statistical methods to analyze data

- Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed;
- Use measures of center, focusing on the median, and understand what each does and does not indicate about the data set;
- Compare different representations of the same data and evaluate how well each representation shows important aspects of the data.

Understand and apply basic concepts of probability

- Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1.

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 x 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 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 6 – 8

In grades 6 – 8 all students should:

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

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

Select and use appropriate statistical methods to analyze data

- Find, use, and interpret measures of center and spread, including mean;
- Understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots;

Develop and evaluate inferences and predictions that are based on data

- Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken.

Understand and apply basic concepts of probability

- Compute probabilities for simple compound events, using such methods as organized lists and tree diagrams.

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.

Connections

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

Representation

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

NCTM Level: Grades 9 – 12

In grades 9 – 12 all students should:

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

- Understands the differences among and draws inferences from various kinds of studies;
- Understand the meaning of measurement, categorical and univariate data, and of the term variable;
- Understands histograms and scatter plots.

Select and use appropriate statistical methods to analyze data

- For univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics.

Develop and evaluate inferences and predictions that are based on data

- Understand how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference.

Understand and apply basic concepts of probability

- Understand the concepts of sample space and probability distribution in simple cases;
- Compute and interpret the expected value of random variables in simple cases;
- Understand how to compute the probability of a compound event.

Problem-solving

- Apply and adapt a variety of appropriate strategies to solve problems.

Reasoning and Proof

- Make and investigate mathematical conjectures;
- Use and evaluate mathematical arguments.

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 of mathematics.

Representations

- Create and use representations that organize, record and communicate mathematical ideas;
- Apply mathematical representations to solve problems;
- Use representations to model and interpret physical, social and mathematical phenomena.