



Fifth Grade Math

Number and Operation

Content Standard 1.0 The student will develop number and operation sense needed to represent numbers and number relationships verbally, symbolically, and graphically and to compute fluently and make reasonable estimates in problem solving.

Learning Expectations:

- 1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.
- 1.2 Understand meanings of operations and how they relate to one another.
- 1.3 Solve problems, compute fluently, and make reasonable estimates.

Accomplishments

5.1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems.

- a. read and write numbers from thousandths to millions;
- b. name the place value of a given digit from thousandths to millions;
- c. use various models to show relationships among whole numbers, fractions, mixed numbers, and decimals (e.g., number lines, base ten blocks, Venn diagrams, hundreds boards);
- d. communicate using mathematical language and symbols;
- e. model proper fractions, improper fractions, and mixed numbers;
- f. show the relationship between improper fractions and mixed numbers;
- g. recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., $1/10$, $1/4$, $1/2$, $3/4$);
- h. recognize relationships among commonly used fractions and decimals.

5.1.2 Understand meanings of operations and how they relate to one another.

- a. use commutative, associative, and identity properties;
- b. explain and demonstrate the inverse nature of addition and subtraction;
- c. explain and demonstrate the inverse nature of multiplication and division;
- d. communicate the effects of addition, subtraction, multiplication, and division on size and order of numbers.

5.1.3 Solve problems, compute fluently, and make reasonable estimates.

- a. select appropriate methods and tools for computations (e.g., mental computation, estimation, calculators, paper and pencil);
- b. explain why one form of a number might be more useful for computation than another form;
- c. recognize reasonable estimates for operations;
- d. add, subtract, multiply, and divide whole numbers and decimals;
- e. use models, benchmarks, and equivalent forms to add and subtract commonly used fractions with like and unlike denominators;
- f. identify missing information and/or too much information in real-world problems;
- g. solve multi-step real-world problems;
- h. solve real-world problems using decimals, fractions, and percents.

Fifth Grade Benchmarks

Performance Indicators State:

As documented through state assessment –

at Level 1, the student is able to

- 5.1.spi.1. read and write numbers from millions to thousandths;

5.1.spi.2. connect symbolic representations of proper and improper fractions to models of proper and improper fractions;

5.1.spi.3. represent whole numbers and two-place decimals in expanded form.

at Level 2, the student is able to

5.1.spi.4. add, subtract, multiply, and divide whole numbers (multipliers and divisors no more than two-digits).

5.1.spi.5. identify the place value of a given digit from millions to thousandths;

5.1.spi.6. represent, compare, and order whole numbers and decimals to thousandths;

5.1.spi.7. use estimation to select a reasonable solution to a whole number computation;

5.1.spi.8. add, subtract, and multiply decimals;

5.1.spi.9. solve one- or two-step real-world problems involving addition, subtraction, and/or multiplication of whole numbers and decimals;

5.1.spi.10. represent numbers as both improper fractions and mixed numbers;

5.1.spi.11. compare and order fractions using the appropriate symbol (<,>=);

5.1.spi.12. add and subtract commonly used fractions.

at Level 3, the student is able to

5.1.spi.13. generate equivalent forms of commonly used fractions, decimals, and percents (e.g., $1/10$, $1/4$, $1/2$, $3/4$);

5.1.spi.14. multiply a fraction by a multiple of its denominator (denominator less than or equal to 10) (3)

Performance Indicators Teacher:

As documented through teacher observation –

at Level 1, the student is able to

5.1.tpi.1. explain and demonstrate the inverse nature of addition and subtraction;

5.1.tpi.2. select appropriate methods and tools for computation (i.e., mental computation, estimation, calculators, paper and pencil).

at Level 2, the student is able to

5.1.tpi.3. use various models to show relationships among fractions and decimals (e.g., number lines, base ten blocks, Venn diagrams, hundreds boards);

5.1.tpi.4. explain and demonstrate the inverse nature of multiplication and division;

5.1.tpi.5. communicate using mathematical terms and symbols;

5.1.tpi.6. solve problems in more than one way and explain why one process may be more efficient than another;

5.1.tpi.7. use models and benchmarks to add and subtract commonly used fractions.

at Level 3, the student is able to

5.1.tpi.8. apply commutative, zero, associative, distributive, and identity properties;

5.1.tpi.9. explain relationships among commonly used fractions and decimals;

5.1.tpi.10. identify missing information and/or too much information in real-world problems

5.1.tpi.11. solve real-world problems using fractions, decimals, and percents.

Algebra

Content Standard 2.0 The student will understand and generalize patterns as they represent and analyze quantitative relationships and change in a variety of contexts and problems using graphs, tables, and equations.

Learning Expectations:

2.1 Understand patterns, relations, and functions.

2.2 Represent and analyze mathematical situations and structures using algebraic symbols.

2.3 Illustrate general properties of operations.

2.4 Analyze change in various contexts.

Accomplishments

5.2.1 Represent and analyze patterns, relations, and functions.

- a. generalize and extend geometric and numerical patterns;
- b. represent and analyze patterns and functions using words, tables, and graphs;
- c. apply basic function rules.

5.2.2 Represent and analyze mathematical situations and structures using algebraic symbols.

- a. demonstrate understanding that an equation is a number sentence stating two quantities are equal;
- b. solve open sentences using informal methods and knowledge of operations;
- c. represent the idea of a variable as an unknown quantity using a letter or a symbol;
- d. express mathematical relationships using equations.

5.2.3 Illustrate general properties of operations.

- a. apply commutative, associative, zero, distributive, and identity properties;
- b. show that division is not commutative.

5.2.4 Analyze change in various contexts.

- a. investigate how a change in one variable relates to a change in a second variable;
- b. use a variety of methods to compare and describe situations involving constant and/or varying rates of change.

Fifth Grade Benchmarks

Performance Indicators State:

As documented through state assessment –

at Level 1, the student is able to

5.2.spi.1. extend numerical patterns;

5.2.spi.2. extend geometric patterns.

at Level 2, the student is able to

5.2.spi.3. apply basic function rules;

5.2.spi.4. connect open sentences to real-world situations;

5.2.spi.5. solve open sentences involving addition, subtraction, multiplication, and division.

at Level 3, the student is able to

5.2.spi.6. generalize numerical patterns using a variable;

5.2.spi.7. select an equation that represents a given mathematical relationship;

5.2.spi.8. extend rate charts to solve real-world problems.

Performance Indicators Teacher:

As documented through teacher observation –

at Level 1, the student is able to

5.2.tpi.1. apply the zero and identity properties;

5.2.tpi.2. show that division is not commutative.

at Level 2, the student is able to

5.2.tpi.3. demonstrate understanding that an equation is a number sentence stating two quantities are equal;

5.2.tpi.4. use appropriate representations to show properties of whole number operations;

5.2.tpi.5. represent patterns and functions using words, tables, and graphs;

5.2.tpi.6. use representations such as graphs, tables, and equations to draw conclusions;

5.2.tpi.7. generalize geometric patterns.

at Level 3, the student is able to

5.2.tpi.8. investigate how a change in one variable relates to a change in a second variable;

5.2.tpi.9. represent the idea of a variable as an unknown quantity using a letter or a symbol.

Geometry

Content Standard 3.0 The student will develop an understanding of geometric concepts and relationships as the basis for geometric modeling and reasoning to solve problems involving one-, two-, and three-dimensional figures.

Learning Expectations:

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

3.2 Specify locations and describe spatial relationships using coordinate geometry.

3.3 Apply transformations and use symmetry to analyze mathematical situations.

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

Accomplishments

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

- a. identify, compare, and analyze attributes of two- and three-dimensional figures;
- b. use the attributes of geometric figures to develop definitions;
- c. draw points, lines, line segments, rays, and angles;
- d. identify and describe the attributes of a circle using appropriate mathematical language (e.g., radius, diameter, center);
- e. use properties to classify geometric figures;
- f. investigate and describe the results of subdividing and combining geometric figures;
- g. compare and contrast congruent and symmetrical geometric figures;
- h. describe characteristics of lines and angles (e.g., parallel, perpendicular, intersecting, right, acute, obtuse);
- i. make and test hypothesis about geometric properties;
- j. explore similarity.

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

- a. describe location and movement using appropriate mathematical language;
- b. find and specify points in Quadrant I of a coordinate system.

5.3.3 Apply transformations and use symmetry to analyze mathematical situations.

- a. investigate, predict, and describe the results of transformations of two-dimensional figures (i.e., slides, flips, turns);
- b. describe line and rotational symmetry in two-dimensional figures;
- c. describe a motion or a series of motions that will show that two shapes are congruent.

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

- a. construct and draw two- and three-dimensional geometric figures;
- b. create and describe mental images of objects, patterns, and paths;
- c. build a three-dimensional object from a two-dimensional representation (nets) of that object;
- d. use visualization and spatial reasoning to solve real-world problems

Fifth Grade Benchmarks

Performance Indicators State:

As documented through state assessment –

at Level 1, the student is able to

- 5.3.spi.1. identify lines, line segments, rays, and angles;
- 5.3.spi.2. identify lines of symmetry in two-dimensional geometric figures.

at Level 2, the student is able to

- 5.3.spi.3. identify two- or three-dimensional shapes given defining attributes;
- 5.3.spi.4. use spatial reasoning to predict the result of sliding, flipping, or turning a two-dimensional shape;
- 5.3.spi.5. locate and specify a point in Quadrant I of a coordinate system.

at Level 3, the student is able to

- 5.3.spi.6. classify geometric figures using properties;
- 5.3.spi.7. use spatial reasoning to identify the three-dimensional figure created from a two-dimensional representation (net) of that figure (i.e., cube, rectangular prism, pyramid, cone, or cylinder).

Performance Indicators Teacher:

As documented through teacher observation –

at Level 1, the student is able to

5.3.tpi.1. draw and describe lines, line segments, rays, and angles;

5.3.tpi.2. draw lines of symmetry for two-dimensional geometric figures.

at Level 2, the student is able to

5.3.tpi.3. construct lines, line segments, rays, and angles;

5.3.tpi.4. explore similarity;

5.3.tpi.5. use appropriate mathematical language to describe the attributes of a circle;

5.3.tpi.6. make coordinate systems to specify locations;

5.3.tpi.7. analyze attributes of two- and three-dimensional geometric figures;

5.3.tpi.8. construct and draw two- and three-dimensional geometric figures.

at Level 3, the student is able to

5.3.tpi.9. use the attributes of geometric figures to develop definitions;

5.3.tpi.10. investigate and describe the results of subdividing and combining geometric figures;

5.3.tpi.11. make and test hypotheses about geometric properties and relationships;

5.3.tpi.12. describe location and movement using mathematical language and geometric vocabulary;

5.3.tpi.13. describe the results of transformations of two-dimensional geometric figures (i.e., slides, flips, and turns).

Measurement

Content Standard 4.0 The student will become familiar with the units and processes of measurement in order to use a variety of tools, techniques, and formulas to determine and to estimate measurements in mathematical and real-world problems.

Learning Expectations:

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

4.2 Apply appropriate techniques, tools, and formulas to determine measurements.

Accomplishments

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

- a. demonstrate understanding of the concepts of length, perimeter, circumference, area, weight, capacity, volume, elapsed time, and angle measure;
- b. demonstrate understanding that measurements are approximations;
- c. understand how differences in units affect precision;
- d. demonstrate understanding of the relationships among the units within the same system of measurements;
- e. explore what happens to measurements of a two-dimensional shape when the shape is changed in some way (e.g., perimeter, area).

5.4.2 Apply appropriate techniques, tools, and formulas to determine measurements.

- a. apply and explain appropriate estimation strategies using standard units of measure;

- b. select and apply appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles;
- c. select and use appropriate tools for measuring in real-world situations;
- d. solve real-world problems involving measurement and elapsed time;
- e. read and record temperature using Fahrenheit and Celsius scales;
- f. develop, understand, and use formulas to find the area of parallelograms and triangles;
- g. explain and demonstrate how scale in maps and drawings shows relative size and distance;
- h. develop informal strategies to determine the surface area and volume of rectangular solids

Fifth Grade Benchmarks

Performance Indicators State:

As documented through state assessment –

at Level 1, the student is able to

- 5.4.spi.1. read temperature using Fahrenheit and Celsius scales;
- 5.4.spi.2. use a ruler to measure to the nearest centimeter and 1/4 inch;
- 5.4.spi.3. use estimation to determine if a length or volume measurement is reasonable;
- 5.4.spi.4. solve real-world problems involving addition and subtraction of measurements.

at Level 2, the student is able to

- 5.4.spi.5. select appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles;
- 5.4.spi.6. connect simple units of measurement within the same system of measurement;
- 5.4.spi.7. use strategies to estimate perimeter and area of rectangles;
- 5.4.spi.8. solve real-world problems involving elapsed time.

at Level 3, the student is able to

- 5.4.spi.9. apply formulas to find the area of parallelograms and triangles;
- 5.4.spi.10. solve real-world problems involving perimeter and area of rectangles.

Performance Indicators Teacher:

As documented through teacher observation –

at Level 1, the student is able to

- 5.4.tpi.1. understand ing of the concepts of perimeter, length, area, weight, capacity, volume, elapsed time, angle measure;
- 5.4.tpi.2. use a protractor to measure angles.

at Level 2, the student is able to

- 5.4.tpi.3. demonstrate understanding of equivalent measures within the same system of measurements;
- 5.4.tpi.4. understand that measurements are approximations;
- 5.4.tpi.5. explain how difference in units affect precision;

5.4.tpi.6. develop and apply strategies for estimating the volume;

5.4.tpi.7. select and use appropriate tools to measure length, perimeter, circumference, area capacity, volume, weight, time, temperature, and angles.

at Level 3, the student is able to

5.4.tpi.8. explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way;

5.4.tpi.9. develop formulas to find area of parallelograms and triangles;

5.4.tpi.10. develop informal strategies to determine the surface area and volume of rectangular solids.

Data Analysis & Probability

Content Standard 5.0 The student will understand and apply basic statistical and probability concepts in order to organize and analyze data and to make predictions and conjectures.

Learning Expectations:

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

5.2 Select and use appropriate statistical methods to analyze data.

5.3 Develop and evaluate inferences and predictions that are based on data.

5.4 Understand and apply basic concepts of probability.

Accomplishments

The student will understand and apply basic statistical and probability concepts as they, organize, and analyze data, and to make predictions and conjectures.

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

- a. collect data using observations, surveys, and experiments;
- b. understand how data-collection methods affect the nature of the data set;
- c. represent data using pictographs, bar graphs, tables, circle graphs, and line graphs;
- d. interpret data displayed in pictographs, bar graphs, tables, circle graphs, and line graphs.

5.5.2 Select and use appropriate statistical methods to analyze data.

- a. use measures of central tendency (i.e., mean, median, mode);
- b. relate mean, median, and mode to a visual representation of a data set;
- c. find the range of a data set.

5.5.3 Develop and evaluate inferences and predictions that are based on data.

- a. make predictions and justify conclusions based on data;
- b. design investigations to address a question;
- c. examine various representations of data to evaluate how accurately the data is depicted;
- d. explain the importance of sample size in investigations.

5.5.4 Understand and apply basic concepts of probability.

- a. describe the likelihood or chance of events as likely, unlikely, certain, equally likely, or impossible;
- b. use a sample space to predict the probability of an event;
- c. understand that the measure of the likelihood of an event can be represented as a number from 0-1

Fifth Grade Benchmarks**Performance Indicators State:**

As documented through state assessment –

at Level 1, the student is able to

5.5.spi.1. represent data using bar graphs and pictographs;

5.5.spi.2. interpret data displayed in bar graphs and pictographs.

at Level 2, the student is able to

5.5.spi.3. determine the median of a data set;

5.5.spi.4. determine the mode of a data set;

5.5.spi.5. determine the most likely, least likely, or equally likely outcomes in simple experiments;

5.5.spi.6. represent the likelihood of an event using a fractional number from zero to one.

at Level 3, the student is able to

5.5.spi.7. determine the mean of a data set;

5.5.spi.8. make predictions based on data.

Performance Indicators Teacher:

As documented through teacher observation –

at Level 1, the student is able to

5.5.tpi.1. collect data using observations, surveys, and experiments;

5.5.tpi.2. organize and display data;

5.5.tpi.3. design investigations to address questions.

at Level 2, the student is able to

5.5.tpi.4. represent data using tables;

5.5.tpi.5. relate mean, median, and mode to a visual representation of a data set;

5.5.tpi.6. create a sample space to predict the probability of an event;

5.5.tpi.7. explain the importance of sample size in investigations;

5.5.tpi.8. examine various representations of data and evaluate how accurately the data is depicted by the graph.

at Level 3, the student is able to

5.5.tpi.9. understand how data collection methods affect the nature of the data set;

5.5.tpi.10. explain which measure of central tendency best represents a given data set.