

SAUSALITO MARIN CITY SCHOOL DISTRICT

Mathematics Standards - GRADE 4

By the end of fourth grade, students understand large numbers and addition, subtraction, multiplication and division of whole numbers. They describe and compare simple fractions and decimals. They understand the properties of and the relationships between plane geometric figures. They collect, represent and analyze data to answer questions.

NUMBER SENSE

1. Students understand place value of whole numbers and decimals to two decimal places, how these relate to simple fractions, and use concepts of negative numbers.

- +1.1. read and write whole numbers in the millions
- +1.2. order and compare whole numbers and decimals to two decimal places
- +1.3. round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand or hundred thousand
- +1.4. decide when a rounded solution is called for, and explain why this is the case
- 1.5. interpret different meanings for fractions including parts of a whole, parts of a set, indicate division of whole numbers and quantities (and measures) between whole numbers on a number line; and relate to simple decimals on a number line
 - (1) use manipulatives to compare whole numbers and fractions
 - (2) connect manipulatives to numeric notation in order to describe and compare whole numbers and fractions

- 1.6. write tenths and hundredths in decimal and fraction notation and know fraction/decimal equivalents for halves and fourths (e.g., $1/2 = 0.5$ or $.50$; $7/4 = 1\ 3/4 = 1.75$)
- 1.7. write the fraction represented by a drawing of parts of a figure; represent a given fraction using drawings

- (1) use pictorial and concrete models to show relationships

- +1.8. use concepts of negative numbers (e.g., on a number line, in counting, in temperature, "owing")

- +1.9. identify the relative position of fractions, mixed numbers, and decimals to two decimal places on the number line

2. Students extend their use and understanding of whole numbers to addition and subtraction of simple decimals.

- 2.1. estimate and compute the sum or difference of whole numbers and positive decimals to two places
 - (1) add and subtract money and make change

- 2.2. round two place decimals to one decimal or the nearest whole number, and use rounding to judge the reasonableness of an answer

- 2.3. write and solve real world problems using addition and subtraction

+3. Students solve problems involving addition, subtraction, multiplication and division of whole numbers, including

the addition and subtraction of negative numbers, and understand the relationships among the operations.

- +3.1. demonstrate understanding of, and the ability to use standard algorithms for addition and subtraction of multi-digit numbers
- +3.2. demonstrate understanding of, and ability to use standard algorithms for multiplying a multi-digit number by a two digit number and long division for dividing a multi-digit number by a one digit number; use relationships between them to simplify computations and to check results
- +3.3. solve problems involving multiplication of multi-digit numbers by two-digit numbers
- +3.4. solve problems involving division of multi-digit numbers by one-digit numbers

- 3.5. understand division in real life situations as either sharing or grouping
- 3.6. understand how to interpret the quotient and remainder to solve real life situations

4. Students know how to factor small whole numbers.

- 4.1. understand that many whole numbers decompose in different ways (e.g., $12 = 4 \times 3 = 2 \times 6 = 2 \times 2 \times 3$)
- +4.2. know that numbers such as 2, 3, 5, 7, 11 do not have any factors except 1 and themselves, and that such numbers are called prime numbers

ALGEBRA AND FUNCTIONS

1. Students use and interpret variables, mathematical symbols and properties to write and simplify expressions and sentences.

- 1.1. describe, analyze and create a wide variety of patterns and relationships (e.g., geometric and numeric)

- 1.2. use letters, boxes, or other symbols to stand for any number in simple expressions or equations (e.g., demonstrate understanding and use of a concept of a variable)

- +1.3. interpret and evaluate mathematical expressions that use parentheses

- +1.4. use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations

- 1.5. use and interpret formulas (e.g., Area = length times width or $A = lw$) to answer questions about quantities and their relationships
- +1.6. understand that an equation such as $y = 3x + 5$ is a prescription for determining a second number when a first number is given

+2. Students know how to manipulate equations.

- +2.1. know and understand that equals added to equals are equal

- +2.2. know and understand that equals multiplied by equals are equal

MEASUREMENT AND GEOMETRY

1. Students understand perimeter and area.

- 1.1. select and use appropriate units for

measuring

1.2. measure the area of rectangular shapes, using appropriate units: square centimeter, square meter, square kilometer, square inches, square yard, square mile

1.3. recognize that the rectangles having the same area can have different perimeters

1.4. understands that rectangles that have the same perimeter can have different areas.

1.5. understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use these formulas to find the areas of more complex figures by dividing them into parts with these basic shapes

+2. Students use two-dimensional coordinate grids to represent points and graph lines and simple figures.

+2.1. draw the points corresponding to linear relationships on graph paper (e.g., draw the first ten points for the equation $y = 3x$ and connect them using a straight line)

+2.2. understand that the length of a horizontal line segment equals the difference of the x-coordinates

+2.3. understand that the length of a vertical line segment equals the difference of the y-coordinates

3. Students demonstrate understanding of plane and solid geometric objects. They use this knowledge to show relationships and solve problems.

3.1. identify lines that are parallel and perpendicular

3.2. identify the radius and diameter of a circle

3.3. identify congruent figures

3.4. identify figures that have bilateral and rotational symmetry

3.5. know the definitions of right angle, acute angle and obtuse angle; understand that 90, 180, 270, and 360 degrees are, respectively, associated with $1/4$, $1/2$, $3/4$ and full turns.

3.6. visualize, describe and represent geometric solids (e.g., prisms, pyramids, etc.) in terms of the number and shape of faces, edges and vertices; interpret two-dimensional representations of three-dimensional objects; and draw patterns (of faces) for a solid that when folded will make a model of the solid

3.7. know the definitions of different triangles (e.g., equilateral, isosceles, scalene) and identify their features

3.8. know the definition of different quadrilaterals (e.g., rhombus, square, rectangle, parallelogram, trapezoid)

STATISTICS, DATA ANALYSIS and PROBABILITY

1. Students organize, represent and interpret numerical and categorical data, and clearly communicate their findings.

1.1. compare data in order to make true statements and draw conclusions based on the data

1.2. formulate survey questions, systematically collect and represent data on a number line, coordinate graphs, tables and charts

1.3. identify the mode(s) for sets of categorical data, and the mode(s), median, and any apparent outliers for numerical data sets

1.4. interpret one- and two-variable data graphs to answer questions about a situation

2. Students make predictions for simple probability situations.

2.1. represent all possible outcomes for a simple probability situation in an organized way (e.g., tables, grids, tree diagrams)

2.2. express outcomes of experimental probability situations verbally and numerically (e.g., 3 out of 4; $3/4$)

MATHEMATICAL REASONING

1. Students make decisions about how to approach problems.

1.1. analyze problems by identifying relationships, discriminating relevant from irrelevant information, sequencing and prioritizing information, and observing patterns

1.2. determine when and how to break a problem into simpler parts

1.3. explain decisions about the approaches, materials, and strategies used to solve problems

2. Students use strategies, skills and concepts in finding solutions.

2.1. use estimation to verify the reasonableness of calculated results

2.2. apply strategies and results from simpler problems to more complex problems

2.3. use a variety of methods such as words, numbers, symbols, charts, graphs, tables, diagrams and models to explain mathematical reasoning

2.4. express the solution clearly and logically using appropriate mathematical notation and terms and clear language; support solutions with evidence, in both verbal and symbolic work

2.5. indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy

2.6. make precise calculations and check the validity of the results from the context of the problem

3. Students move beyond a particular problem by generalizing to other situations.

3.1. evaluate the reasonableness of the solution in the context of the original situation

3.2. note method of deriving the solution and demonstrate conceptual understanding of the derivation by solving similar problems

3.3. develop generalizations of the results obtained and extend them to other circumstances