



INTRODUCTION TO ALGEBRA CONTENT STANDARDS 1 of 5

Grade 6 Statistics, Data Analysis, and Probability

- 1.0 Students compute and analyze statistical measurements for data sets:
 - 1.1 Compute the range, mean, median, and mode of data sets.
 - 1.2 Understand how additional data added to data sets may affect computations of measures of central tendency.
 - 1.3 Understand how the inclusion or exclusion of outliers affects measures of central tendency.
 - 1.4 Know why a specific measure of central tendency provides the most useful information in a given context.
- 2.0 Students use data samples of a population and describe the characteristics and limitations of the samples:
 - 2.1 Compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.
 - 2.2 Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.
 - 2.3 Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.
 - 2.4 Identify data that represent sampling errors and explain why the sample (and the display) might be biased.
 - 2.5 Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.
- 3.0 Students determine theoretical and experimental probabilities and use these to make predictions about events:
 - 3.1 Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
 - 3.2 Use data to estimate the probability of future events (e.g., batting averages or number of accidents per mile driven).



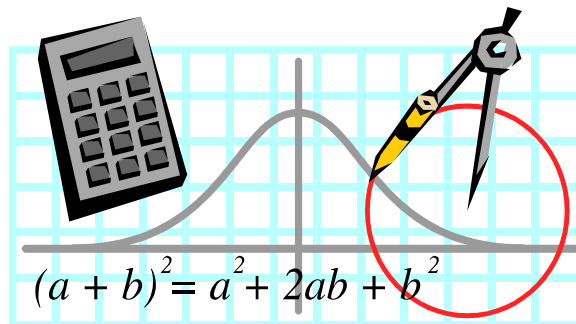


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- 3.3 Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if P is the probability of an event, $1-P$ is the probability of an event not occurring.
- 3.4 Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities.
- 3.5 Understand the difference between independent and dependent events.

Statistics, Data Analysis, and Probability

- 1.0 Students gather and organize information involving one or more variables. Students identify relationships between the variables (i.e. linearity, mean, median, mode). They will make tables and graphs by hand and computer and make spreadsheets on computers.
 - 1.1 Know different ways to show data sets. Know how to graph different information and compare graphs.
 - 1.2 Represent two unknown numbers through various types of graphs and give visual examples using graphical data and any noticeable relationship that exists between two unknowns.
 - 1.3 Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.





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Number Sense

- 1.0 Students use the distributive, associative, commutative and identity properties along with the order of operations to solve problems with both whole and/or rational numbers.
 - 1.1 Read, write and compare rational numbers using positive and negative exponents to the power of 10.
 - 1.2 Add, subtract, multiply, and divide rational numbers and take positive fractions to whole number exponents.
 - 1.3 Change fractions to decimals and percents and can use numbers represented in these three forms in adding, subtracting, multiplying, dividing, and estimating. Also, be able to use these outcomes to solve word problems.
 - 1.4 Know the difference between rational and irrational numbers.
 - 1.5 Change decimals into a fraction. Know how to simplify/reduce fractions.
 - 1.6 Find the percentage of increases and decreases of a number or amount.
 - 1.7 Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.
- 2.0 Students use exponents, powers, and roots and use exponents in working with fractions.
 - 2.1 Understand negative whole number exponents. Multiply and divide terms involving exponents with a common base.
 - 2.2 Add and subtract fractions by using multiples to find common denominators.
 - 2.3 Multiply, divide and simplify fractions by using exponent rules.
 - 2.4 Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.
 - 2.5 Know that absolute value is the distance of a number from zero on a number line and find the absolute value of numbers.

Algebra and Functions

- 1.0 Students use algebraic terminology, variables, expressions, equations, and inequalities to represent quantitative relationships.
 - 1.1 Write expressions, equations and inequalities to describe situations. Use algebraic terminology correctly (e.g. three less than a number, half as large as area A).
 - 1.2 Use the correct order of operations, commonly referred to as PEMDAS to evaluate algebraic expressions.
 - 1.3 Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used.
 - 1.4 Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly.
 - 1.5 Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.



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2.0 Students will be able to use, explain and simplify mathematical expressions that contain integer powers and simple roots.

2.1 Understand, simplify, and use expressions that include positive and negative whole number exponents.

2.2 Simplify monomial expressions through division, multiplication, taking powers, and finding roots with integer exponents.

3.0 Graph and interpret linear and some nonlinear functions.

3.1 Graph functions of the form $y = nx^2$ and $y = nx^3$

3.2 Plot the values from the volumes of 3D shapes for various values of the edge lengths (e.g., cubes with varying edge lengths or a triangle prism with a fixed height and an equilateral triangle base of varying lengths.)

3.3 Graph linear functions and interpret the slope as a constant rate of change.

3.4 Plot constant ratios on a graph (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle) and understand that the slope of a line represents these constant ratios.

4.0 Students solve simple linear equations and inequalities over the rational numbers.

4.1 Solve two-step equations and inequalities in one variable.

4.2 Solve multi-step problems involving rate, average speed, distance, and time or a direct variation.

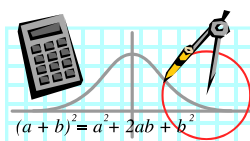
Measurement and Geometry

1.0 Students solve problems by choosing the correct units of measurement and use ratios to change between measurement systems.

1.1 Know and compare weights, times, temperatures, amounts, and geometric measures in the same measurement systems and different measurement system.

1.2 Build and read drawings and models that are made to scale.

1.3 Convert units of measure expressed as rates and products (e.g. person-days) to solve problems and check the correctness of the units of the solutions.





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- 3.0 Students expand their knowledge of geometric shapes by constructing shapes that meet a set of characteristics (i.e. a polygon that has four right angles and four congruent sides is a square). Students know and use the Pythagorean theorem.
- 3.1 Students construct figures (e.g., altitudes) by only using a straightedge and a compass as tools for construction.
 - 3.2 Be able to graph a simple figure on a coordinate plane. Be able to find the lengths and area of that figure. Be able to name the points of their image under a translation and a reflection.
 - 3.3 Students can use and know the Pythagorean theorem and its converse (if $a^2 + b^2 = c^2$ then the triangle is a right triangle.) Students know to use the Pythagorean theorem to find the length of the missing side of the right triangle. Students can prove the Pythagorean theorem by measuring the sides of the right triangle.
 - 3.4 Use the angle and side relationships to determine if two figures are congruent.
 - 3.5 Be able to construct on paper a pattern that when folded will become a three dimensional object.
 - 3.6 Describe the interaction of 3D geometric objects and describe the relationship of the basic building blocks of geometry in space.

Mathematical Reasoning

- 1.0 Students understand how to select and use the most effective problem solving method.
- 1.1 Analyze word problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information and identifying patterns.
 - 1.2 Make and justify a mathematical conjecture by observing a pattern of given mathematical questions or problems.
 - 1.3 Determine when and how to break a problem into smaller parts.
- 2.0 Students use strategies, skills, and concepts in finding solutions.
- 2.1 Use estimation to verify the reasonableness of the answer (does the answer make sense mathematically?)
 - 2.2 Apply strategies and results from simpler problems to more complex problems.
 - 2.3 Find the value of a variable by analyzing a graph, using logical reasoning, arithmetic, and algebraic techniques.
 - 2.4 Make and test conjectures by using both inductive and deductive reasoning.
 - 2.5 Explain how to solve math problems by using numbers, words, symbols, charts, graphs, tables, diagrams, and models.
 - 2.6 Express the solution clearly by using the appropriate mathematical notation and terms and clear language to support solutions with justifications in both verbal and symbolic work.
 - 2.7 Students can decide when it is best to give either an approximate or exact solution.
 - 2.8 Make exact calculations and check the answer to see if it makes sense for the problem mathematically.
- 3.0 Students determine a solution is complete and transfer their understanding to similar situations.
- 3.1 Students can check to make sure their answer makes sense.
 - 3.2 Illustrate, demonstrate and verbalize conceptual understanding of method used to solve problems to solve similar problems.
 - 3.3 Develop general ideas from the results and the strategies used and apply them to solve new problems.