

Idaho Content Standards with Limits Math – Grade 8

Standard 1: Number and Operation

Compare magnitudes and relative magnitudes of rational numbers, including integers, fractions, decimals, percents, and absolute values.

Content Limit: Number lines and symbols $<$, \leq , $>$, \geq , $=$, and \neq may be used. Items use comparison only (e.g., compare, order), no computation. Decimals to ten-thousandths place. Fraction denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 25, and 100. Integers only as negative rational numbers.

Use rational numbers, including percents and ratios, and π (pi) to solve problems.

Content Limit: Items may include percents used to find sales tax, discount, simple interest, net cost after discount, and percent increase or decrease. Items use whole numbers, fractions, and decimals. All items should be set in a real-world context. Items may ask for answers to be rounded to the nearest percent, whole number, dollar, cent, etc.

Locate the position of rational numbers and positive real numbers on a number line.

Content Limit: Fraction denominators limited to 2, 3, 4, 5, 6, 8, and 10. Decimals to thousandths place.

Convert between standard form, scientific notation, and exponential form.

Content Limit: Standard scientific notation of whole numbers and decimals from hundred billions through hundred-billionths. Negative exponents should be used in scientific notation only.

Apply number theory concepts (primes, composites, prime factorization, LCM, GCF).

Content Limit: Problems involve no more than two numbers, each less than 100. Numbers are not relatively prime.

Recognize pertinent information for problem solving.

Content Limit: Items should be set in a real-world context. Problems include information not required to solve. No more than two unnecessary items in a prose item. Information may be given in text or table form. Data provided should be consistent with the context of the problem (i.e., a table listing start/stop times for movies).

Apply integers in one- and two-step common real-world situations.

Content Limit:

All items should be set in a real-world context.

Add, subtract, multiply, and divide rational numbers.

Content Limit: Fraction denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 25, and 100. Integers only as negative rational numbers. May use up to three numbers and two operations. No grouping symbols. Expression must be clearly stated.

Evaluate numerical expressions with whole number exponents.

Content Limit: Exponents must be whole numbers between 2 and 6. Results must be less than 200.

Evaluate numerical expressions with rational numbers using the order of operations.

Content Limit: Operations include addition, subtraction, multiplication, division, and use of exponents and roots. Items are limited to three nestings within grouping symbols. Identifying correct order of operations shown (calculation not required) is allowed. Roots are limited to whole number square roots and cube roots. The 'square root' means the principal square root. Only the cube root of 8, 27, 64, 125, or 1,000 will need to be computed.

Use a variety of strategies including common mathematical formulas to compute problems drawn from real life situations.

Content Limit: Word problems use content limits of other objectives at this grade level. Word problems could be such that a variety of strategies could be used. Do not assess strategies. Formulas will be given in problem and limited to area of a parallelogram, triangle, and circle, circumference of a circle, distance formula, simple interest formula, and volume of a rectangular prism.

Identify whether a given estimate is an overestimate or underestimate.

Content Limit: Estimates will involve multiplication or division only.

Standard 2: Concepts and Principles of Measurement

Select and use appropriate units and tools to make formal measurements in both systems.

Content Limit: Select appropriate units and tools only. Units for length are inches, feet, yards, miles, millimeters, centimeters, and meters. Units for time are seconds, minutes, hours, days, and years. Units for weight are ounces, pounds, tons, grams, and kilograms. Units for volume (capacity) are cups, quarts, gallons, milliliters, and liters.

Given the formulas, find the circumference, perimeter, or area of triangles, circles, and quadrilaterals, and the volume and surface area of rectangular prisms.

Content Limit: Items assess finding linear measure, capacity, perimeter, circumference, area, surface area, and/or volume. Items may include composite figures. Graphics are used in most of these items. Items requiring three-dimensional graphics must be realistic and include verbal descriptions. Items should be set in a real-world context. Answer options may be left in terms of π .

Convert units of measurement within each system in problem solving situations.

Content Limit: All conversions must be within the same system of measurement. Customary units may include inches, feet, yards, miles, ounces, pounds, tons, fluid ounces, cups, pints, quarts, and gallons. Metric prefixes may include milli-, centi-, and kilo- with base units of grams, liters, and meters. Time units may include years, months, weeks, days, hours, minutes, and seconds. Items should be set in a real-world context.

Solve problems involving area of circles and the perimeter and area of rectangles and triangles

Content Limit: Graphics should be used in most of these items, as appropriate. Items should be set in a real-world context. Measurements may be in either metric or customary units. Problems may include shapes that are formed by a combination of two shapes.

Use rates, proportions, ratios, and map scales in problem-solving situations.

Calc: YES

Content Limit: Items involving rate should not be limited to time/distance problems, but should include other rated measures (e.g., rates of change for temperature as it changes throughout the day or speed as the rate of change in distance over time, and other derived measures). Items may require students to demonstrate knowledge of proportional relationships in scale drawings or solve real-world problems, including distance, using a scale drawing. There should be no more than two conversions within one dimension per item (e.g., years to seconds is considered four conversions: year-day-hour-minute-second). Measurements may be in either metric or customary units. Items should involve interpreting and applying various scales including those based on number lines, graphs, models, and maps. Scales should use only rational numbers. Items should be set in a real-world context. Graphics are used in most of these items.

Determine unit rates in real-world situations.

Content Limit: Situations must be real-world applications such as gas mileage, speed, growth, etc. Rates given in the problem should be equivalent unit rates equal to a whole number or a terminating decimal.

Illustrate the interrelationship of measurement units through dimensional analysis conversions.

Content Limit: Customary units may include inches, feet, yards, miles, ounces, pounds, tons, fluid ounces, cups, pints, quarts, and gallons. Metric prefixes may include milli-, centi-, and kilo- with base units of grams, liters, and meters. Time units may include years, months, weeks, days, hours, minutes, and seconds. No more than two conversion ratios should be used in any item.

Standard 3: Concepts and Language of Algebra and Functions

Use variables in expressions, equations, and inequalities.

Content Limit: Evaluate an expression by substituting a number for every variable in the expression. Items are limited to at most three variables at a time. Items may also check solutions to equations or inequalities by substituting values for the variable(s) in an equation or inequality

Translate simple word statements and story problems into algebraic expressions and equations.

Content Limit: Items should be set in a real-world context. Expressions and equations may contain at most three operations and may require at most two grouping symbols. May contain one or two variables.

Use symbols “<,” “>,” “=,” “≠,” “≤,” and “≥” to express relationships.

Content Limit: Items should be set in a real-world context. Item may include integers between -50 and 50, up to three operations, at most two grouping symbol, and exponents limited to 2, 3, and 4. May include one variable.

Use and apply the following properties in evaluating algebraic expressions: commutative, associative, identity, zero, inverse, distributive, and substitution.

Content Limit: Items can use positive fractions with no more than two-digit numerators and denominators or decimals less than ten-thousandths. Expressions may include integers between -50 and 50 , up to three operations, at most two grouping symbol, and exponents limited to 2, 3, and 4. May include one variable.

Use the order of operations in evaluating simple algebraic expressions.

Content Limit: Expressions may include parentheses, exponents, multiplication, division, addition, and/or subtraction. Items can use positive fractions with no more than two-digit numerators and denominators or decimals less than ten-thousandths. Roots are limited to square roots and cube roots. Items require students to compute only the cube root of 8, 27, 64, 125, or 1,000. May include one or two variables.

Simplify algebraic expressions.

Content Limit: Items can use positive fractions with no more than two-digit numerators and denominators or decimals less than ten-thousandths. Expressions may include integers between -50 and 50 , up to three operations, at most two grouping symbol, and exponents limited to 2, 3, and 4. May include one or two variables.

Solve one- and two-step equations and inequalities.

Content Limit: Items can use positive fractions with no more than one-digit numerators and denominators or decimals less than ten-thousandths. Equations and inequalities may include integers between -50 and 50 . Variable may appear on left or right side of equal or inequality sign.

Match graphical representations with simple linear equations.

Content Limit: The x - and y -axes may have different scales. Linear equations will be given in slope-intercept ($y = mx + b$) form.

Extend patterns and identify a rule (function) that generates the pattern using rational numbers.

Content Limit: Items may require a verbal description of the pattern. Variables can be used to write the rule (function). Items should not include more than two variables or include more than two operations. Fraction denominators limited to 2, 3, 4, 5, 6, 8, and 10. Decimals limited to tenths, hundredths, and thousandths. Functions must be expressible as $y = mx + b$. Items may ask the student to extend the pattern, state the rule for the pattern, or both.

Represent a set of data in a table, as a graph, and as a mathematical relationship.

Content Limit: On the graph, x - and y -axes may have different scales. Items do not require students to graph or generate a table of a non-linear relation; students may read points off of a graph of a non-linear relation. Items may include real-world context. Given a continuous (i.e., individual points not indicated) linear graph, students will generate a table of values. Relationship is presented as a table, graph, or equation. The answer options will include a table, a graph, or an equation.

Use patterns and linear functions to represent and solve problems.

Content Limit: Patterns may include rational numbers. Linear functions are limited to whole number variable values.

Standard 4: Concepts and Principles of Geometry

Describe and classify relationships among types of one-, two-, and three- dimensional geometric figures, using their defining properties.

Content Limit: Classify only. Figures may include triangles and quadrilaterals. Triangles may be classified by angles (acute, equiangular, obtuse, or right) or by sides (equilateral, isosceles, or scalene) or both (e.g., an obtuse isosceles triangle). Quadrilaterals may be classified according to number and position of parallel sides as well as angle measure (square, trapezoid, parallelogram, rectangle, or rhombus). Three-dimensional figures can include cubes, rectangular prisms, spheres, pyramids, cones, and cylinders.

Draw and measure various angles and shapes using appropriate tools.

Content Limit: Measure only using superimposed protractor.

Apply the fundamental concepts, properties, and relationships among points, lines, rays, planes, and angles.

Content Limit: Items may include parallel, intersecting and perpendicular lines including two parallel lines cut by a transversal and the congruent and supplementary angles formed. Angles may include acute, right, obtuse, and straight. Angle relationships may include complementary, supplementary, and congruent. Symbols used may include: capital letter for points, two-headed arrow above two capital letters for lines, line segment above two capital letters for line segments, one-headed arrow above two capital letters for rays, angle symbol with one capital letter or angle symbol with three capital letters for angles, and symbols for parallel, perpendicular, and right angle.

Identify and model the effects of reflections, translations, rotations, and scaling on various shapes.

Content Limit: *When using three-dimensional shapes:* Transformations may include reflections, rotation and translations. Items are limited to one transformation per item. Rotations occur in increments of 90° . *When using two-dimensional shapes:* Transformations may include reflections, rotation, translations, and change of scale. Items are limited to two transformations per item. Rotations occur in increments of 45° . Algebraic rules limited to translations and reflections when the figure is shown on a coordinate grid. No algebraic rules are required for items involving more than one transformation. Rotations must indicate clockwise or counterclockwise.

Identify congruence, similarities, and line symmetry of shapes.

Content Limit: Shapes limited to two-dimensional figures.

Identify and plot points on a coordinate plane.

Content Limit: Points limited to integer ordered pairs. Points may appear in any of the four quadrants or on either axis.

Standard 5: Data Analysis, Probability, and Statistics

Analyze and interpret tables, charts, and graphs, including frequency tables, scatter plots, broken line graphs, line plots, bar graphs, histograms, circle graphs, and stem-and-leaf plots.

Graphics may have at most ten data categories. Circle graphs may have at most eight sectors. Scales are in increments appropriate to the application. Histogram intervals must be consistent.

Collect, organize, and display data with appropriate notation in tables, charts, and graphs, including scatter plots, broken line graphs, line plots, bar graphs, histograms, and stem-and-leaf plots.

Content Limit: Given data, choose a display. Displays limited to scatter plots, broken line graphs, line plots, bar graphs, histograms, and stem-and-leaf plots.

Choose and calculate the appropriate measure of central tendency – mean, median, and mode.

Content Limit: Items should be set in a real-world context. Items may assess finding the range, mean, median, or mode of a set of data presented in a chart, table, graph, or plot (e.g., scatter plot, line plot, or stem-and-leaf plot). Items that assess understanding of these concepts may ask students to draw conclusions from an analysis of range and/or central tendency measures. Data set should include no more than 12 data points. Data set may have an even or an odd number of data points and does not need to be in numeric order. No more than three categories of information should be used in data sets.

Recognize equally likely outcomes.

Content Limit: Items describe familiar situations such as spinning a spinner, rolling one or two dice (does not include sum of two dice), or drawing different colored objects from a container. Equally likely outcomes must pertain to the same event.

Make predictions based on experimental and theoretical probabilities.

Content Limit: Items may include combinations of events (e.g., rolling a number cube then spinning a spinner or drawing two cards without replacement). Items may not include conditional probability. Items may require comparison between experimental and theoretical probabilities.