



Essential Standards Extended Guide

Advanced Standards High School Mathematics

GUIDING INFORMATION

In response to requests from schools and districts for guidance on essential standards, committees of educators from around Idaho collaborated in the summer of 2024 to categorize mathematics standards into four groups:

- **Essential standards** are explicitly taught, assessed multiple times, and receive targeted interventions for students who have not yet reached proficiency.
- **Supporting standards** are taught to reinforce essential standards and may or may not be formally assessed.
- **Additional standards** extend learning and are incorporated as time allows within course units, with assessment being optional.
- **Mathematical Big Ideas** are overarching mathematical concepts that are central to the learning of mathematics and link numerous mathematical understandings into a coherent whole. They are difficult to assess.

This guidance helps LEAs prioritize the most critical standards, recognizing that not all standards are of equal importance. This document serves as a resource—not a mandate—to assist local efforts. Importantly, this work did not remove or revise any of the adopted Idaho Content Standards and is intended to refocus time and effort.

The *2022 Idaho Content Standards for Mathematics* list the standards for each grade level by domain and provide clarification statements and examples of individual standards. The *9-12 Course Planning Guide for High School Mathematics* categorizes high school mathematics standards into foundational, advanced and college standards. These advanced standards would typically be taught in the third and fourth years of high school mathematics instruction. This *Essential Standards Extended Guide* provides examples of how teachers can group standards for mathematics instruction. Appendix A provides planning templates for using these instructional groupings to plan instructional calendars and units.

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Instructional Grouping 1: Creating Equations

Mathematical Big Ideas:

- **A.CED.A. Create equations that describe numbers or relationships.**

Essential Standards

Standards to be explicitly taught, assessed more than once, and intervened upon.

A.CED.A.1. Create one-variable equations and inequalities to solve problems, including linear, quadratic, rational, and exponential functions.

Teacher Note: Focus on creating linear equations and inequalities to solve problems at the foundational level. This standard will be expanded upon at the advanced and college levels.

A.CED.A.2. Interpret the relationship between two or more quantities.

A.CED.A.2a. Define variables to represent the quantities and write equations to show the relationship.

A.CED.A.2b. Use graphs to show a visual representation of the relationship while adhering to appropriate labels and scales.

Teacher Note: All of these essential standards are also foundational standards. They are revisited in Advanced mathematics and taught at a deeper level of understanding and application.

Supporting Standards

Standards that support the learning of essential standards and may or may not be formally assessed.

A.CED.A.3. Represent constraints using equations or inequalities and interpret solutions as viable or non-viable options in a modeling context.

Instructional Grouping 2: Solving Equations

Mathematical Big Ideas:

- **A.REI.A. Understand solving equations as a process of reasoning and explain the reasoning.**
- **A.REI.C. Solve systems of equations.**
- **A.REI.D. Represent and solve equations and inequalities graphically.**

Essential Standards Standards to be explicitly taught, assessed more than once, and intervened upon.
N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.
A.REI.B.4. Solve quadratic equations in one variable.
A.REI.D.10. Demonstrate understanding that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. Show that any point on the graph of an equation in two variables is a solution to the equation.
A.REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Supporting Standards Standards that support the learning of essential standards and may or may not be formally assessed.
A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.REI.C.5. Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Additional Standards Standards that deepen learning and may be included as time allows throughout course units of study and may or may not be assessed.
N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
A.REI.B.3a. Solve linear equations and inequalities in one variable involving absolute value.
A.REI.B.4a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

Additional Standards

Standards that deepen learning and may be included as time allows throughout course units of study and may or may not be assessed.

A.REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2=49$), taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

G.GPE.B.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

Instructional Grouping 3: Functions

Mathematical Big Ideas:

- **F.IF.B. Interpret functions that arise in applications in terms of the context. Include linear, quadratic, exponential, rational, polynomial, square root and cube root, trigonometric, and logarithmic functions.**

Essential Standards Standards to be explicitly taught, assessed more than once, and intervened upon.
N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.
F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior; and periodicity.
A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

Supporting Standards Standards that support the learning of essential standards and may or may not be formally assessed.
A.SSE.B.3b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available and use the zeros to construct a rough graph of the function defined by the polynomial.
F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

Additional Standards Standards that deepen learning and may be included as time allows throughout course units of study and may or may not be assessed.
N.CN.A.1. Know there is a complex number such that $i^2 = -1$, and show that every complex number has the form $a + bi$ where a and b are real.
N.CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
A.APR.A.1. Demonstrate understanding that polynomials form a system analogous to the integers; namely, they are closed under certain operations.
A.APR.A.1a. Perform operations on polynomial expressions (addition, subtraction, multiplication, division) and compare the system of polynomials to the system of integers when performing operations.

Additional Standards

Standards that deepen learning and may be included as time allows throughout course units of study and may or may not be assessed.

A.APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.

A.APR.C.4. Prove polynomial identities and use them to describe numerical relationships.

A.APR.C.5. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined, for example, by Pascal's Triangle.

A.APR.D.6. Rewrite simple rational expressions in different forms using inspection, long division, or, for the more complicated examples, a computer algebra system.

A.SSE.B.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1) and use the formula to solve problems.

G.SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles.

G.SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Instructional Grouping 4: Statistics

Mathematical Big Ideas:

- **S.ID.A. Summarize, represent, and interpret data on a single count or measurement variable. Use calculators, spreadsheets, and other technology as appropriate.**
- **S.ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables.**

Essential Standards

Standards to be explicitly taught, assessed more than once, and intervened upon.

N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

S.ID.B.6. Represent data on two categorical variables on a clustered bar chart and describe how the variables are related. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

Supporting Standards

Standards that support the learning of essential standards and may or may not be formally assessed.

S.ID.A.4. Interpret differences in shape, center, and spread in the context of the variables accounting for possible effects of extreme data points (outliers) for measurement variables.

Additional Standards

Standards that deepen learning and may be included as time allows throughout course units of study and may or may not be assessed.

S.ID.A.5. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

Appendix A: Planning Templates

Instructional Calendar Template

Use this template to sequence your instructional units onto a Year At-A-Glance calendar. This template can be adapted to show semesters or trimesters.

Month	Instructional Grouping
August	
September	
October	
November	
December	
January	
February	
March	
April	
May	

Unit Planning Template

Use this template to plan and collaborate around an instructional grouping. This template facilitates identifying curricular and assessment resources to teach and assess the content in one instructional grouping.

Instructional Grouping #:	Unit Topic:
Time Allotment: <i>How many instructional days do you plan to spend on this topic?</i>	
Learning Activities: <i>What common lessons will we teach from our curricular resources?</i>	
Common Assessments: <i>What common assessments will we give?</i> <i>Consider IAB and FIAB assessments in the ISAT portal if appropriate and common teacher created assessments.</i>	
Team Collaboration Notes: <i>What did we learn about teaching this topic from analyzing our student work samples?</i> <i>What intervention do we need to do on essential standards? Who is ready for learning additional standards?</i>	