Iowa Core Essential Concepts/Skill Sets and Details with no Common Core State Standard Matches - Mathematics

<u>Key</u>: Essential Strands (K-8). Note that measurement appears by itself only in grade K. In grade span 3-5, it is combined with Geometry; in grades 6-8, Measurement does not appear as a Strand

N = Number and Operations
A = Algebra
G = Geometry (in grades 3-5, this code includes Geometry and Measurement)
M = Measurement (grade K only)
D = Data Analysis and Probability

<u>Key</u>: Essential Strands (9-12), and Essential Topics within each Essential Strand. Note that Discrete Mathematics topics are integrated throughout the Essential Strands.

A = Algebra
- **F =** Functions
- **EI =** Equations and Inequalities
- **AE =** Algebraic Expressions
- **RC =** Rate of Change
- **RI =** Recursion and Iteration

G = Geometry
- **C =** Coordinates
- **T =** Transformations
- **PR =** Geometric Properties and Relationships
- **TR =** Trigonometric Relationships
- **VG =** Vertex-Edge Graphs

S = Statistics and Probability
- **DS =** Descriptive Statistics
- **P =** Basic Probability
- **IS =** Interential Statistics

Q = Quantitative Literacy
- **N=** Number Operations and Properties
- **SC =** Systematic Counting
- **DM =** Social Decision Making
- **IP =** Mathematics of Information Processing and the Internet

Grade	Strand[1]	Standard #[2]	Standard[2]
K-2	A	1.1	IA.K-2.A.1.1 Recognize, describe, create and extend color, rhythmic, shape, number and letter repeating patterns with simple attributes.
K-2	A	1.2	IA.K-2.A.1.2 Identify a missing element in a pattern.
K-2	A	1.3	IA.K-2.A.1.3 Make a generalization that patterns can translate from one representation to another.
K-2	A	1.4	IA.K-2.A.1.4 Recognize, describe, create and extend repeating and growing patterns.
K-2	A	1.5	IA.K-2.A.1.5 Translate a pattern between sound, symbols, movements and objects.
K-2	A	1.6	IA.K-2.A.1.6 Identify, create, describe, and extend simple number and growing patterns. involving repeated addition and subtraction, skip counting and arrays of objects.
K-2	A	1.7	IA.K-2.A.1.7 Use patterns to solve problems in various contexts.
K-2	A	2.3	IA.K-2.A.2.3 Sort and classify a set of objects using a Venn diagram.
K-2	G	4.2	IA.K-2.G.4.2 Locate points on maps and simple coordinate grids with letters and numbers.
K-2	G	4.3	IA.K-2.G.4.3 Represent points and simple figures on maps using simple coordinate grids with letters and numbers.
K-2	G	5	IA.K-2.G.5 Experience and recognize slides, flips, turns and symmetry to analyze mathematical situations.

Grade	Strand[1]	Standard #[2]	Standard[2]
K-2	M	1.2	IA.K-2.M.1.2 Recognize temporal concepts such as before, after, sooner, later, morning, afternoon, evening.
K-2	M	3.4	IA.K-2.M.3.4 Associate the time of day with everyday events.
K-2	M	3.5	IA.K-2.M.3.5 Name standard units of time (day, week, month).
K-2	M	3.10	IA.K-2.M.3.10 Describe the relationship among standard units of time: minutes, hours days, weeks, months and years.
K-2	D	2.2	IA.K-2.D.2.2 Compare a single data set using different types of graphs.
K-2	D	3.2	IA.K-2.D.3.2 Use interviews, surveys, and observations to collect data that answers questions about themselves and their surroundings.
3-5	N	3.5	IA.3-5.N.3.5 Make reasonable estimates of fraction and decimal sums and differences.
3-5	G	1.2	IA.3-5.G.1.2 Relate two-dimensional shapes to three-dimensional shapes and analyze properties of polyhedral solids, describing them by the number of edges, faces, or vertices as well as the types of faces.
3-5	G	2.2	IA.3-5.G.2.2 Apply congruence to other contexts such as three-dimensional shapes and repeating the congruent shapes to build a similar shape.
3-5	G	2.3	IA.3-5.G.2.3 Explore similar shapes to determine that angle measure is the same and the related sides are proportional, that is, related by the same multiplicative or scale factor.
3-5	G	3.1	IA.3-5.G.3.1 Investigate, describe, and reason about decomposing, combining, and transforming polygons to make other polygons.
3-5	G	3.3	IA.3-5.G.3.3 Extend their understanding of two-dimensional space by using transformations to design and analyze simple tilings and tessellations.
3-5	G	5.7	IA.3-5.G.5.7 Decompose three-dimensional shapes to develop strategies for determining surface area.
3-5	G	6.3	IA.3-5.G.6.3 Understand that a square that is 1 unit on a side is the standard unit for measuring area.
3-5	G	7.3	IA.3-5.G.7.3 Estimate angle measure using a right angle as the benchmark.
3-5	D	1.3	IA.3-5.D.1.3 Compare different representations of the same data and evaluate how well each representation shows important aspects of the data.
3-5	D	1.5	IA.3-5.D.1.5 Apply their understanding of place value to develop and use stem-and-leaf plots.
3-5	D	2.2	IA.3-5.D.2.2 Learn to select and use measures of center: mean, median and mode and apply them to describing data sets.
3-5	D	3	IA.3-5.D.3 Propose and justify conclusions and predictions based on data.
3-5	D	3.1	IA.3-5.D.3.1 Learn how to describe data, make a prediction to describe the data, and then justify their predictions.
3-5	D	3.2	IA.3-5.D.3.2 Learn to collect data using observations, surveys and experiments and propose conjectures.
3-5	D	3.3	IA.3-5.D.3.3 Design simple experiments to examine their conjectures and justify their conclusions.
3-5	D	3.4	IA.3-5.D.3.4 Design investigations to address a question and consider how data collection methods affect the nature of the data set.
3-5	D	3.5	IA.3-5.D.3.5 Examine the role of sample size has in predictions about data.

Grade	Strand[1]	Standard #[2]	Standard[2]
3-5	D	4	IA.3-5.D.4 Predict the probability of simple experiments and test predictions.
3-5	D	4.1	IA.3-5.D.4.1 Examine the probability of experiments that have only a few outcomes, such as game spinners (i.e., how likely is it that the spinner will land on a particular color?), by first predicting the probability of the desired event and then exploring the outcome through experimental probability.
3-5	D	4.2	IA.3-5.D.4.2 Learn to represent the probability of a certain event as 1 and the probability of an impossible event as 0.
3-5	D	4.3	IA.3-5.D.4.3 Learn to use common fractions to represent events that are neither certain nor impossible.
6-8	G	4.4	IA.6-8.G.4.4 Use reasoning about similar triangles to solve a variety of problems, including those that involve determining heights and distances.
6-8	G	5.1	IA.6-8.G.5.1 Recognize and draw two-dimensional representations of three-dimensional figures, including nets, front-side-top views, and perspective drawings.
6-8	D	3.2	IA.6-8.D.3.2 Apply percentages to make and interpret histograms and circle graphs.
6-8	D	5.1	IA.6-8.D.5.1 Understand and apply the Multiplication Principle of Counting in simple situations.
9-12	G	C.8	IA.9-12.G.C.8 In three dimensions, students should be able to plot points using rectangular coordinates.
9-12	G	VG	IA.9-12.G.VG Vertex-Edge Graphs: Use diagrams consisting of vertices and edges (vertex-edge graphs) to model and solve problems
9-12	G	VG.1	IA.9-12.G.VG.1 Within the context of school geometry, which is fundamentally the study of shape, vertex-edge graphs represent, in a sense, the situation of no shape. That is, vertex-edge graphs are geometric models consisting of vertices and edges in which shape is not essential, only the connections among vertices are essential.
9-12	G	VG.2	IA.9-12.G.VG.2 These graphs are widely used in business and industry to solve problems about networks, paths, and relationships among a finite number of objects (such as, analyzing a computer network; optimizing the route used for snowplowing, garbage collection, or visiting business clients; scheduling committee meetings to avoid conflicts; or planning a large construction project to finish on time).
9-12	G	VG.3	IA.9-12.G.VG.3 Students should understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.
9-12	G	VG.4	IA.9-12.G.VG.4 Important vertex-edge graph topics for the high school curriculum include: Euler and Hamilton paths and circuits, the traveling salesman problem (TSP), minimum spanning trees, critical paths, shortest paths, and vertex coloring. These topics can be compared and contrasted in terms of algorithms, optimization, properties, and types of problems that can be solved.
9-12	Q	DM	IA.9-12.Q.DM Social Decision Making: Understand and apply some basic mathematics of decision making in a democratic society

Grade	Strand[1]	Standard #[2]	Standard[2]
9-12	Q	DM.1	IA.9-12.Q.DM.1 Two fundamental aspects of life in a modern democratic society are voting and the Internet. Social Decision Making as described here includes a mathematical analysis of voting.
9-12	Q	DM.2	IA.9-12.Q.DM.2 Some of the mathematics of the Internet is included in the next topic.
9-12	Q	DM.3	IA.9-12.Q.DM.3 To be informed and productive citizens in a democratic society, students should understand and apply basic voting methods, such as majority, plurality, runoff, approval, the Borda method (in which points are assigned to preferences), and the Condorcet method (in which each pair of candidates is run off head to head). Understanding these voting methods, and the issues associated with all voting methods, can help ensure fairer elections when there are more than two candidates. This important topic may only take a couple days in the entire high school curriculum, and could be taught in a social studies class.
9-12	Q	DM.4	IA.9-12.Q.DM.4 Related to the idea of social decision making, some students may also learn about mathematical concepts and methods of fair division and apportionment.
9-12	Q	IP	IA.9-12.Q.IP Mathematics of Information Processing and the Internet: Understand and apply some basic mathematics of information processing and the Internet
9-12	Q	IP.1	IA.9-12.Q.IP.1 We live in a society in which the Internet is ubiquitous. To be informed consumers and citizens in the information-dense modern world permeated by the Internet, students should have a basic mathematical understanding of some of the issues of information processing on the Internet. For example, when making an online purchase, mathematics is used to help you find what you want, encrypt your credit card number so that you can safely buy it, send your order accurately to the vendor, and, if your order is immediately downloaded, as when purchasing software, music, or video, ensure that your download occurs quickly and error-free.
9-12	Q	IP.2	IA.9-12.Q.IP.2 Students should understand and apply elementary set theory and logic, as used in Internet searches.
9-12	Q	IP.3	IA.9-12.Q.IP.3 Students should also understand and apply basic number theory, including modular arithmetic, as used in cryptography. These topics are not only fundamental to information processing on the Internet, but they are also important mathematical topics in their own right with applications in many other areas. These topics may be included as part of instruction in other areas, such as number and operations or proof, or they could be included as separate mini-units.
9-12	Q	IP.4	IA.9-12.Q.IP.4 Some students may also learn about error-detecting and error-correcting codes and data compression through Huffman codes.

[1]The Achieve tools used for this study used the term ***Strand*** for the Iowa Core Disciplines.

[2]The Achieve tools used for this study used the term ***Standard*** for the Iowa Core Essential Concepts/Skill Sets and Details.