SRI International

Alternate Assessment Design–Mathematics

Technical Report 3: Crosswalk

Domain Analysis Aligning National Council of Teachers of Mathematics (NCTM) Expectation with State Extended Mathematics Standards

March 30, 2011

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SRI Project No.: P18879

This report was supported in part by the Elementary and Secondary Education Act, Enhanced Assessment Grant (ESEA grant No. # S368A08008) through a partnership with the Utah (Lead), Idaho, and Florida State Departments of Education and SRI International as the research entity. Any opinions, findings, or conclusions are those of the authors and do not necessarily reflect the view of ESEA or the U. S. Department of Education.

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Crosswalk—Domain Analysis Aligning National Council of Teachers of Mathematics (NCTM) Expectations with State Extended Mathematics Standards

Introduction

Each state is allowed to develop reading, mathematics, and science extended content standards based on their general education content standards for their alternate assessments based on alternate achievement standards (AA-AAS). These assessments are administered to students with significant cognitive disabilities. Up to 1% of proficient scores for this population of students in each state may be reported for annual yearly progress (AYP). The Alternate Assessment Design–Mathematics (AAD-M) project applied evidence-centered design (ECD) to develop performance-based assessment tasks for three states: Utah, Idaho, and Florida. In order to select a set of standards common to all three states on which to base the development of assessment tasks that could appropriately be administered by all three states, mathematics content common to all three states' alternate assessments needed to be identified. The resulting "common content document" is referred to as the "crosswalk." The crosswalk is not an alignment document and is not meant to limit the range of content assessed by any state, but rather to identify mathematics standards that were being assessed by all three states that could then be subjected to the ECD process.

At the time that the "crosswalk" was developed, the *Principles and Standards for School Mathematics,* published by the National Council of Teachers of Mathematics (NCTM) and commonly referred to as the NCTM standards, was the "nationally recognized" set of standards used by states as a common resource document in developing their mathematics content standards for state large-scale assessments. The NCTM standards present an outline of the focus of pre-K-12 mathematics. The NCTM standards are structured as follows:

- There are five Content Standards that "explicitly describe the five strands of content that students should learn."[1]
  - Number and Operations (I),
  - Algebra (II),
  - Geometry (III),
  - Measurement (IV), and
  - Data Analysis and Probability (V).
- There are five Process Standards that "highlight ways of acquiring ad applying content knowledge:"[2]
  - Problems Solving,
  - Reasoning and Proof,
  - Communication,
  - Connections, and

[1] NCTM *Executive Summary, Principles and Standards for School Mathematics*, p. 3

[2] NCTM *Executive Summary, Principles and Standards for School Mathematics*, p. 3

  - Representations.
- The standards span grades prekindergarten through grade 12 and are addressed across four grade spans:
  - Pre-K–2,
  - 3–5,
  - 6–8, and
  - 9–12.
- Emphasis on the standards varies dependent upon the grade span, but all of the Content and Process Standards are covered in each grade span.
- Each Content and Process Standard is described by underlying standards and expectations by grade span as illustrated below for grade span 3–5 Number and Operations.

An example of the organization of the NCTM Standards and Expectations for Grades 3–5 Number and Operations follows.

NCTM Standards and Expectations for Grades 3–5	
I. Number and Operations:	
Standards	**Expectations**
A Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	1. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
	2. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.
	3. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.
	4. Use models, benchmarks, and equivalent forms to judge the size of fractions.
	5. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents.
	6. Explore numbers less than 0 by extending the number line and through familiar applications.
	7. Describe classes of numbers according to characteristics such as the nature of their factors.

Note: To facilitate reference to the NCTM standards, the five Content Standards are identified by Roman numerals (I for Number and Operations, II for Algebra, III for Measurement, IV for Geometry, and V for Data Analysis and Probability); the underlying standards that describe the five Content Standards are lettered (A, B, C, …) and the expectations are numbered as they appear (Expectation 1 for Number and Operations is referred to as A1.)

For the purposes of the AAD-M, the five NCTM Content Standards were addressed at three[3] of the four NCTM Standards grade spans:

- 3–5,
- 6–8, and
- 9–12.

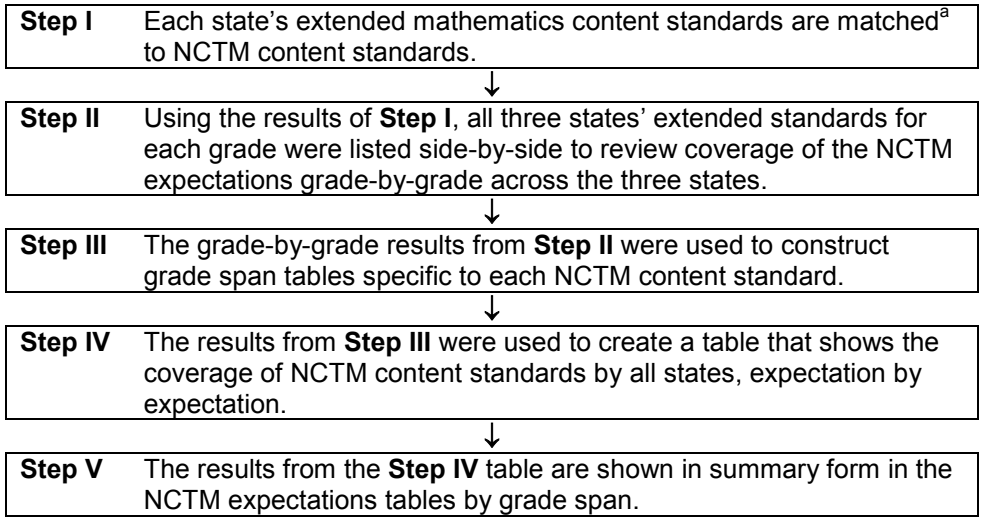
For the purposes of the "crosswalk" the five Content Standards were used. While the Process Standards are also essential in the teaching and learning of mathematics, they are embedded in the Content Standards in varying ways across the states. The five Process Standards are represented in the tasks developed for the AAD-M. Since the development of the "crosswalk,"

[3] The alternate assessment is not administered in grades Pre-K-2.

the Common Core State Standards (CCSS) for mathematics have been developed and adopted by most states as the basis for their large-scale assessment in mathematics. The 30 NCTM expectations ultimately selected for focus during this project were also associated with the CCSS standards and are presented in **Appendix F** (pp. 58–77), Crosswalk of NCTM Standards Selected for the AAD-M to the Common Core Mathematics Standards.

Crosswalk Steps

An overview of the five steps used to develop the "crosswalk" is described in the flow-chart below:



[a] "Matched" is used here instead of "aligned," because this was not a formal alignment process. The "match" of the state standards to the NCTM standards was also influenced by the fact that the NCTM standards are written for the general population of students and the state extended standards are written for the population of students with significant cognitive disabilities in each of the three states.

A more detailed description, including examples, of each of the five steps used to develop the "crosswalk" follows.

Step I

Each grade of the grade-by-grade 3–8 and high school extended mathematics content standards[4] for each of the three states:

- Utah,
- Idaho, and
- Florida

were matched to the NCTM expectations across the three grade spans:

- 3–5,
- 6–8, and
- 9–12

and five NCTM Content Standards:[5]

I. Number and Operations,
II. Algebra,
III. Geometry,
IV. Measurement, and
V. Data Analysis and Probability

A Utah grade 5 example follows in Table 1 that shows that Utah had an extended standard that was related to an NCTM expectation for the place-value structure of the base-ten number system. See **Appendix A** (pp. 11–29) for complete grade 5 examples from UT (pp. 12–16), ID (pp. 17–22), and FL (pp. 23–29).

Table 1: Comparison of State Extended Standards to NCTM Expectations

Utah 5th Grade Extended Core – Depth of Understanding	Related NCTM Grades 3–5 Number/Operations Expectations
Ia. Represent 2-digit whole numbers in tens and ones using base ten models, coins, or manipulative (e.g., 54 cents =5 dimes (tens) + 4 pennies (ones)).	A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.

[4] The grade K-2 standards are not included in this process because the state alternate assessments are intended for grades 3-8 and high school.

[5] There are also five NCTM process strands: problem solving, reasoning and proof, communication, connections, and representations. These are embedded in the state extended content standards.

Step II

Using the results of the **Step I** match of each of the grade level extended standards, state-by-state, to the NCTM expectations, all three states' extended standards for each grade were listed side-by-side to review coverage of the NCTM expectations grade-by-grade across the three states. A portion of the grade 5 table follows. Table 2: shows, for example, that NCTM Number and Operations expectations A1, A3, and A4 and Algebra expectation B2 were common across all three states. The complete table for all expectations can be found in **Appendix B** (pp. 30–31).

Table 2: Grade 5 Crosswalk to NCTM Expectations for Florida, Idaho, & Utah Extended Standards

Common NCTM Standards across the three states[a]	Florida's Extended Standards	Idaho's Extended Standards	Utah's Extended Standards
Number & Operations:[b]	**A1**[c]**, A1, A1, A1**, A2, **A3, A4**, A5, A7	**A1,** A2, **A3, A4,** A5	**A1, A1, A3, A4**
• **A1, A3, A4**	B1, B1, B2, B4	B1, B1, B3	
	C2, C2, C2, C2, C3	C3, C5, C6, C6, C6	
Algebra:[d]	A2	A1, A1	A1, A1
• **B2**	B1, **B2**, B3, B3	B1, **B2**, B3	**B2**
	C1		

[a] Some standards are listed more than once, because they are addressed more than once in the state standards.
[b] NCTM Grades 3–5 Number & Operations Standards not addressed: A6, C1, C4.
[c] There are multiple A1 or other repeated letter/number combinations in a cell of the table, because states have multiple extended standards related to the NCTM expectation represented by the number letter combination.
[d] NCTM Grades 3–5 Algebra Standards not addressed: D1.

Key
NCTM Expectations common across all three states are bolded.
NCTM Expectations common across two of three stats are in regular type.
NCTM Expectations unique to one state are in red.

Note: To facilitate reference to the NCTM standards, the five Content Standards are identified by Roman numerals (I for Number and Operations, II for Algebra, III for Measurement, IV for Geometry, and V for Data Analysis and Probability); the underlying standards that describe the five Content Standards are lettered (A, B, C, …) and the expectations are numbered as they appear (Expectation 1 for Number and Operations is referred to as A1).

Step III

Using the grade-by-grade results across states from **Step II** grade span tables (e.g., Table 2: Grade 5 Crosswalk to NCTM Expectations for Florida, Idaho, & Utah Extended Standards), specific to each NCTM content standard and across the three states, were constructed. A grade 3 portion of the grades 3–5 Number and Operations follows in Table 3, showing that in grade 3, three extended standards for both Florida and Idaho are identified for the Number and Operations A1 NCTM Expectation, but no extended standards are found for Utah at grade 3 to match the Number and Operations A1 NCTM Expectations; the complete 3–5 Number and Operations table can be found in **Appendix C** (pp. 32–45)**.**

Table 3: Grades 3–5 Number & Operations Crosswalk of NCTM Expectations to States' Extended Standards			
Grade	**Florida Extended Standard**	**Idaho Extended Standard**	**Utah Extended Standard**
NCTM Expectation: A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.			
3	A.6.In.b. Apply the concepts of counting and grouping to create sets of tens and ones to identify the value of whole numbers to 30. A.6.Su.b. Use one-to-one correspondence to count sets of objects to 10. A.6.Pa.b. Match objects to marked spaces to show one-to-one correspondence for quantities 1 to 3.	1.1.1 A Identify whole numbers in order up to 30, using a number line when necessary. 1.1.2 A Identify place value of numbers through 30. 1.2.3A. Count three groups of objects, pictures, or symbolic systems to identify total quantity up to ten.	

Note: Shading in a cell of the table indicates that there was no content match at that grade level. To facilitate reference to the NCTM standards, the five Content Standards are identified by Roman numerals (I for Number and Operations, II for Algebra, III for Measurement, IV for Geometry, and V for Data Analysis and Probability); the underlying standards that describe the five Content Standards are lettered (A, B, C, …) and the expectations are numbered as they appear (Expectation 1 for Number and Operations is referred to as A1).

Step IV

The results presented in the **Step III** tables (e.g., Table 3: Grades 3–5 Number & Operations Crosswalk of NCTM Expectations to States' Extended Standards), were used to create a table that shows the coverage of NCTM content standards by all states, expectation by expectation. Table 4 shows the NCTM Expectations common to all states (bolded), two states (regular type), and one state (red type). A sample of the grade 3–5 table for Number and Operations follows and shows, for example, that for the NCTM standard "understand numbers, ways of representing numbers, relationships among numbers, and number systems," that the first 4 NCTM expectations were common across all states in at least one grade in the grade 3 to 5 grade span. The complete 3–5 table can be found in **Appendix D** (pp. 46–51).

Table 4: NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah	
I. Number and Operations:	
NCTM Standard	**NCTM Expectations**
A. Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	**1. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. (grade 5)** (FL & ID at grades 3 & 4)
	2. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. (grade 4) (FL at grades 3 & 5 & ID at grade 5)
	3. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. (grades 4 &5) (All but grade 3 in ID)
	4. Use models, benchmarks, and equivalent forms to judge the size of fractions. (grades 4, 5) (All but grade 3 in UT)
	5. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents. (FL & ID at grade 5)
	6. Explore numbers less than 0 by extending the number line and through familiar applications.
	7. Describe classes of numbers according to characteristics such as the nature of their factors. (Only FL at grades 3 & 5)
B. Understand meanings of operations and how they relate to one another.	**1. Understand various meanings of multiplication and division. (grade 4)** (FL & ID at grades 3 & 5)
	2. Understand the effects of multiplying and dividing whole numbers. (Only FL at grades 3, 4 & 5)
	3. Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems. (grade 4) (FL at grade 3 & ID at grades 3 & 5)
	4. Understand and use properties of operations, such as the distributivity of multiplication over addition. (FL at grade 5)

Key
NCTM Expectations common across all three states are bolded.
NCTM Expectations common across two of three stats are in regular type.
NCTM Expectations unique to one state are in red.

Note: Those expectations that are bolded are found in the extended standards for at least one grade level across grades 3–5 for all three states and are specified in the parentheses. Those in black, unbolded type are found in the extended standards for at least one grade level in one **or** two states and are specified in the parentheses. Those in red are not found in the extended standards for any grade across grades 3–5.

Step V

The detailed results in the **Step IV** tables**, NCTM Standards and Expectations Commonly Covered in the Extended Standards of Florida, Idaho, and Utah,** are shown in summary form in NCTM expectations tables by grade span. Table 5 shows in which grades in each state the NCTM Expectations are covered in the 3–5 grade span and how many extended standards cover the NCTM Expectation at each grade (e.g., At grade 5 in Utah, A1 for Algebra is covered by two Utah extended standards.) A portion of the 3–5 table for Algebra follows showing, for example, that Algebra A1, B2, and C1 were the only expectations common across all three states. The complete 3–5 table is included in **Appendix E** (pp. 52–57)**.**

Table 5: Grades 3–5 Algebra Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah

3–5 NCTM Standard		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
II. Algebra	**A.** Understand patterns, relations, and functions.									
	A1	1[a]	1		1	1	2	1	1	2
	A2	1	1	1				1	1	
	B. Represent and analyze mathematical situations and structures using algebraic symbols.									
	B1			1	1	1	1			
	B2			1	2		1		1	1
	B3		1	2	1	1	1			
	C. Use mathematical models to represent and understand quantitative relationships.									
	C1	1		1	1	1			1	
	D. Analyze change in various contexts.									
	D1									
	D2			1						

[a] The numbers in the table represent the number of extended standards in each state's extended standards that are matched to the designated NCTM standard (e.g., A "1" designates that there is one matching extended standard; a "2" means there are 2 matching extended standards.)

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Note: To facilitate reference to the NCTM standards, the five Content Standards are identified by Roman numerals (I for Number and Operations, II for Algebra, III for Measurement, IV for Geometry, and V for Data Analysis and Probability); the underlying standards that describe the five Content Standards are lettered (A, B, C, …) and the expectations are numbered as they appear (Expectation 1 for Number and Operations is referred to as A1).

Once the crosswalk was completed, SRI International along with consultants with expertise in mathematics and with the population eligible for alternate assessment recommended the NCTM expectations to be used for the development of Design Patterns and tasks. The states considered the recommendation and agreed on a set of expectations for which Design Patterns and tasks would be created. The review of the crosswalk and the design and development work was carried out through weekly conference calls that included representatives from Utah, Idaho, and/or Florida, also with expertise in mathematics and with the population eligible for alternate assessment.

The three states' extended content standards were developed to cover the five NCTM Content Standards: Number and Operations, Algebra, Measurement, Geometry, and Data Analysis and Probability. For each of the three grade spans, 3–5, 6–8, and 9–12, state extended content standards were matched to expectations from each of the five NCTM Content Standards, and tasks were developed for each of the five NCTM Content Standards. The "crosswalk", the development of which is described in the five-step process above, provided a reference framework for ensuring coverage of all five of the mathematics content standards. Representation of the five mathematics content standards in the assessment tasks developed helps to ensure that the students taking the alternate assessments are provided access to the content of mathematics as a whole. Using the "crosswalk" in developing the assessment tasks gave state participants a comparison of extended standards across the three states, which provided one measure for evaluating:

- the scope and breadth of each states' mathematics extended content standards and
- the ability to assess the mathematics extended content standards.

Appendix A

Grade 5 Mathematics Extended Standards for Utah, Idaho, and Florida Related to the 3–5 NCTM Standards for the Five Content Standards of Number and Operation, Algebra, Geometry, Measurement, and Data Analysis and Probability

Crosswalk Between Utah Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
I. Number & Operations	
Utah Standard I – Students will expand number sense to include integers and perform operations with whole numbers, simple fractions, and decimals.	
Utah Elements of Standard I – Use number sense and operations with whole numbers, simple fractions, and decimals.	
Utah 5th Grade Extended Core – Depth of Understanding	**Related NCTM Grades 3–5 Number/Operations Expectations**
Ia. Represent 2-digit whole numbers in tens and ones using base ten models, coins, or manipulative (e.g., 54 cents =5 dimes (tens) + 4 pennies (ones)).	A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
Ib. Use area, set, or linear (number line) models to identify, order, or compare whole numbers, fractions (1/2, 1/3, ¼), mixed numbers (e.g., 1 ½) (e.g., show part of the set & whole set; show 3 equal parts of the whole set; find 1 ½ on number line).	A3 – Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. A4 – Use models, benchmarks, and equivalent forms to judge the size of fractions.
Ic. Identify the place value in 2-digit and 3-digit whole numbers (e.g., The number 54 has 5 tens and 4 ones; 50 + 4 = 54).	A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.

Crosswalk Between Utah Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
II. Algebra	
Utah Standard II – Students will use patterns and relations to represent and analyze mathematical problems and number relationships using algebraic symbols.	
Utah Elements of Standard II – Use patterns and relations to represent mathematics problems and number relationships.	
Utah 5th Grade Extended Core – Depth of Understanding	**Related Match to NCTM Grades 3–5 Algebra Expectations**
IIa. Recognize or determine a rule for a numeric pattern (e.g., add 2); extend a numeric pattern.	A1 – Describe, extend, and make generalizations about geometric and numeric patterns.
IIb. Recognize the symbols (+) and (-) and (=), and (x) and/or (÷).	**No match found:** underlying knowledge for express mathematic relationships using equations (B3).
IIc. Analyze a pattern to determine what is missing (e.g., 2, 3, 4, __, 6; input-output table with 5, 10, __, 20)	A1 – Describe, extend, and make generalizations about geometric and numeric patterns.
IId. Construct and solve open sentences that have variables (e.g., x + 7 = 10).	B2 – Represent the idea of a variable as an unknown quantity using a letter or a symbol.

Crosswalk Between Utah Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
III. Geometry	
Utah Standard III – Students will use spatial reasoning to recognize, describe, and analyze geometric figures.	
Utah Elements of Standard III – Use spatial reasoning to recognize, describe, and analyze geometric objects.	
Utah 5th Grade Extended Core – Depth of Understanding	**Related NCTM Grades 3–5 Geometry Expectations**
IIIa. Use the language of spatial reasoning to describe a position on a coordinate grid or movement in an environment. (e.g. top, bottom, under, above, below, left, right).	B1 – Describe location and movement using common language and geometric vocabulary. B2 – Make and use coordinate systems to specify locations and to describe paths.
IIIb. Locate, describe, or compare relative positions of objects or places on a simple map.	B1 – Describe location and movement using common language and geometric vocabulary.
IIIc. Identify at least 3 three-dimensional figures by name (e.g., cone, sphere, cylinder, cube, and pyramid).	A1 – Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.
IIId. Identify relationships between two- and three- dimensional figures (e.g., find the circles on a cone and cylinder; locate/match common objects to three-dimensional geometric figures).	A1 – Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.

Crosswalk Between Utah Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
IV. Measurement	
Utah Standard IV – Students will determine area of polygons and surface area and volume of three-dimensional shapes.	
Utah Elements of Standard IV – Understand area of polygons and volume of three-dimensional shapes.	
Utah 5th Grade Extended Core – Depth of Understanding	**Related NCTM Grades 3–5 Measurement Expectations**
IVa. Find the area of a rectangle and square by using a total number of same sized units needed to fill the region (e.g. How many blocks are needed to fill in this rectangle?)	A1 – **U**nderstand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. B2 – Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.
IVb. Compare areas of polygons using the same measurement tool (e.g., Use these blocks to see which box has a bigger area; can you predict which box has a bigger area?)	B2 – Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. B3 – Select and use benchmarks to estimate measurements.
IVc. Find the volume of a three-dimensional figure by using a total number of same-sized cubes needed to fill the space without gaps or overlaps.	A1 – **U**nderstand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. B2 – Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.

Crosswalk Between Utah Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
V. Data Analysis & Probability	
Utah Standard V – Students will construct, analyze, and make reasonable conclusions from data and apply basic concepts of probability.	
Utah 5th Grade Elements of Standard V – Construct, analyze, and make reasonable conclusions from data; understand basic probability concepts.	
Utah Extended Core – Depth of Understanding	**Related NCTM Grades 3–5 Data Analysis/Probability Expectations**
Va. Identify the minimum and maximum value in a set of data.	B1 – Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed.
Vb. Collect, record, and display data using an appropriate method (pictograph table, bar graph, line plot) to answer a question (e.g., How much rain did we get each day this week?)	A2 – Collect data using observations, surveys, and experiments. A3 – Represent data using tables and graphs such as line plots, bar graphs, and line graphs.
Vc. Use data to make a prediction, see a pattern, or draw a conclusion (e.g., Are there more boys than girls; what is the favorite ice cream flavor of the class?)	C1 – Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions. D2 – Predict the probability of outcome of simple experiments and test the predictions.

Crosswalk Between Idaho Grade 5 Mathematics Extended Standards to Grades 3–5 NCTM Curriculum Expectations	
I. Number and Operations – Extended Standard 1: Students in Grade 5 read, write, compare, or order whole numbers and simple decimal numbers. Students identify commonly used fractions as a part of a whole. Students use objects or pictures to explore adding and subtracting fractions with like denominators and decimals using money. Students compute basic multiplication and division facts with or without a calculator Students follow the appropriate method of computation using paper and pencil or calculator or combination. Students use simple estimation skills.	
ID Grade 5 Number & Operations Extended Content Indicators	**Related NCTM Grades 3–5 Number & Operations Expectations**
Goal: 5.M.1.1 – Understand and use numbers.	A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals (1.1.1A, 1.1.2A).
1.1.1 A Communicate and demonstrate whole numbers in to 100 and decimal numbers to hundredths.	**No match found** (1.1.3).
1.1.2 A Identify place value for whole numbers to 100 and decimal numbers to hundredths.	A4 – Use models, benchmarks, and equivalent forms to judge the size of fractions (1.1.4 A).
1.1.3 A Sort dollar denomination and use whole dollar estimation up to $10.00	A5 – Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (1.1.5 A).
1.1.4 A Compare commonly used fractions with symbolic representations.	A2 – Recognize equivalent representations for the same number and generate them by decomposing and composing numbers (1.1.6 A).
1.1.5 A Match a commonly used fraction with its equivalent decimal.	C6 – Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool (1.1.7 A).
1.1.6 A Use repeated addition to demonstrate prime numbers in multiplication.	**No match found:** underlying knowledge for communicating about numbers and operations (1.1.8 A).
1.1.7 A Choose appropriate application to solve a problem.	
1.1.8 A Recognize appropriate vocabulary.	

ID Grade 5 Number & Operations Extended Content Indicators	Related NCTM Grades 3–5 Number & Operations Expectations
Goal: 5.M.1.2 – Perform computations accurately.	
1.2.1 A Explore single digit multiplication for 1's – 10's through symbolic concrete systems. 1.2.2 A Identify that numbers with decimals as a part of a whole (e.g., money using coins and dollars). 1.2.3 A Explore division through the manipulation of dividing a whole into repeated equal sets. 1.2.4 A Recognize common small pieces or fractions to fourths can be subtracted from the whole. 1.2.5 A Solve single addition and subtraction problems that include parentheses, using calculator or manipulatives if necessary. 1.2.6 A Choose concrete objects, symbolic systems or calculator to solve addition or subtractions problems. 1.2.7 A Use a variety of strategies to solve real-life problems. 1.2.8 A Recognize appropriate vocabulary.	B1 – Understand various meanings of multiplication and division (1.2.1A, 1.2.3 A). A3 – Develop understanding of fractions (decimals) as parts of unit wholes, as parts of a collection as locations on number lines, and as divisions of whole numbers (1.2.2 A, 1.2.4 A). C5 – Use visual models, benchmarks, and equivalent forms to ad and subtract commonly used fractions and decimals (1.2.4 A) C6 – Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool (1.2.5 A, 1.2.6 A, 1.2.7 A). **No match found:** underlying knowledge for communicating about numbers and operations (1.2.8A).
Goal: 5.M.1.3 – Estimate and judge reasonableness of results.	
1.3.1 A Estimate to predict results or amounts. 1.3.2 A Identify daily activities where estimation is appropriate. 1.3.3 A Determine over and under estimations in daily living activities. 1.3.4 A Use a calculator to solve problems. 1.3.5 A Formulate a guess to a problem. 1.3.6 A Recognize appropriate vocabulary.	C3 – Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results (1.3. 1A). C6 – Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool (1.3.2 A, 1.3.3 A, 1.3.4 A, 1.3.5 A). **No match found:** 1.3.2A or 1.3.4A (underlying knowledge for communicating about numbers and operations)

II. Algebra – Extend Standard 3: Students in Grade 5 compare objects or pictures using vocabulary or symbols of "<, " ">," and "=" to express relationships. Students solve missing addend or factor equations, using concrete objects or calculator when necessary. Students identify a pattern and use concrete manipulatives to represent a simple rule for a pattern.	
ID Grade 5 Algebra Extended Content Indicators	**Related NCTM Grades 3–5 Algebra Expectations**
Goal: 5.M.3.1 – Use algebraic symbolism as a tool to represent mathematical relationships. 3.1.1 A Express the concept of division using concrete objects or pictures. 3.1.2 A Translate simple word statements into numeric expressions. 3.1.3 A Show the relationship in fact families for mathematical operations. 3.1.4 A Compare objects or pictures using vocabulary or symbols for "<," ">," and "=" to express relationships .	**No Match in Algebra, but in Number & Operations:** B1 – Understand various meanings of multiplication and division (3.1.1A). B3 – Express mathematical relationships using equations (3.1.2 A, 3.1.4 A). **No Match in Algebra, but in Number & Operations:** B3 – Identify and use relationships between operations such as division as the inverse of multiplication, to solve problems (3.1.3A).
Goal: 5.M.3.2 – Evaluate algebraic expressions. 3.2.1 A Use the following properties as they relate to addition and multiplication: commutative, identity, and zero.	B1 – Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers (3.2.1A).
Goal: 5.M.3.3 – Solve algebraic equations and inequalities. 3.3.1A. Solve missing addend or simple factor equations, using concrete objects or calculator when necessary.	B2 – Represent the idea of a variable as an unknown quantity using a letter or a symbol (3.3.1 A)
Goal: 5.M.3.4 – Understand the concept of functions. 3.4.1 A Identify a simple pattern using whole numbers. 3.4.2 A Recognize appropriate vocabulary.	A1 – Describe, extend, and make generalizations about geometric and numeric patterns (3.4.1A). **No match found:** underlying knowledge for communicating about algebra (3.4.2A).
Goal: 5.M.3.5 – Represent equations, inequalities and functions in a variety of formats.	**No Idaho/NCTM objectives/expectations at this grade level.**
Goal: 5.M.3.6 – Apply functions to a variety of problems. 3.6.1 A Use concrete manipulatives to represent a simple rule for a pattern.	A1 – Describe, extend, and make generalizations about geometric and numeric patterns (3.6.1 A).

<table>
<tr><td colspan="2">III. Geometry – Extended Standard 4; Students in Grade 5 identify and compare attributes of polygons and develop vocabulary to describe the attributes. Students identify points, lines, and angles. Students identify the difference between perimeter and area. Students identify a grid and indicate where points on a grid are located.</td></tr>
<tr><td>ID Grade 5 Geometry Extended Content Indicators</td><td>Related NCTM Grades 3–5 Geometry Expectations</td></tr>
<tr><td>Goal: 5.M.4.1 – Apply concepts of size shape, and spatial relationships.</td><td rowspan="2">A1 – Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (4.1.1 A, 4.1.2 A, 4.1.3 A).

C1 – Predict and describe the results of sliding, flipping, and turning two-dimensional shapes (4.1.4 A).

A4 – Explore congruence and similarity (4.1.5 A).

C3 – Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs (4.1.5A).

No match in Geometry, but closest match in Measurement: A5 – Explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way (4.1.6A).

No match found: underlying knowledge for communicating about geometry (4.1.7A).</td></tr>
<tr><td>4.1.1 A Identify a polygon and develop vocabulary to describe the attributes.

4.1.2 A Identify right or straight angles without formal measures.

4.1.3 A Identify points, lines, and line segments.

4.1.4 A Identify when a two-dimensional shape has been flipped or rotated.

4.1.5 A Match shapes that are congruent, similar, or symmetrical.

4.1.6 A Indicate the difference between perimeter and area of a polygon.

4.1.7 A Recognize appropriate vocabulary.</td></tr>
<tr><td>Goal: 5.M.4.2 – Apply the geometry of right triangles.</td><td>No Idaho/NCTM objectives/expectations at this grade level.</td></tr>
<tr><td>Goal: 5.M.4.3 – Apply graphing in two dimensions.</td><td rowspan="2">No Match Found: This seems to be a combination of Number and Operations and Problem Solving. To relate to geometry, the movement would need to involve a geometric figure (4.3.1A).</td></tr>
<tr><td>4.3.1A. Identify the difference between a point and a grid.</td></tr>
</table>

IV. Measurement – Extended Standard 2: Students in Grade 5 select the appropriate units and tools for measurements. Students identify the spatial concept of perimeter and area. Students solve basic problems involving elapsed time and length and students match equivalent units of length.	
ID Grade 5 Measurement Extended Content Indicators	**Related NCTM Grades 3–5 Measurement Expectations**
Goal: 5.M.2.1 – Understand and use U.S. customary and metric measurements.	
2.1.1 A Select the appropriate units and tools to make formal measurements of length, temperature, weight. 2.1.2 A Estimate length, time, weight, and temperature in real-world problems. 2.1.3 A Tell time using a digital or analog clock. 2.1.4 A Identify real-world problems related to elapsed time. 2.1.5 A Recognize the concept of around (perimeter) and area for simple polygons, (e.g., rectangle and squares). 2.1.6 A Match equivalent units length within the U.S. customary system. 2.1.7 A Use a calendar in daily life activities. 2.1.8 A Match equivalent units of weight and volume. 2.1.9 A Recognize appropriate vocabulary.	B2 – Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles (2.1.1A, 2.1.3 A). B1 – Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes (2.1.2 A). **No match found** (2.1.4 A, 2.1.7 A). A5 – Explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way (2.1.5 A). A3 – Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement (2.1.6 A, 2.1.8 A). **No match found:** underlying knowledge for communicating about measurement (2.1.8A).
Goal: 5.M.2.2 – Apply the concepts of rates, ratios, and proportions.	**No Idaho/NCTM objectives/expectations at this grade level.**
Goal: 5.M.2.3 – Apply dimensional analysis.	**No Idaho/NCTM objectives/expectations at this grade level.**

V. Data & Probability – Extended Standard 5: Students in Grade 5 read and display data in simple tables, charts, bar graphs, and line graphs. Students make predictions based on data.	
ID Grade 5 Data & Probability Extended Content Indicators	**Related NCTM Grades 3–5 Data & Probability Expectations**
Goal: 5.M.5.1 – Understand data analysis. 5.1.1 A Read and interpret simple charts, bar graphs, circle graph, or line graphs. 5.1.2 A Recognize appropriate vocabulary.	A3 – Represent data using tables and graphs such as line plots, bar graphs, and line graphs (5.1.1A). **No match found:** underlying knowledge for communicating about data and probability (5.1.2A).
Goal: 5.M.5.2 – Collect, organize, and display data. 5.2.1 A Organize and display data in tables, bar graphs, and circle or line graphs using title, labels, and reasonable scales.	A3 – Represent data using tables and graphs such as line plots, bar graphs, and line graphs (5.2.1 A).
Goal: 5.M.5.3 – Apply simple statistical measurements. 5.3.1 A Find the median and mode – with simple sets of arranged data between 1–9 using whole numbers. 5.3.2 A Find the end points of the range of a set of data using whole numbers 1–10.	B2 – Use measures of center, focusing on the median, and understand what each does and does not indicate about the data set (5.3.1A). B1 – Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed (5.3.2 A).
Goal: 4.M.5.4 – Understand basic concepts of probability. 5.4.1 A Predict results of simple probability experiments using coins and spinners. 5.4.2 A Use language of probability.	D2 – Predict the probability of outcome of simple experiments and test the predictions (5.4.1A). D1 – Describe events as likely or unlikely and discuss the degree of likelihood using such words as *certain, equally likely,* and *impossible* (5.4.2 A).
Goal: 4.M.5.5 – Make predictions or decisions based on data. 5.5.1A. Make predictions based on data.	C1 – Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions (5.5.1A).

Crosswalk Between Florida Grade 5 Mathematics Extended Core DOU to Grades 3–5 NCTM Curriculum Expectations	
MA.5.A.1 Number & Operations (I)	
Florida 5th Grade Number/Operations Access Points	**Related NCTM Grades 3–5 Number/Operations Expectations**
Big Idea 1: Develop an understanding of and fluency with division of whole numbers. **Independent:** A.1.In.a. Use a grouping strategy to separate (divide) quantities to 50 into equal sets using objects, coins, and pictures with numerals. A.1.In.b. Solve problems that involve multiplying or dividing equal sets with quantities to 50 using objects and pictures with numerals. **Supported:** A.1.Su.a. Use counting and grouping to separate (divide) quantities to 25 into equal sets using objects and pictures with numerals. A.1.Su.b. Solve problems that involve combining (multiplying) or separating (dividing) equal sets with quantities to 25 using objects and pictures with numerals. **Participatory:** A.1.Pa.a. Separate groups of objects to 4 into sets with the same quantity and recognize how many are in each set. A.1.Pa.b. Solve simple problems involving joining or separating sets of objects to 5.	**Related to a & b:** A2 – Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. B1 – Understand various meanings of multiplication and division. B2 – Understand the effects of multiplying and dividing whole numbers. C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

Florida 5th Grade Number/Operations Access Points	Related NCTM Grades 3–5 Number/Operations Expectations
Big Idea 2: Develop an understanding of and fluency with addition and subtraction of fractions and decimals.	
Independent:	
A.2.In.a. Express and represent fractions, including halves and fourths, and thirds as parts of a whole and as parts of a set using number names.	**Related to a:** A3 – Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.
A.2.In.b. Compare fractional parts of objects of equal size, including halves, fourths, and thirds.	
A.2.In.c. Express, represent, and use whole numbers to 100 in various contexts.	**Related to b:** A4 – Use models, benchmarks, and equivalent forms to judge the size of fractions. A5 – Recognize and generate equivalent forms of commonly used fractions, decimals, and percents.
A.2.In.d. Identify place value of two-digit numbers to 99 in terms of tens and ones.	
Supported:	
A.2.Su.a. Express, represent, and use fractions, including halves and fourths, as parts of a whole and as parts of a set, using number names.	**Related to c:** A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
A.2.Su.b. Compare fractional parts of objects of equal size, including halves and fourths.	
A.2.Su.c. Express, represent, and use whole numbers to 30 and ordinal numbers first to fifth in various contexts.	**Related to d (Independent & Supported):** A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.
A.2.Su.d. Apply the concepts of counting and grouping by tens and ones to identify the value of whole numbers to 30.	
Participatory:	
A.2.Pa.a. Identify parts of a whole using a set of objects or a whole object.	
A.2.Pa.b. Distinguish half from whole using objects or visual models.	
A.2.Pa.c. Compare sets of objects to 5 and determine if they have the same or different quantities.	

Florida 5th Grade Number/Operations Access Points	Related NCTM Grades 3–5 Number/Operations Expectations
Independent: A.6.In.a. Use skip counting to identify multiples of 2, 5, and 10 for numbers to 100. A.6.In.b. Use the associative property as a strategy to solve addition problems with three or more numbers. A.6.In.c. Compare and order numbers to 100 using a number line. A.6.In.d. Solve real-world addition and subtraction problems with one-digit numbers by estimating and checking for accuracy. A.6.In.e. Select the operation and solve one-step problems involving addition or subtraction of two-digit numbers without regrouping and check for accuracy. A.6.In.f. Solve for an unknown number in addition and subtraction number sentences with numbers to 18. **Supported:** A.6.Su.a. Use skip counting by 5s to 30. A.6.Su.b. Use the commutative property as a strategy to check the accuracy of solutions to addition problems. A.6.Su.c. Compare and order whole numbers to 30 using objects, pictures, number names, numerals, and a number line. A.6.Su.d. Solve real-world problems involving addition facts with sums to 25 and related subtraction facts using numerals with pictures. **Participatory:** A.6.Pa.a. Demonstrate one-to-one correspondence to count from 1 to 5 using objects or pictures. A.6.Pa.b. Recognize when items have been added to or taken away from sets of objects to 5. A.6.Pa.c. Solve simple problems involving small quantities using language, such as more, less, and same.	**Related to a (Independent & Supported):** A7 – Describe classes of numbers according to characteristics such as the nature of their factors. B1 – Understand various meanings of multiplication and division. C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. **Related to a, b, & c (Participatory):** C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. **Related to b (Independent & Supported):** B4 – Understand and use properties of operations, such as the distributivity of multiplication over addition. **Algebra Match Related to b (Independent & Supported):** B1 – Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers. **Related to c (Independent & Participatory):** A1: Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. **Related to d (Independent):** C3 – Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results. **Related to e (Independent) & d (Supported):** C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. **Algebra Match Related to f (Independent):** B2 – Represent the idea of a variable as an unknown quantity using a letter or a symbol. **Algebra Match Related to f (In), d (Su), & c (Pa):** B3 – Express mathematical relationships using equations.

MA.5.A.4 Algebra (II)	
Florida 5th Grade Algebra Access Points	**Related NCTM Grades 3–5 Algebra Expectations**
Independent: A.4.In.a. Use the concept of equality as a strategy to solve problems. A.4.In.b. Describe the meaning of information in a pictograph or bar graph that shows change over time. **Supported:** A.4.Su.a. Identify and compare the relationship between two same or different (equal or unequal) sets to 25 using physical and visual models. A.4.Su.b. Identify information displayed on an object graph or pictograph. **Participatory:** A.4.Pa.a. Identify items that belong together to form two or more sets with the same quantity (equal). A.4.Pa.b. Recognize an object graph or pictograph.	**Related to a:** B3 – Express mathematical relationships using equations **Related to b (Independent):** C1 – Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions. D2 – Identify and describe situation with constant or varying rates of change and compare them. **Related to b (Independent, Supported, & Participatory):** A2 – Represent and analyze patterns and functions, using words, tables, and graphs.

MA.5.G.5 Geometry (III) (and VI. Measurement)	
Florida 5th Grade Geometry Access Points	**Related NCTM Grades 3–5 Geometry Expectations**
Big Idea 3: Describe three-dimensional shapes and analyze their properties, including volume and surface area. **Independent:** G.3.In.a. Identify properties, including number of edges, curved or straight sides, and faces and match two-dimensional shapes with three-dimensional solids, including circle with sphere, square with cube, and triangle with cone. G.3.In.b. Identify the six faces of a three-dimensional rectangular prism or cube using a real object or physical model. **Supported:** G.3.Su.a. Identify properties, including number of edges, curved or straight sides, and number of corners (angles), in two- and three-dimensional objects. G.3.Su.b. Recognize the faces of a three-dimensional object. **Participatory:** G.3.Pa.a. Recognize differences in features related to the shape of two- and three-dimensional objects. G.3.Pa.b. Recognize differences in size of two- and three-dimensional objects.	**Related to a:** A1 – Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. A2 – Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. **Related to b:** A1 – Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.

MA.5.G.3 (III. Geometry &) Measurement (IV)	
Florida 5th Grade Measurement Access Points	**Related NCTM Grades 3–5 Measurement Expectations**
Independent: G.5.In.a. Indicate the relative position, before or after, of whole numbers on a 0 to 100 number line. G.5.In.b. Solve real-world problems involving length and weight using tools with standards units. G.5.In.c. Identify time to the minute. G.5.In.d. Find the area of rectangles and squares using a visual model, such as a grid. **Supported:** G.5.Su.a. Indicate the relative position, before or after, of whole numbers on a 1-10 number line. G.5.Su.b. Solve real-world problems by using tools and comparing the measurement including length and weight. G.5.Su.c. Identify time to the hour and half-hour. G.5.Su.d. Identify the distance around all sides (perimeter) of squares and rectangles. G.5.Su.e. Compare the size of two square areas using physical models. **Participatory:** G.5.Pa.a. Count from 1 to 5 using objects or pictures. G.5.Pa.b. Identify different features of objects, such as shape and size, to solve simple problems. G.5.Pa.c. Indicate the next activity in a daily schedule. G.5.Pa.d. Recognize differences in size of large and small areas.	**No Match in Measurement, but Number and Operations Match Related to a:** A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. **Related to b (Independent & Supported):** B2 – Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. **No Match in Measurement, but Geometry Match Related to b (Participatory):** A1– Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. **Related to c (Independent & Supported):** B2 – Select and apply appropriate standard units and tools to measure length, area, volume, time, temperature, and size of angles. **No Match Found for c (Participatory).** **Related to d (Independent & Supported):** B2 – Select and apply appropriate stand units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. **No Match in Measurement, but Geometry Match Related to d (Participatory) & e (Supported):** A4 – Explore congruence and similarity.

MA.5.S.7 Data Analysis (and Probability) (V)	
Florida 5th Grade Data Analysis (and Probability) Access Points	**Related NCTM Grades 3–5 Data Analysis (and Probability) Expectations**
Independent: S.7.In.a. Sort and count data into three designated categories, and display data on a pictograph or bar graph. S.7.In.b. Describe the meaning of data in a three-category pictograph or bar graph. **Supported:** S.7.Su.a. Sort and count objects or pictures into two designated categories and display data in an object graph or pictograph. S.7.Su.b. Identify the meaning of data in a two-category object graph or pictograph. **Participatory:** S.7.Pa.a. Count up to 5 objects, pictures, or symbols in data sets used in object graphs or pictographs.	**Related to a (Independent & Supported):** A3 – Represent data using tables and graphs such as line plots, bar graphs, and line graphs. **No Match Found for a (Participatory).** **Related to b (Independent & Supported):** B1 – Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed.

Appendix B

Grade 5 Crosswalk to NCTM Expectations for Florida, Idaho, & Utah Extended Standards

Grade 5 Crosswalk to NCTM Expectations for Florida, Idaho, & Utah Extended Standards			
Common NCTM Standard[a]	**Florida**	**Idaho**	**Utah**
I. Number & Operations:[b]	**A1, A1, A1, A1**, A2, **A3, A4**, A5, A7	**A1,** A2, **A3, A4,** A5	**A1, A1, A3, A4**
• **A1, A3, A4**	B1, B1, B2, B4	B1, B1, B3	
	C2, C2, C2, C2, C3	C3, C5, C6, C6, C6	
II. Algebra:[c]	A2	A1, A1	A1, A1
• **B2**	B1, **B2**, B3, B3	B1, **B2**, B3	**B2**
	C1		
	D2		
III. Geometry:[d]	**A1, A1, A1**, A2, A4	**A1**, A4	**A1, A1**
• **A1**			B1, B1, B2
		C1, C3	
IV. Measurement:[e]		A3, A5, A5	A1, A1
• **B2**	**B2, B2, B2**	B1, **B2**	**B2, B2, B2**, B3
V. Data Analysis & Probability:[f]	**A3**	**A3, A3**	A2, **A3**
	B1	**B1**, B2	**B1**
• **A3**		C1	C1
• **B1**		D1, D2	D2

[a] Some standards are listed more than once, because they are address more than once in the state standards.
[b] NCTM Grades 3–5 Number & Operations Standards not addressed: A6, C1, C4.
[c] NCTM Grades 3–5 Algebra Standards not addressed: D1.
[d] NCTM Grades 3–5 Geometry Standards not addressed: A3, A5, B3, C2, D1, D2, D3, D4, D5, D6.
e NCTM Grades 3–5 Measurement Standards not addressed: A2, A4, B4, B5.
f NCTM Grades 3–5 Data Analysis & Probability not addressed: A1, A4, B3, D3.

Key
NCTM Expectations common across all three states are bolded.
NCTM Expectations common across two of three stats are in regular type.
NCTM Expectations unique to one state are in red.

Appendix C

Grades 3–5 Number & Operations Crosswalk of NCTM Expectations to Utah, Idaho, and Florida Extended Standards for Possible Design Patterns

Grades 3–5 Number & Operations Crosswalk of NCTM Expectations to States' Extended Standards			
Grade	**Florida**	**Idaho**	**Utah**
A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.			
3	A.6.In.b. Apply the concepts of counting and grouping to create sets of tens and ones to identify the value of whole numbers to 30. A.6.Su.b. Use one-to-one correspondence to count sets of objects to 10. A.6.Pa.b. Match objects to marked spaces to show one-to-one correspondence for quantities 1 to 3.	1.1.1 A Identify whole numbers in order up to 30, using a number line when necessary. 1.1.2 A Identify place value of numbers through 30. 1.2.3A. Count three groups of objects, pictures, or symbolic systems to identify total quantity up to ten.	

Grade	Florida	Idaho	Utah
A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.			
4	A.2.In.a. Apply the concepts of counting, grouping, and place value with whole numbers to create sets of tens and ones to identify the value of whole numbers to 50. A.2.Su.a. Apply the concept of grouping to create sets of ten and ones to 18 as a strategy for counting objects. A.2.Pa.a. Match objects to marked spaces to show one-to-one correspondence for quantities 1 to 4. A.6.In.a. Express, represent, and use whole numbers zero to 50 in various contexts. A.6.Su.a. Express, represent, and use whole numbers to 25, using sets of objects and pictures, number names, and numerals in various contexts. A.6.Pa.a. Use quantities to four represented by objects, pictures, or number names in various contexts. A.6.Su.b. Use ordinal numbers, including first and second, in real-world situations. A.6.Pa.b. Separate groups of objects to four into sets with the same quantity.	1.1.1A. Communicate and demonstrate whole numbers in order up to 50, using number line or chart when necessary. 1.1.2A. Identify and apply place value through 50. 1.1.5A. The student will recognize the value of common coins and the dollar.	

Grade	Florida	Idaho	Utah
A1 – Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.			
5	A.2.In.c. Express, represent, and use whole numbers to 100 in various contexts. A.2.Su.c. Express, represent, and use whole numbers to 30 and ordinal numbers first to fifth in various contexts. A.2.Pa.c. Compare sets of objects to 5 and determine if they have the same or different quantities. A.2.In.d. Identify place value of two-digit numbers to 99 in terms of tens and ones. A.2.Su.d. Apply the concepts of counting and grouping by tens and ones to identify the value of whole numbers to 30. A.6.In.c. Compare and order numbers to 100 using a number line. A.6.Pa.c. Solve simple problems involving small quantities using language, such as more, less, and same. G.5.In.a. Indicate the relative position, before or after, of whole numbers on a 0 to 100 number line. G.5.Su.a. Indicate the relative position, before or after, of whole numbers on a 1-10 number line. G.5.Pa.a. Count from 1 to 5 using objects or pictures.	1.1.1 A Communicate and demonstrate whole numbers in to 100 and decimal numbers to hundredths. 1.1.2 A Identify place value for whole numbers to 100 and decimal numbers to hundredths.	Ia. Represent 2-digit whole numbers in tens and ones using base ten models, coins, or manipulative (e.g., 54 cents =5 dimes (tens) + 4 pennies (ones)). Ic. Identify the place value in 2-digit and 3-digit whole numbers (e.g., The number 54 has 5 tens and 4 ones; 50 + 4 = 54).

Grade	Florida	Idaho	Utah
A2 – Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.			
3	A.6.In.a. Express, represent, and solve problems with cardinal numbers 0 to 30 and ordinal number to tenth using sets of objects or pictures, number names, and numerals. A.6.Su.a. Express, represent, and solve problems with numbers to 10, using sets of objects and pictures, number names, and numerals. A.6.Pa.a. Recognize quantities 1 to 3 using sets of objects, pictures, or number names.		
4	A.6.In.d. Use skip counting by 5s and 10s to determine amounts to 50. A.6.Su.e. Separate quantities to 25 into equal sets and identify the total number of sets and the number in each set.	1.1.3A. Count and value of a collection of pennies, nickels, and dimes up to $1.00.	Ia. Model basic addition, subtraction, and multiplication facts using manipulative or a calculator.

Grade	Florida	Idaho	Utah
A2 – Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.			
5	A.1.In.a. Use a grouping strategy to separate (divide) quantities to 50 into equal sets using objects, coins, and pictures with numerals. A.1.In.b. Solve problems that involve multiplying or dividing equal sets with quantities to 50 using objects and pictures with numerals. A.1.Su.a. Use counting and grouping to separate (divide) quantities to 25 into equal sets using objects and pictures with numerals. A.1.Su.b. Solve problems that involve combining (multiplying) or separating (dividing) equal sets with quantities to 25 using objects and pictures with numerals. A.1.Pa.a. Separate groups of objects to 4 into sets with the same quantity and recognize how many are in each set. A.1.Pa.b. Solve simple problems involving joining or separating sets of objects to 5.	1.1.6 A Use repeated addition to demonstrate prime numbers in multiplication.	

Grade	Florida	Idaho	Utah
A3 – Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.			
3	A.2.In.a. Represent half and whole using area and sets of objects. A.2.Su.a. Recognize part and whole using area and sets of objects. A.2.Pa.a. Recognize parts of whole objects and parts of sets of objects. A.2.In.b. Identify the relationship between half and whole.		Ib. Use fractions to identify or describe parts of the whole (half, third, fourth) (e.g., divide geometric shapes into 2, 3, an 4 equal parts; match the unit fraction ½, 1/3, and ¼ with objects, pictures, words, or symbols; fold a paper in half. Share a cookie with another person or with 2 friends.)
4	A.2.In.b. Express and represent fractions, including halves and fourths, as parts of whole and parts of a set using objects, pictures, and number names. A.2.Su.b. Represent half and whole using area and sets of objects. A.2.Pa.b. Distinguish parts of objects from whole objects. A.6.In.c. Identify the relationship between halves, fourths, and a whole. A.6.Su.d. Identify the relationship between half and whole. A.6.Pa.c. Match parts to whole objects.	1.2.4A. Identify that "a whole" can be divided to create "smaller pieces" (fractions) and the pieces can be added to create a whole again.	Ib. Use area, set, or linear (number line) models to identify, order, or compare whole numbers and fractions (1/2, 1/3, ¼), mixed numbers (e.g., 1 ½) (e.g., show part of the set & whole set; show 3 equal parts of the whole set; find 1 ½ on number line).

Grade	Florida	Idaho	Utah
A3 – Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.			
5	A.2.In.a. Express and represent fractions, including halves and fourths, and thirds as parts of a whole and as parts of a set using number names. A.2.Su.a. Express, represent, and use fractions, including halves and fourths, as parts of a whole and as parts of a set, using number names. A.2.Pa.a. Identify parts of a whole using a set of objects or a whole object.	1.2.2 A Identify that numbers with decimals as a part of a whole (e.g., money using coins and dollars). 1.2.4 A Recognize common small pieces or fractions to fourths can be subtracted from the whole.	Ib. Use area, set, or linear (number line) models to identify, order, or compare whole numbers, fractions (1/2, 1/3, ¼), mixed numbers (e.g., 1 ½) (e.g., show part of the set & whole set; show 3 equal parts of the whole set; find 1 ½ on number line).
A4 – Use models, benchmarks, and equivalent forms to judge the size of fractions.			
3	A.2.In.b. Identify the relationship between half and whole.	1.1.4 A Recognize commonly used fractions using concrete materials.	
4	A.2.In.c. Identify differences between halves, fourths, and a whole. A.2.Su.c. Identify half as a part of a whole. A.2.Pa.c. Recognize a half of an object as part of the whole object. A.6.In.c. Identify the relationship between halves, fourths, and a whole. A.6.Su.d. Identify the relationship between half and whole. A.6.Pa.c. Match parts to whole objects.	1.1.4A. Communicate and demonstrate commonly used fractions with symbolic representations.	Ib. Use area, set, or linear (number line) models to identify, order, or compare whole numbers and fractions (1/2, 1/3, ¼), mixed numbers (e.g., 1 ½) (e.g., show part of the set & whole set; show 3 equal parts of the whole set; find 1 ½ on number line).

Grade	Florida	Idaho	Utah
A4 – Use models, benchmarks, and equivalent forms to judge the size of fractions.			
5	A.2.In.b. Compare fractional parts of objects of equal size, including halves, fourths, and thirds. A.2.Su.b. Compare fractional parts of objects of equal size, including halves and fourths. A.2.Pa.b. Distinguish half from whole using objects or visual models.	1.1.4 A Compare commonly used fractions with symbolic representations.	Ib. Use area, set, or linear (number line) models to identify, order, or compare whole numbers, fractions (1/2, 1/3, ¼), mixed numbers (e.g., 1 ½) (e.g., show part of the set & whole set; show 3 equal parts of the whole set; find 1 ½ on number line).
B1 – Understand various meanings of multiplication and division.			
3	A.1.In.a. Solve problems that involve combining (multiplying) equal sets with quantities to 18 using objects and pictures with numerals. A.1.Su.a. Solve problems that involve combining (multiplying) and sets with sums to 9 using objects and pictures. A.1.Pa.a. Solve simple problems involving joining or separating sets of objects to 3.	1.2.4A. Explore multiplication through the manipulation of adding repeated sets. 3.1.1A. Use concrete objects to symbolize multiple sets that would be reflected in a simple multiplication problem.	
4	A.1.In.a. Solve problems involving combining (multiplying) or separating into (dividing) equal sets with quantities to 30 using objects and pictures with numerals. A.1.Su.a. Solve problems that involve combining (multiplying) and separating (dividing) into equal sets with quantities to 15 using objects and pictures. A.1.Pa.a. Solve simple problems involving joining or separating set of objects to 4.	1.2.3A. Explore multiplication through the manipulation of adding repeated sets and division by separating sets into equal parts. 3.1.1A. Express the concept of division using concrete objects or pictures.	Ic. Model problems and make and solve number sentences involving addition, subtraction, and multiplication (e.g., Model a problem: show that 5 groups of 4 tiles equals 20 tiles; make a number sentence; use number and symbol cards to show that 5 x 4 = 20).

Grade	Florida	Idaho	Utah
B1 – Understand various meanings of multiplication and division.			
5	A.1.In.a. Use a grouping strategy to separate (divide) quantities to 50 into equal sets using objects, coins, and pictures with numerals. A.1.Su.a. Use counting and grouping to separate (divide) quantities to 25 into equal sets using objects and pictures with numerals. A.1.Pa.a. Separate groups of objects to 4 into sets with the same quantity and recognize how many are in each set. A.1.In.b. Solve problems that involve multiplying or dividing equal sets with quantities to 50 using objects and pictures with numerals. A.1.Su.b. Solve problems that involve combining (multiplying) or separating (dividing) equal sets with quantities to 25 using objects and pictures with numerals. A.1.Pa.b. Solve simple problems involving joining or separating sets of objects to 5. A.6.In.a. Use skip counting to identify multiples of 2, 5, and 10 for numbers to 100. A.6.Su.a. Use skip counting by 5s to 30.	1.2.1 A Explore single digit multiplication for 1's – 10's through symbolic concrete systems. 1.2.3 A Explore division through the manipulation of dividing a whole into repeated equal sets. 3.1.1 A Express the concept of division using concrete objects or pictures.	

Grade	Florida	Idaho	Utah
B3 – Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.			
3	A.1.In.d. Use objects and pictures to represent the inverse relationship between addition and subtractions facts.	1.2.4A. Explore multiplication through the manipulation of adding repeated sets. 3.1.3A. Express addition or subtraction statements for a fact family given two addends.	
4	A.6.In.b. Use the inverse relationship of addition and subtraction as a strategy to solve problems. A.6.Su.c. Use objects and pictures to represent the relationship between addition with sums to 15 and related subtraction facts.	3.1.3A. Show the relationship between addition and subtraction in fact families using concrete objects or pictures.	Ic. Model problems and make and solve number sentences involving addition, subtraction, and multiplication (e.g., Model a problem: show that 5 groups of 4 tiles equals 20 tiles; make a number sentence; use number and symbol cards to show that 5 x 4 = 20).
5		3.1.3 A Show the relationship in fact families for mathematical operations.	

Grade	Florida	Idaho	Utah
C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.			
3	A.1.In.b. Solve addition facts with sums to 18 and related subtraction one-digit fact families using the formal algorithm with numerals and signs (+, -, =). A.1.Su.b. Solve addition facts with sums to 9 and related subtraction facts using numerals with objects and pictures. A.1.Pa.b. Recognize when 1 or 2 items have been added to or removed from sets of objects to 3. A.1.In.c. Use one-to-one correspondence, grouping, and counting as strategies to solve real-world problems involving addition facts with sums to 18 and related subtraction facts. A.1.Su.c. Use one-to-one correspondence and counting as strategies to solve real-world problems with addition facts with sums to 9 and related subtraction facts.	1.2.1A. Use objects, pictures, or symbolic systems to solve addition or subtraction problems up to 18. 1.2.2A. Explore adding and subtracting with regrouping using manipulatives. 1.2.6A. Select appropriate operations to solve one-step addition or subtraction word or symbolic problems.	Ic. Model problems and make and solve number sentences involving addition and subtraction using numbers 0 – 25 (e.g., Model a problem: show that 5 tiles combined with 3 tiles equals 8 tiles; make a number sentence: use number and symbol cards to show that 5 + 3 = 8).
4	A.1.In.b. Solve real-world addition and subtraction problems with two-digit numbers to 30 without regrouping, and check for accuracy. A.1.Su.b. Solve real-world problems involving addition facts with sums to 15 and related subtraction facts using numerals with sets of pictures and the =, -, and = signs. A.1.Pa.b. Recognize when items have been added to or removed from sets of objects to 4.	1.2.1A. Explore single digit multiplication for 1's – 5's through symbolic concrete systems. 1.2.2A. Add and subtract whole numbers, with or without the use of manipulatives. 1.2.5A. Demonstrate knowledge to add a collection of dollars using the decimal point symbol.	

Grade	Florida	Idaho	Utah
C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.			
5	A.1.In.a. Use a grouping strategy to separate (divide) quantities to 50 into equal sets using objects, coins, and pictures with numerals. A.1.Su.a. Use counting and grouping to separate (divide) quantities to 25 into equal sets using objects and pictures with numerals. A.1.Pa.a. Separate groups of objects to 4 into sets with the same quantity and recognize how many are in each set. A.1.In.b. Solve problems that involve multiplying or dividing equal sets with quantities to 50 using objects and pictures with numerals. A.1.Su.b. Solve problems that involve combining (multiplying) or separating (dividing) equal sets with quantities to 25 using objects and pictures with numerals. A.1.Pa.b. Solve simple problems involving joining or separating sets of objects to 5.		

Grade	Florida	Idaho	Utah
C2 – Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.			
5	A.6.In.a. Use skip counting to identify multiples of 2, 5, and 10 for numbers to 100. A.6.Su.a. Use skip counting by 5s to 30. A.6.Pa.a. Demonstrate one-to-one correspondence to count from 1 to 5 using objects or pictures. A.6.Pa.b. Recognize when items have been added to or taken away from sets of objects to 5. A.6.Pa.c. Solve simple problems involving small quantities using language, such as more, less, and same. A.6.Su.d. Solve real-world problems involving addition facts with sums to 25 and related subtraction facts using numerals with pictures. A.6.In.e. Select the operation and solve one-step problems involving addition or subtraction of two-digit numbers without regrouping and check for accuracy.		

Appendix D

NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah

NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah	
I. Number and Operations:	
Standard	**Expectations**
C. Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	**8. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals. (5)** (FL & ID at 3 & 4)
	9. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers. (4) (FL at 3 & 5 & ID at 5)
	10. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers. (4, 5) (All but 3 in ID)
	11. Use models, benchmarks, and equivalent forms to judge the size of fractions. (4, 5) (All but 3 in UT)
	12. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents. (FL & ID at 5)
	13. Explore numbers less than 0 by extending the number line and through familiar applications.
	14. Describe classes of numbers according to characteristics such as the nature of their factors. (Only FL at 3 & 5)
D. Understand meanings of operations and how they relate to one another.	**5. Understand various meanings of multiplication and division. (4)** (FL & ID at 3 & 5)
	6. Understand the effects of multiplying and dividing whole numbers. (Only FL at 3, 4 & 5)
	7. Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems. (4) (FL at 3 & ID at 3 & 5)
	8. Understand and use properties of operations, such as the distributivity of multiplication over addition. (FL at 5)
E. Compute fluently and make reasonable estimates.	**1. Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30 x 50.**
	2. Develop fluency in adding, subtracting, multiplying, and dividing whole numbers. (3)(Fl 4,5 & ID 4)
	3. Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results. (Fl & ID 4, 5 & ID 3)
	4. Develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience.
	5. Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals. (Only ID 5)
	6. Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tool. (ID at 3,4,5 & UT at 3)

NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah	
II. Algebra:	
Standard	**Expectations**
A. Understand patterns, relations, and functions.	**1. Describe, extend, and make generalizations about geometric and numeric patterns. (3, 4)** (ID & FL at 5)
	2. Represent and analyze patterns and functions, using words, tables, and graphs. (FL at 3, 4, 5 UT at 3, 4)
B. Represent and analyze mathematical situations and structures using algebraic symbols.	1. Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers. (ID at 3, 4, 5 & FL at 5)
	2. Represent the idea of a variable as an unknown quantity using a letter or a symbol. (5) (ID at 3 & UT at 4)
	3. Express mathematical relationships using equations. (ID at 3, 4, 5 & FL at 4, 5)
C. Use mathematical models to represent and understand quantitative relationships.	1. Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions. (FL at 3, 5; ID at 3, 4; UT at 4)
D. Analyze change in various contexts.	**1. Investigate how a change in one variable relates to a change in a second variable.**
	2. Identify and describe situations with constant or varying rates of change and compare them. (Only FL at 5)

NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah	
III. Geometry:	
Standard	**Expectations**
A. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.	**1. Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes. (3, 5)** (FL & UT at 4)
	2. Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids. (FL at 3, 4, 5)
	3. Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes. (Only FL at 3)
	4. Explore congruence and similarity. (FL at 3, 4, 5 & UT at 3, 4 & ID at 5)
	5. Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.
B. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.	1. Describe location and movement using common language and geometric vocabulary. (ID at 3 & UT at 4 & 5)
	2. Make and use coordinate systems to specify locations and to describe paths. (UT 4 & 5)
	3. Find the distance between points along horizontal and vertical lines of a coordinate system.
C. Apply transformations and use symmetry to analyze mathematical situations.	1. Predict and describe the results of sliding, flipping, and turning two-dimensional shapes. (ID 3, 4, & 5)
	2. Describe a motion or a series of motions that will show that two shapes are congruent.
	3. Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs. (FL at 4 & ID at 3, 4, & 5)
D. Use visualization, spatial reasoning, and geometric modeling to solve problems.	**1. Build and draw geometric objects.**
	2. Create and describe mental images of objects, patterns, and paths.
	3. Identify and build a three-dimensional object from two-dimensional representations of that object.
	4. Identify and build a two-dimensional representation of a three-dimensional object.
	5. Use geometric models to solve problems in other areas of mathematics, such as number and measurement.
	6. Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

NCTM Standards and Expectations for Grades 3–5 Commonly Covered in the Extended Standards of Florida, Idaho, and Utah	
IV. Measurement:	
Standard	**Expectations**
A. Understand measurable attributes of objects and the units, systems, and processes of measurement.	1. Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute. (FL at 3 & 4 & UT at 5)
	2. Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems.
	3. Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement. (ID at 3, 4, & 5)
	4. Understand that measurements are approximations and understand how differences in units affect precision.
	5. Explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way. (ID at 5)
B. Apply appropriate techniques, tools, and formulas to determine measurements.	1. Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes. (ID at 5)
	2. Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles. (4, 5) (FL & ID at 3)
	3. Select and use benchmarks to estimate measurements. (FL & ID at 3 & UT at 4 & 5)
	4. Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms.
	5. Develop strategies to determine the surface areas and volumes of rectangular solids.

NCTM Standards and Expectations for Grades 3–5	
V. Data Analysis and Probability:	
Standard	**Expectations**
A. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	1. Design investigations to address a question and consider how data-collection methods affect the nature of the data set. (UT at 4)
	2. Collect data using observations, surveys, and experiments. (UT at 3 & 4)
	3. Represent data using tables and graphs such as line plots, bar graphs, and line graphs. (3, 5) (ID & UT at 4)
	4. Recognize the differences in representing categorical and numerical data. (Only FL at 3)
B. Select and use appropriate statistical methods to analyze data.	**1. Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed. (5)** (Only at 5 in all)
	2. Use measures of center, focusing on the median, and understand hat each does and does not indicate about the data set. (ID at 4 & 5)
	3. Compare different representations of the same data and evaluate how will each representation show important aspects of the data
C. Develop and evaluate inferences and predictions that are based on data.	1. Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions. (ID at 3, 4, & 5 & UT at 4 & 5)
D. Understand and apply basic concepts of probability.	1. Describe events as likely or unlikely and discuss the degree of likelihood using such words as *certain, equally likely,* and *impossible.* (ID at 5 & UT at 4)
	2. Predict the probability of outcomes of simple experiments and test the predictions. (ID & UT at 4 & 5)
	3. Understand that the measure of the likelihood of an event con be represented by a number form 0 to 1.

Appendix E

Grades 3–5 Crosswalk of State Extended Content Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah

Grades 3–5 Number & Operations Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida Idaho, & Utah										
3–5 NCTM Standard		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
I. Number and Operations	**A.** Understand numbers, ways of representing numbers relationships among numbers and numbers systems.									
	A1	1	2	4	2	1	1			2
	A2	1	1	1		1	1		1	
	A3	2	2	1		1	1	1	1	1
	A4	1	2	1	1	1	1		1	1
	A5			1			1			
	A6									
	A7	1		1						
	B. Understand meanings of operations and how they relate to one another.									
	B 1	1	1	2	2	1	2		1	
	B2	1	1	1						
	B3	1	1		2	1	1		1	
	B4			1						
	C. Compute fluently and make reasonable estimates.									
	C1									
	C2	2	1	4	1	1		1		
	C3		1	1	1	1	1			
	C4									
	C5						1			
	C6				3	3	3	1		

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Grades 3–5 Algebra Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah										
3–5 NCTM Standard		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
II. Algebra	**A.** Understand patterns, relations, and functions.									
	A1	1	1		1	1	2	1	1	2
	A2	1	1	1				1	1	
	B. Represent and analyze mathematical situations and structures using algebraic symbols.									
	B1			1	1	1	1			
	B2			1	2		1		1	1
	B3		1	2	1	1	1			
	C. Use mathematical models to represent and understand quantitative relationships.									
	C1	1		1	1	1			1	
	D. Analyze change in various contexts.									
	D1									
	D2			1						

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Grades 3–5 Geometry Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah										
3–5 NCTM Standards		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
III. Geometry	**A.** Analyze characteristics and properties of two - and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships.									
	A1	2	1	3	1		1	2	1	2
	A2	1	1	1						
	A3	1								
	A4	1	1	1			1	1	1	
	A5									
	B. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.									
	B1				1				1	2
	B2								1	1
	B3									
	C. Apply transformations and us symmetry to analyze mathematical situations.									
	C1				1	1	1			
	C2									
	C3		1		1	1	1			
	D. Use visualization, spatial reasoning, and geometric modeling to solve problems.									
	D1									
	D2									
	D3									
	D4									
	D5									
	D6									

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Grades 3–5 Measurement Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah										
3–5 NCTM Standard		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
IV. Measurement	**A.** Understand measurable attributes of objects and the units, systems, and processes of measurement.									
	A1	1	1							2
	A2									
	A3				1	1	1			
	A4									
	A5						2			
	B. Apply appropriate techniques, tools and formulas to determine measurements.									
	B1						1			
	B2	1	1	3	1	1	1		1	3
	B3	1			1				1	1
	B4									
	B5									

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Grades 3–5 Data Analysis and Probability Crosswalk of State Extended Standards to Grades 3–5 NCTM Expectations for Florida, Idaho, & Utah

3–5 NCTM Standard		Florida			Idaho			Utah		
		Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
V. Data Analysis and Probability	**A.** Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.									
	A1								1	
	A2							1	1	1
	A3	1		1	2	1	2	2	1	1
	A4	1								
	B. Select and use appropriate statistical methods to analyze data.									
	B1			1			1			1
	B2					1	1			
	B3									
	C. Develop and evaluate inferences and predictions that are based on data.									
	C1				1	1	1		1	1
	D. Understand and apply basic concepts of probability.									
	D1						1		1	
	D2					1	1		1	1
	D3									

Key			
Covered in at least one grade by all 3 states across 3–5 span	Covered in at least one grade by 2/3 states across 3–5 span	Covered in at least one grade by 1/3 states across 3–5 span	Not covered by any state

Appendix F

Crosswalk of NCTM Standards Selected for the AAD-M to the Common Core Mathematics Standards for Grade Spans: 3–5, 6–8, and 9–12

Crosswalk of NCTM Standards Selected for the AAD-M to the Common Core Mathematics Standards – Grades 3–5			
NCTM Standards		**Common Core Mathematics Standards**	
Content Strand: Number and Operations		**Domain: Number and Operations in Base Ten (NBT)**	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	A1. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.	Generalize place value understanding for multi-digit whole numbers. (4.NBT)	1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right. 2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
		Understand the place value system. (5.NBT)	1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. 3. Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandth using base-ten numerals, number names, and expanded form. b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
	A2. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.[a]	Use place value understanding and properties of operations to perform multi-digit arithmetic. (3.NBT)	2. Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.
		Generalize place value understanding for multi-digit whole numbers. (4.NBT)	2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
	A3. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on	**Domain: Number and Operations – Fractions (NF)**	
		Develop understanding of fractions as numbers. (3.NF)	1. Understand a fraction 1/b as the quantity formed by 1 pat when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. 2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.

	number lines, and as divisions of whole numbers.		a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 located the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a length 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
	A4. Use models, benchmarks, and equivalent forms to judge the size of fractions.	Develop understanding of fractions as numbers. (3.NF)	3. Explain equivalence of fraction in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., ½ = 2.4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, and <, and justify the conclusions, e.g., by using a visual fraction model.
		Extend understanding of fraction equivalence and ordering (4.NF)	1. Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. 2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize the results of comparisons with symbols >, =, and <, and justify the conclusions, e.g., by using a visual fraction model.

B. Understand meanings of operations and how they relate to one another.	B1. Understand various meanings of multiplication and division.	**Domain: Number and Operations in Base Ten (NBT)**	
		Perform operations with multi-digit whole numbers and with decimals to hundredths. (5.NBT)	6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
	B3. Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.	Perform operations with multi-digit whole numbers and with decimals to hundredths. (5.NBT)	6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
		Domain: Operations and Algebraic Thinking (OA)	
		Multiply and divide within 100. (3.OA)	7. Fluently multiply and divide withing100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.
C. Compute fluently and make reasonable estimates.	C2. Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.	**Domain: Number and Operations in Base Ten (NBT)**	
		Use place value understanding and properties of operations to perform multi-digit arithmetic. (3.NBT)	3. Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations and/or the relationship between addition and subtraction.
		Use place value understanding and properties of operations to perform multi-digit arithmetic. (4.NBT)	4. Fluently add and subtract multi-digit numbers using the standard algorithm.
		Perform operations with multi-digit whole numbers and with decimals to hundredths. (5.NBT)	5. Fluently multiply multi-digit whole numbers using the standard algorithm.
		Domain: Operations and Algebraic Thinking (OA)	
		Multiply and divide within 100. (3.OA)	7. Fluently multiply and divide withing100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.

[a] There is weak alignment to this expectation.

Content Strand: Algebra		**Domain: Operations and Algebraic Thinking (OA)**	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand patterns, relations, and functions.	A1. Describe, extend, and make generalizations about geometric and numeric patterns.	Solve problems involving the four operations, and identify and explain patterns in arithmetic. (3.OA)	9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.
		Generalize and analyze patterns. (4.OA)	5. Generalize a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
		Analyze patterns and relationships. (5OA)	3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on the coordinate plane.
B. Represent and analyze mathematical situations and structures using algebraic symbols.	B2. Represent the idea of a variable as an unknown quantity using a letter or a symbol.	Represent and solve problems involving multiplication and division. (3.OA)	3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. 4. Determine the unknown whole number in a multiplication or division equations relating three whole numbers.
		Solve problems involving the four operations, and identify and explain patterns in arithmetic. (3.OA)	8. Solve two-step word problems using the four operations. Represent these problems using equation with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
		Use the four operations with whole numbers to solve problems. (4.OA)	2. Multiply and divide to solve word problems involving multiplicative comparisons, e.g., by suing drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
C. Use mathematical models to represent and understand quantitative relationships.	C1. Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.	Represent and solve problems involving multiplication and division. (3.OA)	3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
		Domain: Measurement and Data	
		Represent and interpret data. (4.MD)	4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.
		Represent and interpret data. (5.MD)	2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.

Content Strand: Geometry		**Domain: Geometry**	
Standard	**Expectation**	**Topic**	**Standard**
A. Analyze characteristics and properties of two-and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.	A1. Identify, compare and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes.	Reason with shapes and their attributes. (3.G)	1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
		Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (4.G)	1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. 2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.
		Classify two-dimensional figures into categories based on their properties. (5.G)	3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. 4. 4. Classify two-dimensional figures in a hierarchy based on properties.
	A4. Explore congruence and similarity.	Reason with shapes and their attributes. (3.G)	2. Partition shapes into parts with equal areas.
		Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (4.G)	3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figures can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Content Strand: Measurement		**Domain: Measurement and Data**	
Standard	**Expectation**	**Topic**	**Standard**
B. Apply appropriate techniques, tools, and formulas to determine measurements.	B2. Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (3.MD)	1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., y suing drawings to represent the problem.
		Represent and interpret data. (3.MD)	4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked in appropriate units – whole numbers, halves, or quarters.
		Geometric measurement: understand concepts of angle and measure angles. (4.MD)	5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement. 6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
		Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (5.MD)	3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
	B3. Select and use benchmarks to estimate measurements.	Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (3.MD)	7. Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square”, is said to have “one square unit” of area, and can be used to measure area. b. A plane figure, which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

			8. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units. 9. Relate area to the operations of multiplication and addition. d. Recognize areas as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
		Geometric measurement: understand concepts of angle and measure angles. (4.MD)	5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
		Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (5.MD)	3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure, which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. 4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

Content Strand: Data Analysis and Probability		**Domain: Measurement and Data**	
Standard	**Expectation**	**Topic**	**Standard**
A. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	A3. Represent data using tables and graphs such as line plots, bar graphs, and line graphs.	Represent and interpret data. (3.MD)	3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems, using information presented in scaled bar graphs.
		Represent and interpret data. (4.MD)	4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.
		Represent and interpret data. (5.MD)	2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.
B. Select and use appropriate statistical methods to analyze data.	B1. Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed.[a]	**Domain: Geometry**	
		Graph points on the coordinate plane to solve real-world and mathematical problems. (5.G)	2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

[a] There is weak alignment to this expectation.

Crosswalk of NCTM Standards Selected for the AAD-M to the Common Core Mathematics Standards – Grades 6–8			
NCTM Standards		**Common Core Mathematics Standards**	
Content Strand: Number and Operations		**Domain: Ratios and Proportional Relationships**	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	A1. Work flexibly with fractions, decimals, and percents to solve problems.	Understand ratio concepts and use ratio reasoning to solve problems. (6.RP)	3. Use ratio and rate reasoning to solve real-world and mathematical problems. c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
		Analyze proportional relationships and use them to solve real-world and mathematical problems. (7.RP)	1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. 3. Use proportional relationships to solve multistep ratio and percent problems.
		Domain: The Number System (NS)	
		Apply and extend previous understandings of multiplication and division to divide fractions by fractions. (6.NS)	1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
		Compute fluently with multi-digit numbers and find common factors. (6.NS)	3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
		Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers. (7.NS)	2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers, interpret products of rational numbers by describing real-world contexts. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
		Know that there are numbers that are not rational, and approximate them by rational numbers. (8.NS)	1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion, which repeats eventually, into a rational number.

		Domain: Expressions and Equations	
		Understand the connections between proportional relationships, lines, and linear equations. (8.EE)	5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
	A7. Develop meaning for integers and represent and compare quantities with them.	Apply and extend previous understandings of numbers to the system of rational numbers. (6.NS)	5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. 6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite. b. Understand signs of number in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. 7. Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude fro a positive or negative quantity in a real-world situation. d. Distinguish comparisons of absolute value from statements about order.

Content Standard: Number and Operations		**Domain: Ratios and Proportional Relationships (RP)**	
Standard	**Expectation**	**Topic**	**Standard**
C. Compute fluently and make reasonable estimates.	C4. Develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios.	Understand ratio concepts and use ratio reasoning to solve problems. (6.RP)	1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. 2. Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with $b \neq 0$ and use rate language to the context of a ratio relationship. 3. Use ratio and rate reasoning to solve real-world and mathematical problems. a. Make tables of equivalent ratio relating quantities with whole-number measurements; find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
		Analyze proportional relationships and use them to solve real-world and mathematical problems. (7.RP)	1. Compute unit rates associated with ratios of fractions, including ratios of lengths, area, and other quantities measured in like or different units. 2. Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate. 3. Use proportional relationships to solve multistep ratio and percent problems.

		Domain: Geometry	
		Draw, construct, and describe geometrical figures and describe the relationships between them. (7.G)	1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas form a scale drawing and reproducing a scale drawing at a different scale.

Content Strand: Algebra		**Domain: Expressions and Equations**	
Standard	**Expectation**	**Topic**	**Standard**
B. Represent and analyze mathematical situations and structures using algebraic symbols.	B1. Develop an initial conceptual understanding of different uses of variables.	Apply and extend previous understandings of arithmetic to algebraic expressions. (6.EE)	2. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are not parentheses to specify a particular order (Order of Operations).
		Reason about and solve one-variable equations and inequalities. (6.EE)	5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a give number in a specified set makes an equation or inequality true. 6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. 7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers. 8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
		Represent and analyze quantitative relationships between dependent and independent variables. (6.EE)	9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using

			graphs and tables, and relate these to the equation.
		Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7.EE)	4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, Identifying the sequence of the operations used in each approach. b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context or the problem.
		Analyze and solve linear equations and pairs of simultaneous linear equations. (8.EE)	7. Solve linear equations in one variable.

Content Strand: Geometry		**Domain: Geometry**	
Standard	**Expectation**	**Topic**	**Standard**
A. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.	A1. Precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.[a]	Solve real-world and mathematical problems involving area, surface area, and volume. (6.G)	1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. 2. Find the volume of right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $B = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. 3. Draw polygons in the coordinate plane given coordinates for vertices; use coordinates to find the length of a side joining points with the same first coordinates or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. 4. Represent three-dimensional figures using nets make up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

		Draw, construct, and describe geometrical figures and describe the relationships between them. (7.G)	2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. 3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
		Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7.G)	5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. 6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

[a] Please note that the Common Core Domain Geometry, Topic, and Standards are the same for NCTM Strands Geometry (Standard A, Expectation A1) and Measurement (Standard B, Expectation B2), because the Common Core Geometry Topic and Standards relate the finding of length, area, and volume of two- and three-dimensional objects to the properties of the objects.

Content Strand: Measurement		**Domain: Ratios and Proportional Relationships**	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand measurable attributes of objects and the units, systems, and processes of measurement.	A2. Understand relationships among units and convert from one unit to another within the same system.	Understand ratio concepts and use ratio reasoning to solve problems. (6.RP)	3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables or equivalent ratios, tape diagrams, double number line diagrams, or equations. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
		Analyze proportional relationships and use them to solve real-world and mathematical problems. (7.RP)	1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
B. Apply appropriate techniques, tools, and formulas to determine measurements.	B2. Select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision.[a]	**Domain: Geometry**	
		Solve real-world and mathematical problems involving area, surface area, and volume. (6.G)	1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. 2. Find the volume of right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas

			V = *l w h* and *B* = *b h* to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. 3. Draw polygons in the coordinate plane given coordinates for vertices; use coordinates to find the length of a side joining points with the same first coordinates or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. 4. Represent three-dimensional figures using nets make up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
		Draw, construct, and describe geometrical figures and describe the relationships between them. (7.G)	1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas form a scale drawing and reproducing a scale drawing at a different scale.
		Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7.G)	4. Know the formulas for area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. 5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. 6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
		Solve real-world and mathematical problems involving volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. (8.G)	9. Know the formulas for volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

[a] Please note that the Common Core Domain Geometry, Topic, and Standards are the same for NCTM Strands Geometry (Standard A, Expectation A1) and Measurement (Standard B, Expectation B2), because the Common Core Geometry Topic and Standards relate the finding of length, area, and volume of two- and three-dimensional objects to the properties of the objects.

Content Strand: Data Analysis and Probability		Domain: Statistics and Probability	
Standard	**Expectation**	**Topic**	**Standard**
A. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	A2. Select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.	Summarize and describe distributions. (6.SP)	4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. 5. Summarize numerical data sets in relation to their context, such as by: d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
		Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP)	8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”). Identify the outcomes in the sample space, which compose the event.
		Investigate patterns of association in bivariate data. (8.SP)	1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Crosswalk of NCTM Standards Selected for the AAD-M to the Common Core Mathematics Standards Grades 9–12			
Grades 9-12 NCTM Standards		**High School Common Core Mathematics Standards**	
Content Strand: Number and Operations		**Conceptual Category: Number and Quantity (N)**	
		Domain: The Real Number System-RN	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand numbers, ways of representing numbers, relationships among numbers, and number systems.	A1. Develop a deeper understanding of very large and very small numbers and of various representations of them.	Extend the properties of exponents to rational exponents. N-RN	1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
		Domain: Quantities-Q	
		Reason quantitatively and use units to solve problems. (N-Q)	2. Define appropriate quantities for the purpose of descriptive modeling.
C. Compute fluently and make reasonable estimates.	C1. Develop fluency in operations with real numbers, vectors, and matrices, using mental computation or paper-and-pencil calculations for simple cases and technology for more-complicated cases.	**Conceptual Category: Algebra (A)**	
		Domain: Arithmetic with Polynomials & Rational Expressions-APR	
		Perform arithmetic operations on polynomials. (A-ARP)	1. Understand that polynomials form a system analogous to integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Content Strand: Algebra		**Conceptual Category: Algebra (A)**	
		Domain: Creating Equations-CED	
Standard	**Expectation**	**Topic**	**Standard**
B. Represent and analyze mathematical situations and structures using algebraic symbols.	B3. Use symbolic algebra to represent and explain mathematical relationships.	Create equations that describe numbers or relationships. (A-CED)	1. Create equations and inequalities in one variable and use them to solve problems. 2. Create equations in two or more variables to represent relationships

			between quantities; graph equations on coordinate axes with labels and scales.

Content Strand: Geometry		**Conceptual Category: Geometry (G)**	
		Domain: Congruence-CO	
Standard	**Expectation**	**Topic**	**Standard**
A. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.	A1. Analyze properties and determine attributes of two- and three-dimensional objects.	Experiment with transformations in the plane. (G-CO)	1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
		Make geometric constructions. (G-CO)	12. Make formal geometric constructions with a variety of tools and methods (compass and straight edge, string, reflective devices, paper folding, dynamic geometric software, etc.). 13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
		Domain: Circles-C	
		Understand and apply theorems about circles. (G-C)	2. Identify and describe relationships among inscribed angles, radii, and chords.
		Domain: Geometric Measurements and Dimension-GMD	
		Visualize relationships between two-dimensional and three-dimensional objects. (G-GMD)	4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Content Strand: Measurement		Conceptual Category: Number and Quantity (N)	
		Domain: Quantities-Q	
Standard	**Expectation**	**Topic**	**Standard**
A. Understand measurable attributes of objects and the units, systems, and processes of measurement.	A1. Make decisions about units and scales that are appropriate for problem situations involving measurement.	Reason quantitatively and use units to solve problems. (N-Q)	1. Use units as a way to understand problems and to guide the solution f multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Content Strand: Data Analysis and Probability		Conceptual Category: Statistics and Probability (S)	
		Domain: Interpreting Categorical and Quantitative Data-ID	
Standard	**Expectation**	**Topic**	**Standard**
B. Select and use appropriate statistical methods to analyze data.	B1.For univariate measurement data, be able to display the distribution, describe its shape, and select and calculate summary statistics.	Summarize, represent, and interpret data on a single count or measurement variable. (S-ID)	1. Represent data with plots on the real number line (dot plots, histograms, and box plots). 2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more data sets. 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 4. 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.