K-8 Mathematics Comparative Analysis

The K-8 Mathematics Comparative Analysis summarizes the relationship between grades K-8 of the 2001 Ohio Academic Content Standards (Ohio ACS) for Mathematics and the 2010 Common Core State Standards (CCSS) adopted by Ohio on June 7, 2010. The purpose of this document is to assist educators in reviewing their current curriculum and instruction in preparation for the transition to the CCSS.

The CCSS can be found at www.corestandards.org.

The structure and organization of the standards has changed. The formats for the 2001 and 2010 standards are not parallel. While there are clear connections between both sets of standards, there also are significant differences

2001 Academic Content Standards for Mathematics Format
Standard
Benchmark (by grade band)
Indicator (by grade)

2010 Common Core State Standards for Mathematics K-8 Format
Grade
Domain
Cluster
Standard (Statement)

This document connects the CCSS clusters and standards with the Ohio Academic Content Standards grade level indicators. The content is sorted into three columns and is classified by what is **new**, what is **no longer a focus**, or what **still exists and is modified in some way**.

How to read the document
The first two columns are written in the context of the Common Core: italicized *Domains*, followed by the cluster statement and then the coding for the specific standards. (4.G.6) means grade 4, Geometry, standard 6. Items in the NEW column are new or significantly different from a current interpretation or practice. Notable comments are indicated by brackets [ ]. The third column identifies the Strand and then the topic with a reference of where that topic is now found. No CCSS reference indicates that the topic does not appear in grades K-8 in the CCSS.

How to use the document
CCSSM is designed to provide focus and coherence while at the same time address 21st Century Skills, College and Career Readiness and increased rigor. The Standards of Mathematical Practice in the CCSS expand the expectations from the Mathematical Processes (OACS) of representation, reasoning and proof, communication, problem solving, and connections, to include adaptive reasoning, strategic competence, conceptual understanding, procedural fluency and productive disposition from Adding It Up. Understanding these "Mathematical Practices" helps to frame the depth of understanding or cognitive demand of the content standards. Additionally, the Introduction of each grade level of the CCSSM identifies Critical Areas of Focus for that grade. In these descriptions, connections are made between domains, clusters and standards across the grade illustrating further the concepts and relationships students are to make. The Mathematical Practices and the Critical Areas of Focus are instrumental in truly understanding the intent of the Domains, Clusters and Standards. It is recommended that familiarity with the Standards of Mathematical Practice, pages 6-8 of the

CCSSM and the grade level Critical Areas of Focus should occur prior to analyzing the Comparative Analysis.

The Comparative Analysis is a useful tool for confirming or quickly seeing the differences between the two sets of standards. It is recommended that thoughtful reading of the Common Core State Standards for Mathematics is a beneficial experience for teachers who are transitioning their instruction. It is through this careful inspection that deep understanding will develop. In alignment with this belief, guidelines for getting to know the Standards of Mathematical Practice and the Critical Areas of Focus precede the usage of the Comparative Analysis.

Getting to know the Standards for Mathematical Practice
Use pages 6-8 of the CCSSM or this link to a two page document **Standards for Mathematical Practice** or place this address in your browser http://education.ohio.gov/getattachment/Topics/Academic-Content-Standards/Mathematics/Common-Core-State-Standards-in-Mathematics.pdf.aspx.

- Read a Standard for Mathematical Practice
  - What is the meaning of the practice?
  - How will the practice look at my grade level?
- Repeat for each Mathematical Practice

Getting to know the Critical Areas of Focus
Please refer to **Critical Areas of Focus** on the Mathematics webpage or place this address in your browser: http://education.ohio.gov/getattachment/Topics/Academic-Content-Standards/Mathematics/Resources-Ohio-s-New-Learning-Standards-K-12-Mathe/K-8-Critical-Areas-of-Focus1-1-27-11.pdf.aspx to access suggestions for becoming familiar with the Critical Areas of Focus.

Using the K-8 Comparative Analysis
Materials: K-8 Comparative Analysis, Grade Level CCSSM pages, Standards for Mathematical Practice

<u>The process outline below is a guide for careful inspection and deeper understanding of the CCSSM.</u>

- Read the Mathematical Practices and the appropriate Critical Areas of Focus for the selected grade level
- Read a Cluster and its Standards in the CCSSM
- Discussion:
  - What does the Cluster mean? Think about:
    - What Critical Area(s) of Focus does (do) the Cluster relate to?
    - What Mathematical Practice(s) relate to the Cluster?
    - What other Domains and Clusters are connected?
  - What are the concepts in the Cluster? Highlight in (red).
    - Concepts refer to big ideas, understandings or meanings, strategies and relationships. Understanding these concepts underlies the development and usage of skills and procedures.
  - What are the skills and procedures in the Cluster? Highlight in (blue).
    - Skills and procedures refer to rules, routines, and algorithms. They evolve from the understanding and usage of concepts.

- How is the intent of the Cluster different from current practice?
    - Determine if the content is new or modified.
    - Pay attention to details. Sometimes a major change is what is not there, especially in Measurement and Data, and Geometry.
    - If a Curriculum Specialist is working with the group, the specialist can confirm by locating the Domain and Cluster on the K-8 Comparative Analysis.

- Repeat for each Cluster in the grade.

- Further work would answer:
    - What instructional strategies would be most effective?
        - Refer to the grade level Model Curriculum on the Mathematics webpage for clarification.
    - What materials and resources are currently available for teachers to use in developing instructional strategies for the Cluster?
    - What materials and resources are needed for teachers to use in developing instructional strategies for the Cluster?
    - What rich problems are appropriate?
    - What instructional strategies would be effective?

Watch for new resources, webinars, pod casts and professional development opportunities throughout the school year to assist in understanding and transitioning to the Common Core State Standards. Remember, full implementation is targeted for the 2014-2015 school year.

Questions or Comments

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MATHEMATICS COMPARATIVE ANALYSIS of the COMMON CORE STATE STANDARDS and the OACS

Kindergarten

Content that is new to Kindergarten	Content that is still included at Kindergarten, but may be modified or at a greater depth	Content that is no longer a focus at Kindergarten
• *Operations and Algebraic Thinking* Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (K.OA.4-5) • *Number and Operations in Base Ten* Work with numbers 11-19 to gain foundations for place value. (K.NBT.3) • *Geometry* Identify shapes as two-dimensional or three-dimensional. (K.G.3)	• *Counting and Cardinality* Know number names and the count sequence. [to 100] (K.CC.1-3) • *Counting and Cardinality* Count to tell the number of objects. [up to 20 objects] (K.CC.4-5) • *Operations and Algebraic Thinking* Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. [make ten, fluently add, subtract within 5] (K.OA.1-5) • *Measurement and Data* Describe and compare measurable attributes. [direct comparison] (K.MD.1-3) • *Geometry* [Correctly] Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cylinders, spheres). (K.G.1-2) • *Counting and Cardinality* Compare numbers. (K.CC.6-7) • *Geometry* Analyze, compare, create and compose shapes. (K.G.4-6)	• *Number, Number Sense and Operations* Demonstrate joining multiple groups of objects each containing the same number of objects. (See 2.OA.3-4) • *Number, Number Sense and Operations* Partition or share a small set of objects into groups of equal size. (See 2.OA.3-4) • *Measurement* Time and Money (See 1.MD.3, 2.MD.7-8) • *Data Analysis* is used as a tool for working with numbers and geometric shapes. • *Patterns, Functions and Algebra* Identify, create, extend and copy sequences.

MATHEMATICS COMPARATIVE ANALYSIS of the COMMON CORE STATE STANDARDS and the OACS

Grade One

Content that is new to Grade 1	Content that is still included at Grade 1, but may be modified or at a greater depth	Content that is no longer a focus at Grade 1
• *Operations and Algebraic Thinking* Understand and apply properties of operations and the relationship between addition and subtraction. (1.OA.3-4) • *Number and Operations in Base Ten* Use place value understanding and properties of operations to add and subtract. [multiples of 10, properties and strategies] (1.NBT.4-6) • *Measurement and Data* Measure lengths indirectly and by iterating length units. (1.MD.1) • *Geometry* Reason with shapes and their attributes. [foundation for fractions using geometric shapes] (1.G.3)	• *Operations and Algebraic Thinking* Represent and solve problems involving addition and subtraction. (1.OA.1-2) • *Operations and Algebraic Thinking* Add and subtract within 20. (1.OA.5-6) • *Operations and Algebraic Thinking* Work with addition and subtraction equations. (1.OA.7-8) • *Number and Operations in Base Ten* Extend the counting sequence. [to 120] (1.NBT.1) • *Number and Operations in Base Ten* Understand place value. [compare two two-digit numbers using <, =, >] (1.NBT.3) • *Measurement and Data* Tell and write time. [hours and half-hours] (1.MD.3) • *Measurement and Data* Represent and interpret data. (1.MD.4) • *Geometry* Reason with shapes and their attributes. [note defining attributes] (1.G.1-2)	• *Number, Number Sense and Operations* Model and represent multiplication and division. (See 2.OA.4 and 3.OA.1-4) • *Number, Number Sense and Operations* Money can be used as a tool for working with numbers. (See 2.MD.7-8) • *Measurement* Weight (See 3.MD1-2) • *Measurement* Length with standard units (See 2.MD1-4) • *Data Analysis* is used as a tool for working with numbers and geometric shapes. • *Probability (See 7.SP.5-8)* • *Patterns, Functions and Algebra* Sequences, growing patterns

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Grade Two

Content that is new to Grade 2	Content that is still included at Grade 2, but may be modified or at a greater depth	Content that is no longer a focus at Grade 2
• *Operations and Algebraic Thinking* Add and subtract within 20. (2.OA.2) • *Number and Operations in Base Ten* Understand place value. [bundle of ten tens, multiples of 100s] (2.NBT.1-2) • *Measurement and Data* Relate addition and subtraction to length. (2.MD.5-6) • *Measurement and Data* Represent and interpret data. (2.MD.9) • *Geometry* Reason with shapes and their attributes. [new shapes and faces] (2.G.1-2) • *Geometry* Reason with shapes and their attributes. [partitioning wholes] (2.G.3)	• *Operations and Algebraic Thinking* Represent and solve problems involving addition and subtraction. (2.OA.1) • *Operations and Algebraic Thinking* Work with equal groups of objects to gain foundation for multiplication. (2.OA.3-4) • *Number and Operations in Base Ten* Understand place value. [use , using <, =, > (2.NBT.3-4) • *Number and Operations in Base Ten* Use place value understanding and properties of operations to add and subtract. [fluently add/subtract within 100 using <u>strategies</u>; add four two-digit numbers; mentally add/subtract 10 or 100; explain using place value and properties of operations; no algorithms mentioned] (2.NBT.5-9) • *Measurement and Data* Measure and estimate lengths in standard units. (2.MD.1-4) • *Measurement and Data* Work with time and money. (2.MD.7-8) • *Measurement and Data* Represent and interpret data. [picture and bar graphs] (2.MD.10) • *Geometry* (2.G.1)	• *Number, Number Sense and Operations* Ten as ten ones (See 1.NBT.1-4) • *Number, Number Sense and Operations* Add/subtract multiples of ten (See 1.NBT.4-6) • *Number, Number Sense and Operations* Fractions limited to partitioning circles and rectangles 2.G.3 *(See 3.NF)* • *Number, Number Sense and Operations* Division (See 3.OA.3) • *Number, Number Sense and Operations* Front end estimation • *Measurement* Weight and volume (See 3.MD.1-2,) • *Geometry* Three-dimensional objects • *Geometry* Two-dimensional congruence and line symmetry (See 6-8.G) • *Patterns, Functions and Algebra* Sequences, growing patterns, quantitative and qualitative changes • *Data Analysis* is used as a tool for working with numbers and geometric shapes • *Probability* (See 7.SP.5-8)

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Grade Three

Content that is new to Grade 3	Content that is still included at Grade 3, but may be modified or at a greater depth	Content that is no longer a focus at Grade 3
• *Operations and Algebraic Thinking* Understand properties of multiplication and the relationship between multiplication and division. (3.OA.6) • *Number and Operations in Base Ten* Use place value understanding and properties of operations to perform multi-digit arithmetic. [range of algorithms] (3.NBT.1-3) • *Measurement and Data* Represent and interpret data. (3.MD.3-4) • *Measurement and Data* Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (3.MD.5-7) • *Measurement and Data* Geometric measurement: recognize perimeter as an attribute of place figures and distinguish linear and area measures. (3.MD.6) • *Geometry* Reason with shapes and their attributes. (3.G.1-2)	• *Operations and Algebraic Thinking* Represent and solve problems involving multiplication and division. (3.OA.1-4) • *Operations and Algebraic Thinking* Understand properties of multiplication and the relationship between multiplication and division. (3.OA.5) • *Operations and Algebraic Thinking* Multiply and divide within 100. (3.OA.7) • *Operations and Algebraic Thinking* Solve problems involving the four operations, and identify and explain patterns in arithmetic. (3.OA.8-9) • *Number and Operations –Fractions* Develop Understanding of fractions as numbers; limited to denominators of 2, 3, 4, 6, and 8. [not sets] (3.NF.1-3) • *Measurement and Data* Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (3.MD.1-4) • *Measurement and Data* Represent and interpret data. (3.MD.3-4)	• *Number, Number Sense and Operations* Decimals (See 4.NF) • *Number, Number Sense and Operations* Money represented as cents is a context for solving problems. (See 2.MD.8 for money introduction and 4,NF.5-7) • *Number, Number Sense and Operations* Division remainders (See 4.OA.3) • *Measurement* Temperature • *Measurement* Volume (See 5.MD.3-5) • *Geometry* Three-dimensional objects (See Grades 5-6.G) • *Geometry* Angles (See Grades 4-5.G) • *Patterns, Functions and Algebra* Multiplicative and growing patterns, quantitative changes • *Data Analysis* is used as a tool for working with numbers and geometric shapes • *Probability* (See 7.SP.5-8)

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Grade Four

Content that is new to Grade 4	Content that is still included at Grade 4, but may be modified or at a greater depth	Content that is no longer a focus at Grade 4
• *Measurement and Data* Represent and interpret data. [representing measurement data in fractions of a unit to solve problems involving addition and subtraction] (4.MD.4) • *Measurement and Data* Measure of an angle determined by the degree of rotation. [1/360 of a circle] (4.MD.5) • *Measurement and Data* Geometric measurement: understand concepts of angle and measure angles. [using a protractor] (4.MD.6) • *Geometry* Draw and identify lines and angles, and classify shapes by properties of their lines and angles. [note geometric lines and angles; line of symmetry] (4.G.1-2)	• *Operations and Algebraic Thinking* Use the four operations with whole numbers to solve problems. (4.OA.1-3) • *Number and Base Ten* Generalize place value understanding for multi-digit whole numbers. (4.NBT.1-3) • *Number and Base Ten* Use place value understanding and properties of operations to perform multi-digit arithmetic. [Add/subtract with algorithms; multiply/divide using the relationships between operations, mathematical properties and place value] (4.NBT.4-5) • *Number and Operations – Fractions* Extend understanding of fraction equivalence and ordering. [models] (4.NF.1-2) • *Number and Operations – Fractions* Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. [Addition and subtraction of like denominators using models and equations; multiples of fractions; denominators of: 2, 3, 4, 5, 6, 8, 10, 12, 100] (4.NF.3-4) • *Number and Operations – Fractions* Understand decimal notation for fractions, and compare decimal fractions. [decimals to hundredths, no operations] (4.NF.5-7)	• *Number, Number Sense and Operations* Addition and subtraction of decimals (See 5.NF.1-2) • *Number, Number Sense and Operations* Fluency in multiplying whole numbers by 1- and 2- digits numbers (See 5.NBT.5-7) • *Number, Number Sense and Operations* Fluency in dividing whole numbers by 1- and 2- digits numbers (See 6.NS.2-3) • *Measurement* Volume (See 5.MD.3-5) • *Geometry* Coordinate plane (See 5.G.1-2) • *Geometry* Transformations (See 8.G) • *Patterns, Functions and Algebra* Inequalities: concept (See 6.EE.5-8); solving (See 7.EE.4) • *Data Analysis* Interpretations and measures of center (See 6-8.SP) • *Probability* (See 7.SP)

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Grade Five

Content that is new to Grade 5	Content that is still included at Grade 5, but may be modified or at a greater depth	Content that is no longer a focus at Grade 5
• *Operations and Algebraic Thinking* Write and interpret numerical expressions. (5.OA.2) • *Number and Operations in Base Ten* Understand the place value system. (5.NBT.1-3) • *Number and Operations in Base Ten* Perform operations with multi-digit whole numbers with decimals to hundredths. (5.NBT.5) • *Number and Operations-Fractions* Apply and extend previous understandings of multiplication and division to multiply and divide fractions. [Familiar ideas but with new understandings; division of a fraction by a fraction not required] (5.NF.3-7) • *Measurement and Data* Represent and interpret data. (5.MD.2) • *Measurement and Data* Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (5.MD.3-5) • *Geometry* Classify two-dimensional figures into categories based on their properties. (5.G.3-4)	• *Operations and Algebraic Thinking* Write and interpret numerical expressions. (5.OA.1) • *Operations and Algebraic Thinking* Analyze patterns and relationships. (5.OA.3) • *Number and Operations in Base Ten* Understand the place value system. (5.NBT.4*)* • *Number and Operations in Base Ten* Perform operations with multi-digit whole numbers with decimals to hundredths. (5.NBT.6-7) • *Number and Operations-Fractions* Use equivalent fractions as a strategy to add and subtract fractions. (5.NF.1-2) • *Measurement and Data* Convert like measurement units within a given measurement system. (5.MD.1) • *Geometry* Graph points on the coordinate plane to solve real-world and mathematical problems. [first quadrant only] (5.G.1-2)	• *Number, Number Sense and Operations* Ratio, percent (See 6.RP) • *Measurement* Angles (See 4.MD) • *Measurement* Surface area (See 6.G) • *Measurement* Volume formulas (See 6.G) • *Geometry* Circles (See 7.G) • *Geometry* Congruent figures (See 7-8.G) • *Geometry* Four quadrant coordinate system (See 6.G) • *Geometry* Angles (See 4.MD.5) and (7.G.5) • *Geometry* Nets (See 6.G) • *Patterns, Functions and Algebra* Inequalities (See 6-7.EE) • *Data Analysis* Prior to grades 6-8, Data Analysis is a tool for organizing numbers and geometric shapes (See 6-8.SP) • *Probability* (See 7.SP.5-8)

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Grade Six

Content that is new to Grade 6	Content that is still included at Grade 6, but may be modified or at a greater depth	Content that is no longer a focus at Grade 6
• *Ratios and Proportional Relationships* Understand ratio concepts and use ratio reasoning to solve problems. (6.RP.1-2) • *The Number System* Compute fluently with multi-digit numbers and find common factors and multiples. (6.NS.2-3) • *The Number System* Apply and extend previous understandings of numbers to the system of rational numbers. (6.NS.5-8) • *Expressions and Equations* Reason about and solve one-variable equations and inequalities. (6.EE.7-8) • *Geometry* Solve real-world and mathematical problems involving area, surface area, and volume. (6.G.3-4) • *Statistics and Probability* Develop understanding of statistical variability. (6.SP.1-3) • *Statistics and Probability* Summarize and describe distributions. (6.SP.5c-d)	• *Ratios and Proportional Relationships* Understand ratio concepts and use ratio reasoning to solve problems. [Convert measurement units] (6.RP.3) • *The Number System* Apply and extend previous understandings of multiplication and division to divide fractions by a fraction. (6.NS.1) • *The Number System* Compute fluently with multi-digit numbers and find common factors and multiples. (6.NS.4) • *Expressions and Equations* Apply and extend previous understandings of arithmetic to algebraic expressions. (6.EE.1-4) • *Expressions and Equations* Reason about and solve one-variable equations and inequalities. (6.EE.5-6) • *Expressions and Equations* Represent and analyze quantitative relationships between dependent and independent variables. (6.EE.9) • *Geometry* Solve real-world and mathematical problems involving area, surface area, and volume. (6.G.1-2) • *Statistics and Probability* Summarize and describe distributions. (6.SP.5a-b) • *Statistics and Probability* Develop understanding of statistical variability. (6.SP.4)	• *Number, Number Sense and Operations* Exponents (See 7.EE.1-4) • *Measurement* Differences between perimeter and area (See Grade 3.MD) • *Measurement* Circles (See Grade 7.G) • *Geometry* Classification of two-dimensional shapes (See 5.G.3-4); three-dimensional shapes (See HS) • *Geometry* Transformations and similar figures (See 8.G.1-5) • *Patterns, Functions and Algebra* Equivalent algebraic expressions (See Grades 6-7.EE) • *Patterns, Functions and Algebra* Linear equations and inequalities (See Grades 7- 8.EE) • *Patterns, Functions and Algebra* Functions (See Grade 8.F) • *Patterns, Functions and Algebra* Rate of Change (See 7.RP.2) • *Probability* (See 7.SP.5-8)

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Grade Seven

Content that is new to Grade 7	Content that is still included at Grade 7, but may be modified or at a greater depth	Content that is no longer a focus at Grade 7
• *Expressions and Equations* Use properties of operations to generate equivalent expressions. (7.EE.1-2) • *Expressions and Equations* Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7.EE.4) • *Geometry* Draw construct, and describe geometrical figures and describe the relationships between them. (7.G.2-3) • *Geometry* Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7.G.4-5) • *Statistics and Probability* Use random sampling to draw inferences about a population. (7.SP.1-2)	• *Ratios and Proportional Relationships* Analyze proportional relationships and use them to solve real-world and mathematical problems. (7.RP.1-3) • *The Number System* Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (7.NS.1-3) • *Expressions and Equations* Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7.EE.3) • *Geometry* Draw construct, and describe geometrical figures and describe the relationships between them. (7.G.1) • *Geometry* Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7.G.6) • *Statistics and Probability* Draw informal comparative inferences about two populations. (7.SP.3-4) • *Statistics and Probability* Investigate chance processes, and develop, use and evaluate probability models. [initial introduction to probability] (7.SP.5-8)	• *Number, Number Sense and Operations* Scientific notation and negative exponents (See 8.EE.1-4) • *Number, Number Sense and Operations* Irrational numbers (See 8NS.1-2) • *Number, Number Sense and Operations* Absolute value (See 6.NS.7) • *Measurement* Precision estimates • *Measurement* Area of composite shapes (See 6.G.1) • *Measurement* Volume of cylinders (See 8.G.9) • *Measurement* Comparison of surface area and volume • *Geometry* Properties of two-dimensional shapes (See 5.G.3-4); three-dimensional shapes (See HS) • *Geometry* Pythagorean Theorem (See 8.6-8) • *Geometry* Transformations and symmetry (See 8.G.1-5) • *Patterns, Functions and Algebra* Algebraic expressions (See 6-7.EE) Linear equations (See 7- 8.EE or 8.F); Non-linear (See HS) • *Data Analysis* Graphical representation analysis (See 6.SP)

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Grade Eight

Content that is new to Grade 8	Content that is still included at Grade 8, but may be modified or at a greater depth	Content that is no longer a focus at Grade 8
• *The Number System* Know that there are numbers that are not rational, and approximate them by rational numbers. (8.NS.1-2) • *Functions* Define, evaluate, and compare functions. (8.F.1-3) • *Functions* Use functions to model relationships between quantities. (8.F.4-5) • *Geometry* Understand congruence and similarity using physical models, transparencies, or geometry software.[initial introduction] (8.G.1-2) • *Geometry* Understand and apply the Pythagorean Theorem. [initial introduction] (8.G.6-8) • *Statistics and Probability* Investigate patterns of association in bivariate data. (8.SP.4)	• *Expressions and Equations* Work with radicals and integer exponents. (8.EE.1-4) • *Expressions and Equations* Understand the connections between proportional relationships, lines, and linear equations. [derive *y=mx*] (8.EE.5-6) • *Expressions and Equations* Analyze and solve linear equations and pairs of simultaneous linear equations. (8.EE.7-8) • *Geometry* Understand congruence and similarity using physical models, transparencies, or geometry software. (8.G.3-5) • *Geometry* Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. (8.G.9) • *Statistics and Probability* Draw informal comparative inferences about two populations. (7.SP.3-4) • *Statistics and Probability* Investigate patterns of association in bivariate data. (8.SP.1-3)	• *Number, Number Sense and Operations* Ratio, proportion percent problems (See Grade 7.RP) • *Measurement* Order and conversion of units of measure (See Grade 6.G) • *Measurement* Rates (See Grade 7.RP) • *Geometry* Geometric figures on coordinate plane (See Grades 6-7.G) • *Geometry* Nets (See 6.G.4) • *Patterns, Functions and Algebra* Algebraic expressions (See Grades 6-7.EE) • *Patterns, Functions and Algebra* Grade 8 learning is limited to linear equations • *Patterns, Functions and Algebra* Quadratic equations (See HS) • *Data Analysis* Graphical representation analysis (See Grade 6.SP) • *Data Analysis* Measures of center and spread; sampling (See Grade 7.SP) • *Probability* (See Grade 7.SP)