Table Index to the Massachusetts ABE Mathematics Curriculum Frameworks: Strands, Topics, and Benchmarks

By Andrea Martone, Barbara Goodridge, Marilyn Moses, and Judy Titzel
(2004)

[1] Martone, A., Goodridge, B., Moses, M., & Titzel, J. (2004). Refinements to Massachusetts' Adult Basic Education Mathematics Standards for Assessment Purposes. *Center for Educational Assessment Research Report No. 548*. Amherst, MA: Center for Educational Assessment, University of Massachusetts.

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Strand	Topic	2 Beg ABE	3 Intermediate ABE	4 Pre-GED	5 GED	6 Bridge to College
Number Sense	Place value	2N-1.1 Count, read, write, order and compare two and three-digit numbers. 2N-1.2 Distinguishes between odd and even numbers up to 1,000.	3N-1.1 Read, write, order and compare numbers up to 1,000,000. 3N-1.6 Read, write, and compare positive and negative numbers in practical contexts. **Assessed by** 4N-1.2	4N-1.1 Read, write, order and compare numbers, including large numbers (millions or billions). 4N-1.2 Recognize positive and negative numbers in practical contexts.	5N-1.1 Read, write, order and compare positive and negative numbers of any size in a practical context.	6N-1.1 Read, write, order and compare positive and negative numbers of any size.
Number Sense	Rounding/ Estimation	2N-3.2 Estimate to the nearest 10 or 100 in numbers up to 1,000. 2N-3.7 Approximate by rounding numbers to the nearest tens or hundreds in numbers up to 1,000.	3N-3.5 Approximate by rounding numbers up to 1,000,000 to the nearest tens, hundreds, or thousands.	4N-3.8 Estimate answers to calculations.		

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Number Sense	Addition/ Subtraction	2N-2.1 Demonstrate an understanding of different meanings of addition (counting on, combining) of two and three-digit numbers. 2N-3.1 Add two and three-digit whole numbers flexibly, efficiently, and accurately. 2N-1.5 Skip count forward or backward by 2's, 5's, or 10's. 2N-2.2 Demonstrate an understanding of efficient and flexible strategies of subtraction of two and three digit numbers. 2N-3.3 Subtract using two and three-digit whole numbers flexibly, efficiently, and accurately. 2N-2.3 Demonstrate an understanding of how addition and subtraction relate to each other for numbers up to 1,000.	3N-2.3 Demonstrate an understanding of how addition and subtraction relate to each other for numbers up to 1,000,000. 3N-3.10 Carry out calculations using addition and subtraction with numbers up to 1,000,000 using efficient written methods including ways to check answers.	4N-3.10 Carry out calculations using addition and subtraction with numbers of any size using efficient written methods including ways to check answers.		

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Number Sense	Multiplication/Division	2N-2.4 Demonstrate an understanding of different meanings of multiplication of numbers up to 12 (repeated addition, grouping, and arrays). 2N-3.4 Multiply two-digit whole numbers by numbers 1,2,3,4,5,10 and 11. 2N-2.5 Demonstrate an understanding of different meanings of division (separating into equal groups, discovering the number of equal groups contained within). 2N-3.6 Divide two-digit whole numbers by single-digit whole numbers. 2N-2.6 Demonstrate an understanding of how multiplication and division of one and two digit numbers relate to each other.	3N-3.1 Divide by two and three-digit whole numbers and interpret remainders. **Assessed by** 3N-3.11 3N-3.11 Carry out calculations using multiplication and division with two and three digit numbers using efficient written methods including ways to check answers and interpret remainders 3N-3.3 Multiply and divide whole numbers by 10 and 100.	4N-2.2 Perform multiplication operations reliably, accurately, and efficiently. 4N-3.12 Multiply whole numbers by 10, 100, and 1,000 to understand the impact on place value. 4N-3.13 Divide whole numbers by 10, 100, and 1,000 to understand the impact on place value. 4N-3.11 Carry out calculations with multiplication and division using efficient methods including ways to check answers.	5N-3.7 Determine prime numbers up to 100.	

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Number Sense	Operations - general		3N-3.2 Carry out calculations with three-digit whole numbers using efficient written methods. **Assessed by** 3N-3.10 and 3.11 3N-2.4 Choose the correct operation for solving a one-step narrative problem.	4N-2.1 Choose the correct operation for solving a multi-step narrative problem		
Number Sense	Integers			4N-3.7 Add and subtract integers. 4P-3.7 Read and understand positive and negative integers. 4P-3.8 Demonstrate an understanding addition and subtraction of integers.	5N-2.2 Demonstrate an understanding of the effects of each operation with integers. 5N-3.4 Add, subtract, multiply and divide using integers in practical contexts.	6N-3.4 Add, subtract, multiply and divide using integers.

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Number Sense	Exponents/ roots		3N-1.7 Read, write and compute squares and cubes of whole numbers. 3N-2.2 Demonstrate an understanding of how squaring and taking the square root are related. **Assessed by** 4N-2.5 3N-2.5 Understand and use exponents to represent repeated multiplication. 3N-3.8 Find squares, square roots, and cubes of whole-number quantities. **Assessed by** 3N-1.7	4N-2.4 Read, write and compute with exponents. 4N-2.5 Calculate square roots of perfect squares, estimate within range of square root value, and demonstrate an understanding of how squaring and taking the square root are related.	5N-1.6 Read and write numbers in scientific notation.	6N-1.6 Read and write numbers in exponential notation using integer exponents. 6N-2.2 Demonstrate an understanding that raising a number to a negative integer is repeated division.
Number Sense	Calculator usage	2N-3.8 Use a calculator to check calculations using whole numbers	3N-3.9 Use a calculator to carry out calculations using whole numbers and decimals to two places to solve problems in context, and to check calculations	4N-3.9 Use a calculator to calculate efficiently using whole numbers, fractions, decimals and percentages.	5N-3.6 Use a calculator to calculate efficiently using whole numbers, integers, fractions, decimals and percentages.	6N-3.6 Use a calculator to calculate efficiently using whole numbers, integers, fractions, decimals, percentages.

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Number Sense	Decimals		3N-1.4 Read, write and compare decimals up to two decimal places in practical contexts (such as money in decimal notation, e.g. $10.35). 3N-3.4 Carry out basic calculations with money.	4N-1.4 Read, write, order and compare decimals up to three decimal places. 4N-3.1 Round decimals in practical contexts and verbal problems. 4N-3.2 Add, subtract, multiply and divide decimals up to three places.	5N-1.3 Read, write, order and compare decimal numbers of any size. 5N-3.1 Add, subtract, multiply and divide decimals of any size.	6N-1.3 Read, write, order and compare decimal numbers. 6N-3.1 Add, subtract, multiply and divide decimals up to three places.
Number Sense	Fractions	2N-1.3 Read, write, and compare halves and quarters of quantities. 2N-3.5 Know halves of even numbers up to 100.	3N-1.2 Read, write and compare common fractions (e.g. thirds, halves, quarters). 3N-1.3 Recognize and use equivalent forms of common fractions (e.g.1/2 = 5/10). **Assessed by** 4N-1.11 3N-2.1 Demonstrate an understanding that multiplying a whole number by a unit fraction is the same as dividing the whole number by that fraction's denominator. 3N-3.6 Find common parts of whole number quantities or measurements (e.g. ¾ of 12, 2/3 of 15).	4N-1.3 Read, write, order and compare fractions and mixed numbers. 4N-1.11 Recognize and use equivalent forms of common fractions (e.g.1/2 = 5/10) 4N-3.3 Evaluate one number as a fraction of another. 4N-3.4 Use common fractions to add, subtract, multiply and divide amounts or quantities.	5N-1.2 Read, write, order and compare fractions and mixed numbers. 5N-3.3 Add, subtract, multiply and divide using fractions and mixed numbers. 5N-2.1 Demonstrate an understanding of the effects of each operation with fractions.	6N-1.2 Read, write, order and compare fractions and mixed numbers. 6N-3.3 Add, subtract, multiply and divide using fractions.

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Number Sense	Percentages	2N-1.4 Use 50% as equivalent for *one-half*.	3N-1.8 Understand that percent represents a ratio of a part to a whole where the whole is 100. 3N-3.12 Compute percentages when part and whole are given using friendly numbers (10%, 25%, 50%, 75%).	4N-1.7 Read, write, order and compare simple percentages. 4N-1.8 Demonstrate an understanding of simple percentage of increase and decrease. **Assessed by** 5N-1.4 4N-1.10 Use ratio and proportion to solve one-step percent problems.	5N-1.4 Order and compare percentages and understand percentage of increase and decrease. 5N-3.5 Compute with percentage to solve problems in context.	6N-1.4 Order and compare percentages and understand percentage increase and decrease. 6N-3.5 Compute with percentage.
Number Sense	Decimal/ Fraction/ Percentage - Equivalency		3N-1.5 Recognize fraction, decimal, and percent equivalents for a half and one quarter. 3N-3.7 Use equivalencies between common fractions and percentages to find part of whole-number quantities.	4N-1.5 Recognize and use equivalencies between fractions and decimals. 4N-1.6 Convert fractions to decimals and decimals to fractions. 4N-1.9 Recognize equivalencies between common fractions, percentages and decimals (e.g. 50% = ½, 0.25 = ¼) and use these to find part of whole-number quantities. **Assessed by** 5N-1.5	5N-1.5 Identify and use equivalencies between fractions, decimals and percentages. 5N-2.3 Demonstrate an understanding that dividing by the denominator of a unit fraction produces the same result as multiplying by the decimal form of the fraction. 5N-2.4 Recognizes equivalent fractions, decimals, and percents and can convert from each form to the other two.	6N-1.5 Identify and use equivalencies between fractions, decimals and percentages. 6N-2.1 Demonstrate an understanding that use of the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition can simplify computations with decimals, fractions, and integers.

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Number Sense	Ratio			4N-2.3 Use ratios to describe the relationship between two sets of objects 4N-3.5 Work out simple ratio and direct proportion.	5N-3.2 Calculate ratio and direct proportion.	6N-3.2 Calculate ratio and direct proportion.
Patterns, Functions, and Algebra	Number Line	2P-3.4 Read and understand positive and negative numbers as showing direction and change. **Assessed by** 3P-3.7 2P-3.5 Use a number line to represent the counting numbers.	3P-3.5 Use a number line to represent the counting numbers. **Assessed by** 4P-3.9 3P-3.7 Read and understand positive and negative numbers as showing direction and change on both horizontal and vertical number lines.	4P-3.9 Use a number line to represent values.		
Patterns, Functions, and Algebra	Place value – inequality	2P-3.3 Write statements of inequality for numbers up to 1,000.	3P-3.6 Write statements of inequality for numbers up to 1,000,000.	4P-3.10 Write statements of inequality for integers of any size e.g.: 2 < 10 10 > 8 99 < 100 1,000 > 999.99 -12 < - 11.		

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Patterns, Functions, and Algebra	Operations – general	2P-3.1 Use and interpret +, -, x, /, and = to represent combining, comparing, separating and equivalence. **Assessed by** 2P-3.6 2P-3.6 Write a simple expression or equation representing a verbal expression to demonstrate an understanding of the four operations and the equal sign.	3P-2.1 Write an expression or equation representing verbal situations with one or two operations. 3P-3.1 Use and interpret +, -, x, /, and = to represent combining, comparing, and equivalence. **Assessed by** 3P-3.2 3P-3.2 Read, write, and solve expressions using algebraic notation for addition, subtraction, multiplication, division, and parentheses with one or two operations.	4N-3.6 Follow order of operations in evaluating number sentences with more than one operation. **Assessed by** 3P-3.2 4P-2.1 Write an expression or equation representing verbal situations, including multiple operations, fractions, exponents and parenthesis. 4P-3.1 Use and interpret the +, -, x, /, and = to represent combining, comparing, and equivalence. **Assessed by** 4P-3.2 4P-3.2 Read and write number operations using algebraic notation for multiplication, division, and parentheses. 4P-3.3 Demonstrate appropriate use of the universally accepted "order of operations".	5P-2.1 Create own equations, rules or sketch graphs from word problems or observed situations.	

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Patterns, Functions, and Algebra	Missing Variables	2P-3.2 Read and write simple number sentences such as $n + 5 = 10$, $8 - 3 = \square$, $5 \times \square = 10$, $8 \div 2 = \square$ $\square \div 3 = 5$ where the $\square$ represents a missing amount or n = a missing number.	3P-3.3 Substitute the value for the variable in one step expressions using whole numbers for all operations when the value is given, such as finding $x + 4$ and $10 - x$ when x has a value of 1. 3P-3.4 Find the value of the variable in one-step equations with whole numbers such as: $x + 25 = 100$ $x - 16 = 42$ $3y = 42$ $y/5 = 200$	4P-3.4 Substitute the value for the variable in an addition or subtraction expression when the value is given, such as finding $x + 4$ and $10 - x$ when x has a value of 1. 4P-3.5 Substitute the value for the variable in a multiplication or division expression when the value is given (e.g. finding $2x$ and $8/x$ when $x = 2$ including exponents. 4P-3.6 Evaluate expressions and make whole number substitutions in given formula to produce results. 4P-3.11 Find the value of a variable in multi-step equations e.g.: $3x + 25 = 100$ $2x - 16 = 42$ $3y + 3 = 42$ $m/5 - 25 = 200$.	5P-3.1 Find the value of an unknown in equations that require multi-step solutions e.g.: $2x + 4 = 6x - 8$ $0.5y^2 - 10 = 40$. 5P-3.2 Evaluate formulas. 5P-3.3 Solve linear and quadratic equations.	6P-3.3 Evaluate formulas and functions. 6P-3.4 Solve equations (e.g. linear, quadratic, exponential, trigonometric) and systems of linear equations. 6P-3.5 Recognize and use direct and indirect variation.

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Patterns, Functions, and Algebra	Patterns – identification	2P-1.1 Complete simple repeating number patterns up to 1,000 and identify the unit being repeated. 2P-1.2 Recognize and create repeating patterns and identify the unit being repeated.	3P-1.1 Complete number sequences with whole numbers involving two-step progressions. 3P-1.2 Recognize and create repeating patterns and identify the unit being repeated. **Assessed by** 3P-1.1 3P-1.3 Given a table of amounts, generalize the relationship between the quantities using simple patterns such as doubling.	4P-1.1 Complete number sequences (all whole numbers, simple fractions and decimals) involving two-step progressions. 4P-1.2 Recognize and create repeating patterns, identify the unit being repeated, and generalize. 4P-1.3 Given a table of amounts, generalize the relationship between the quantities.	5P-1.1 Extend a pattern and when applicable hypothesize reasons, and analyze how both repeating and growing patterns are generated. 5P-1.2 Demonstrate an understanding of graphical, tabular, or symbolic representations for a given pattern and/or relationship.	6P-1.1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative/recursive (e.g. Fibonnacci Numbers), linear, quadratic and exponential functions. 6P-1.2 Explain the difference between linear and exponential growth. 6P-3.1 Recognize that a variety of problem situations may be modeled by the same function or type of function.

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Patterns, Functions, and Algebra	Patterns – Represent Relationships with Tables, Graphs, Rules, Equations	2P-2.1 Create tables to show the patterns inherent in addition and multiplication of number pairs from 0 to 12. 2P-4.1 Describe qualitative change, such as lengthening hours of daylight or increasing heat 2P-4.2 Describe quantitative change, such as saving 3 cents a day for one month	3P-2.2 Develop and use simple formulas from tables with one or two arithmetical steps for real life contexts. 3P-4.1 Investigate how a change in one variable relates to a change in a second variable. 3P-4.2 Identify and describe situations with constant or varying rates of change and compare them.	4P-2.2 Develop and use simple formulas from tables with multiple arithmetical steps for real life contexts. 4P-4.1 Use graphs to analyze the nature of changes in quantities in linear relationships	5P-2.2 Convert between different representations, such as tables, graphs, verbal descriptions, and equations. 5P-2.3 Develop algebraic expressions, rules, formulae, or sketch graphs to generalize straightforward number patterns or observable relationships between variables. 5P-2.4 Draw graphs using techniques such as plotting points; sketching from known main features of algebraic function; or using technology like a graphing calculator or computer package. 5P-2.5 Identify general shapes and major characteristics of linear and simple non-linear graphs and interpret their real world meanings.	6P-2.1 (6P-3.2) Convert between different representations, such as tables, graphs, verbal descriptions, and equations. 6P-2.2 Develop algebraic expressions, rules, formulae, or sketch graphs to generalize straightforward number patterns or observable relationships between variables. 6P-2.3 Draw graphs using techniques such as plotting points; sketching from known main features of algebraic function; or using technology like a graphing calculator or computer package. 6P-2.4 Identify general shapes and major characteristics of linear and simple non-linear graphs and interpret their real world meanings.

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Statistics and Probability	Data – Collect, Organize, and Represent	2S-1.1 Gather data to answer posed questions. 2S-1.2 Group objects or responses by a single criterion. 2S-1.3 Represent information so that it makes sense to others (e.g., using a list, table or diagram).	3S-1.1 Pose questions about themselves and their surroundings and gather data to answer posed questions. **Assessed by** 2S-1.1 3S-1.2 Group objects or responses by a single criterion. **Assessed by** 2S-1.2 3S-1.3 Represent information so that it makes sense to others. 3S-1.5 Represent categorical data on a line plot. 3S-2.3 Sort graphs and tables by type.	4S-1.1 Pose questions about themselves and their surroundings and gather data to answer posed questions. 4S-1.2 Group objects or responses by single or double criteria. 4S-1.3 Represent information so that it makes sense to others in any graphical form. 4S-1.5 Display categorical data in a bar graph or simple fractions of data in a circle graph. 4S-1.6 Convert a bar graph into a circle graph. 4S-1.7 Translate data from a numerical table to a line graph and vice versa.	5S-1.1 Pose both categorical and numerical questions about himself or his environment. 5S-1.2 Collect and organize responses to questions. **Assessed by** 5S-1.1 5S-1.3 Choose appropriate representation to display responses to all types of data. 5S-1.4 Collect comparative data on a single given question such as responses grouped by age group vs. responses grouped by gender. 5S-1.5 Display comparative data on a double bar or line graph.	6S-1.1 Pose both categorical and numerical questions about himself or his environment. 6S-1.2 Collect and organize responses to posed questions. 6S-1.3 Choose appropriate representation to display responses to all types of data. 6S-1.4 Collect comparative data on a single given question such as responses grouped by age group vs. responses grouped by gender. 6S-1.5 Display comparative data on a double bar or line graph. 6S-16 When computers and software are available, know how to use a spreadsheet.

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Statistics and Probability	Data – Read and Interpret	2S-1.4 Find a total from subtotaled categories of two or three-digits to verify inclusion of all data. 2S-2.1 Identify graphs and tables in available resources. 2S-2.2 Find graphs and tables from external sources. 2S-2.3 Extract simple information from a list or table. 2S-2.4 Read values on a bar graph up to 1,000. 2S-2.5 Make numerical comparisons about relative values on a bar graph.	3S-1.4 Find a total from subtotaled categories to verify inclusion of all data. 3S-2.1 Identify graphs and tables in available resources. **Assessed by** 2S-2.1 3S-2.2 Find graphs and tables in external sources. **Assessed by** 2S-2.2 3S-2.4 Extract simple information from a list or table. **Assessed by** 2S-2.3 3S-2.5 Read values on a bar and line graph up to 1,000,000. 3S-2.6 Make numerical comparisons about relative values on a bar graph.	4S-1.4 Find a total from subtotaled categories to verify inclusion of all data. **Assessed by** 3S-1.4 4S-2.1 Identify graphs and tables in available resources. **Assessed by** 2S-2.1 4S-2.2 Find graphs and tables in external sources. **Assessed by** 2S-2.2 4S-2.3 Name and sketch various types of graphs from a table. 4S-2.4 Extract simple information from a list or table. **Assessed by** 2S-2.3 4S-2.5 Read values on a bar, line, or circle graph. 4S-2.6 Make numerical comparisons about relative values on a bar graph or circle graph.	5S-2.1 Identify graphs and tables in available resources. **Assessed by** 2S-2.1 5S-2.2 Know where graphs and tables are likely to be found. **Assessed by** 2S-.2.2 5S-2.3 Infer meaning from gaps, clusters and comparisons of data. 5S-2.4 Give a verbal description of bar, line, and circle graphs and tables. 5S-2.5 Make numerical comparisons about values on graphs and tables.	6S-2.1 Identify graphs and tables in available resources. 6S-2.2 Know where graphs and tables are likely to be found. 6S-2.3 Give a verbal description of bar, line, and circle graphs, and tables. 6S-2.4 Make numerical comparisons about relative values on graphs and tables. 6S-2.5 Infer meaning from gaps, clusters, and comparisons of data. 6S-2.6 Infer consequences related to data outcomes.

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Statistics and Probability	Data – Description, Statistics, and Trends		3S-3.1 Identify the minimum, maximum, spread and shape of data. **Assessed by** 5S-3.1 3S-3.2 Use “most of” statements to describe data. 3S-3.3 Find the average (mean) and range for a data set. 3S-3.4 Find the median. **Assessed by** 4S-3.4 3S-4.8 Recognize that mean and median numbers are considered "averages," and that averages represent numbers typical of the data that can support an argument. **Assessed by** 4S-3.4	4S-3.1 Identify the minimum, maximum, spread and shape of data. **Assessed by** 5S-3.1 4S-3.2 Use "most of" statements to describe data. **Assessed by** 3S-3.2 4S-3.3 Find the mean. 4S-3.4 Find the median and mode. 4S-3.5 Identify the effect of spread on mean and median. **Assessed by** 5S-4.5	5S-3.1 Identify the minimum, maximum, spread, shape, and range of data, mean, median, mode to understand trends and statements. 5S-3.2 Identify the effect of spread on mean and median. **Assessed by** 5S-4.5 5S-4.5 Demonstrate an understanding of the impact of spread on mean and median, and which statistic, *mean*, *median*, or *mode,* is most appropriate for data.	6S-3.1 Identify the minimum, maximum, spread, shape, and range of data. 6S-3.2 Use 'most of' statements to describe data. 6S-3.3 Find the mean. 6S-3.4 Find the median. 6S-3.5 Identify the effect of spread on mean and median.
Statistics and Probability	Data – Make and Evaluate Statements by Applying Knowledge of Data	2S-3.1 Match graphs and tables to statements 2S-3.2 Determine whether or not a graph connects to an argument/ statement using title, labels and percent matches. **Assessed by** 4S-4.1 (cont.)	3S-4.1 Match more than one graph or table with statements. **Assessed by** 2S-3.1 (cont.)	4S-4.1 Determine whether or not a graph/table connects to an argument/statement using title, data labels and percent matches. (cont.)	5S-4.1 Choose the best graph to support a position. (cont.)	6S-4.1 Make statements about data trends to support or reject arguments/statements forwarded by others. (cont.)

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		2S-3.3 Support simple statements with data. 2S-3.4 Visually identify 'who has more' and identify obvious misstatements.	3S-4.2 Determine whether or not a graph/table connects to a statement using title, data labels and percent matches. **Assessed by** 4S-4.1 3S-4.3 Visually identify "who has more," and use some numbers to compare quantities. **Assessed by** 2S-3.4 3S-4.4 Support simple statements with data. 3S-4.5 Use "most of" statements to support arguments. **Assessed by** 3S-4.4 3S-4.6 Know statements using "double" and "half" or fifty percent are accurate 3S-4.7 Know when percent figures don't add up to 100%. **Assessed by** 4S-4.6 3S-4.9 Recognize that bar widths can provide misleading information. (cont.)	4S-4.2 Visually identify "who has more," use numbers to compare quantities and identify obvious misstatements. **Assessed by** 2S-3.4 4S-4.3 Make statements about data trends to support or reject arguments/ statements forwarded by others. **Assessed by** 5S-4.4 4S-4.4 Know statements using "double" and "half" or fifty percent are accurate. **Assessed by** 3S-4.6 4S-4.5 Verify that statements using three times or four times, one fourth or one tenth are accurate. 4S-4.6 Know when percent figures don't add up to 100% and when numbers and percent figures (50%, 25%,10%) don't match up. (cont.)	5S-4.2 Support arguments with data and data representations and use number statements to demonstrate the power of an argument. 5S-4.3 Convert graphs to narratives and narratives to graphs to forward a position. 5S-4.4 Make statements about data trends to support or reject arguments/statements forwarded by others. 5S-4.6 Recognize that bar widths, scale, and wedge size distortions can provide misleading information. 5S-4.7 Explain where and how authors of data reports can manipulate data to benefit themselves or malign others in mixed materials. 5S-4.8 Understand that different categorizations of data reveal different stories. (cont.)	6S-4.2 Know when percents given and figures used don't match Make accurate statements using percents. 6S-4.3 Recognize that mean, median, and mode numbers are considered "averages," and that averages represent numbers typical of the data that can support an argument. 6S-4.4 Demonstrate an understanding of the impact of spread on mean and median, and therefore, when the choice of statistic is appropriate and know that mean and medians are compressions of data. 6S-4.5 Determine which statistic, mean or median, is appropriate for data. (cont.)

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			3S-4.10 See where authors of data reports can manipulate data to benefit themselves or malign others in provided materials. **Assessed by** 5S-4.7 3S-4.11 Identify obvious misstatements. 3S-4.12 Use statements that refer to "double" and "half" or fifty percent of the data.	4S-4.7 Compare and contrast provided graphs to evaluate for contradictory or unsupported statements.	5S-4.9 Demonstrate an understanding of the impacts of data compression, and when compression helps or hinders an argument. **Not assessed, but important to teach at this level** 5S-4.10 Compare and contrast provided graphs to evaluate contradictory or unsupported statements, or to strengthen an argument. **Assessed by** 4S-4.7	6S-4.6 Recognize that bar widths can provide misleading information, and state how those distortions are used to affect the arguments/statements. 6S-4.7 Recognize scale distortions in research materials, and state how those distortions are used to affect the arguments/statements. 6S-4.8 Recognize wedge size distortions, and state how those distortions are used to affect the arguments/statements. 6S-4.9 Note where authors of data reports can manipulate data to benefit themselves or malign others in mixed materials and state those bias factors. (cont.)

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						6S-4.10 Demonstrate an understanding that different categorizations of data reveal different stories and state how and why such effects relate to arguments/statements. 6S-4.11 Demonstrate an understanding of the impacts of data compression and state how and why such effects relate to arguments/statements. 6S-4.12 Compare and contrast graphs to evaluate for contradictory or unsupported statements. 6S-4.13 Demonstrate an understanding of simple sample biases.

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Statistics and Probability	Probability	2S-4.1 Discuss events as likely or unlikely. 2S-4.2 Give the probability of a single outcome in simple concrete situations such as tossing a coin or rolling a die. **Assessed by** 3S-5.2	3S-5.1 Discuss events as likely or unlikely benchmarks. 3S-5.2 Give the probability of a single outcome in simple concrete situations such as tossing a coin or rolling a die. 3S-5.3 State probability as a ratio in multiple forms (colons, words, fractions) with simple scenarios.	4S-5.1 Discuss events as likely or unlikely. **Assessed by** 3S-5.1 4S-5.2 Give the probability of a single outcome in simple concrete situations such as tossing a coin or rolling a die. **Assessed by** 3S-5.2 4S-5.3 State probability as a ratio fraction. 4S-5.4 Find the probability of independent events. 4S-5.5 State probability as a percent.	5S-5.1 Find the probability of both independent and dependent events. 5S-5.2 Find the number of possible combinations given two or more sets of data.	6S-5.1 Discuss events as likely or unlikely. 6S-5.2 Give the probability of a single outcome in simple concrete situations such as tossing a coin or rolling a die. 6S-5.3 State probability as a ratio fraction. 6S-5.4 State probability as a percent. 6S-5.5 Find the probability of both independent and dependent events.

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Geometry and Measurement	Map Skills/ Coordinates	2G-3.1 Use the compass rose on a map with secondary (SW, NE, etc) directions. 2G-3.2 Use a street directory or a map with a coordinate grid (C5, etc.). **Assessed by** 3G-3.1	3G-3.1 Use direction, distance, coordinates, simple scales, labels, symbols, and keys to read and use maps and plans. 3G-3.2 Draw 2 dimensional (2-D) shapes in different orientations on a grid. **Assessed by** 4G-3.3 3G-4.3 Read and interpret scales with marked and unmarked labels. **Assessed by** 4G-3.1	4G-3.1 Read, interpret, and use a distance scale to find the shortest route between two locations on a map. 4G-3.2 Measure common three-dimensional (3-D) shapes (e.g. a room) and represent the information on an appropriate diagram drawn to scale. 4G-3.3 Draw 2D shapes in different orientations on a grid. 4G-3.4 Use coordinate grid to identify and locate specific points on the x and y axes.	5G-2.1 Use coordinates to design and describe geometric figures or translations/rotations of geometric figures. 5G-3.1 Find, use, and interpret the slope of a line, the y-intercept of a line, and the intersection of two lines.	6G-2.1 Use coordinates to describe translations/rotations of geometric figures. 6G-3.1 Use coordinates to design and describe geometric figures or translations/rotations of geometric figures.

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Geometry and Measurement	Measurement	2G-4.3 Estimate, measure, and compare lengths, weights, capacity using standard and non-standard units. 2G-4.4 Use simple instruments graduated in familiar units (e.g. inches, feet, yards, pounds, fluid ounces, and centimeters). **Assessed by** 3G-4.12 2G-4.5 Know the relationship of familiar units (e.g. 12 inches in a foot, 3 feet in a yard, 4 cups in a quart).	3G-4.4 Measure with a ruler to 1/8 inch and metric ruler in cm and mm. 3G-4.5 Make informal comparisons between inches and centimeters. 3G-4.7 Use and apply concepts of weight and capacity to solve problems. 3G-4.12 Estimate, measure, and compare whole number weights using simple instruments graduated in familiar units (ounces and pounds) and know when to use appropriate measures. 3G-4.6 Convert units of measure in the same systems.	4G-4.4 Measures with a ruler to 1/16 inch and metric ruler in cm and mm. 4G-4.5 Uses the language (prefixes) of metric units to describe environment. 4G-4.6 Make informal comparisons between grams and ounces, liters and quarts. 4G-4.7 Estimate, measure, and compare capacity using simple instruments graduated in standard units and know when to use appropriate measures. 4G-4.1 Given the equivalents, convert units of measure in different systems by using own informal methods	5G-1.1 Apply ratio and proportion in familiar situations that may use scales or magnification. 5G-1.2 Use the language (prefixes) of metric units to describe environment (centi, milli, kilo, micro, mega). **Assessed by** 4G-4.5 5G-4.1 Solve and estimate solutions to problems involving length, perimeter, area, surface area, volume, angle measurement, capacity, weight, and mass.	6G-4.1 Solve and estimate solutions to problems involving length, perimeter, area, surface area, volume, angle measurement, capacity, weight, and mass.

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Geometry and Measurement	Shapes – properties	2G-1.1 Name, order and group 2 dimensional shapes by properties. 2G-1.2 Investigate and explain common uses of shapes in the environment.	3G-1.1 Use informal visual methods to describe and compare shape, dimensions, perimeters, area, and angles, sides in 2 dimensional objects. 3D objects **Assessed by** 4G-1.3	4G-1.3 Use informal visual methods to describe and compare shape, dimensions, perimeters, area, and angles, sides in two-dimensional (2-D) and three-dimensional (3D) objects. 4G-1.4 Identify shapes that are congruent or similar.	5G-1.3 Use spatial visualization to describe and analyze geometric figures. **Assessed by** 4G-1.3	6G-1.1 Model and solve problems using the concepts of perpendicularity, parallelism, congruence and similarity of geometric figures (includes polygons, 3-D figures, and circles). 6G-1.3 Use spatial visualization to describe and analyze geometric figures.
Geometry and Measurement	Symmetry	2G-2.1 Estimate where a line of symmetry falls in a basic shape. **Assessed by** 3G-2.3 2G-2.2 Show more than one line of symmetry in a basic shape. **Assessed by** 3G-2.3	3G-2.1 Estimate where a line of symmetry falls in a basic shape. **Assessed by** 3G-2.3 3G-2.2 Show more than one line of symmetry in a basic shape. **Assessed by** 3G-2.3 3G-2.3 Identify where a line of symmetry falls in a basic shape.	4G-2.1 Estimate where a line of symmetry falls in a basic shape. 4G-2.2 Show more than one line of symmetry in a complex shape.		
Geometry and Measurement	Circles			4G-1.1 Directly measure and compare the radius, diameter, and circumference of a circle		

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Geometry and Measurement	Triangles/ Angles		3G-1.2 Identify properties, locations, and functions of right angles.	4G-1.2 Directly measure different angles with a protractor. **Assessed by** 5G-1.7 4G-1.5 Identify types of angles such as right, obtuse, acute, or straight. 4G-1.6 Understand the relationship of angles when you have a system of parallel lines cut by a transversal . 4G-1.7 Identify different names of triangles by properties, such as isosceles, right, and equilateral. 4G-1.8 Estimate measure of an angle using benchmarks.	5G-1.5 Uses properties of triangles to solve problems. 5G-1.6 Use properties of right triangles and Pythagorean relationship to solve problems. 5G-1.7 Directly measure different angles with a protractor.	6G-1.2 Use the Pythagorean theorem, similarity, and right-triangle trigonometry to model and solve problems.

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Geometry and Measurement	Area/Perimeter/Volume	2G-4.8 Find the perimeter of rectangles. 2G-4.9 Find the area of rectangles. **Assessed by** 3G-4.11	3G-4.11 Measure perimeter in linear units and area in square units (sq. in., sq. ft., sq. cm.).	4G-4.8 Work out simple volumes of cubes, cylinders, and rectangular containers. 4G-4.9 Find perimeter/area of combination shapes using what you know about rectangle and triangles.	5G-1.4 Develop and use formula e that describe relationships between variables in familiar contexts (area and volume). 5G-4.2 Predict the impact of changes in linear dimensions on the perimeter, area, and volume of figures. 5G-4.4 Solve problems of area involving inscribed figures (ex. circle inscribed in a square).	6G-4.2 Predict the impact of changes in linear dimension on the perimeter, area, and volume of figures.
Geometry and Measurement	Money	2G-4.1 Calculate the total cost of many items and the change from a whole dollar amount.	3G-4.1 Add, subtract, multiply and divide sums of money including decimal notation.			
Geometry and Measurement	Time	2G-4.2 Read, record, and understand time formats of quarter and half, with a digital and 12 hour analog clock.	3G-4.9 Use and interpret the 24 hour clock. 3G-4.10 Calculate times using the appropriate value and converting between time formats (including elapsed time).			

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Geometry and Measurement	Temperature	2G-4.6 Read and compare positive temperatures in Fahrenheit. 2G-4.7 Develop personal benchmarks for temperatures.	3G-4.8 Use, read, and compare positive and negative Fahrenheit temperatures.	4G-4.2 Read, measure, and compare Fahrenheit and Celsius temperatures.	5G-4.5 Use simplified formula to convert between Fahrenheit and Celsius temperatures.	
Geometry and Measurement	Rate of change		3G-4.2 Demonstrate a general understanding of inter-relatedness of distance, time, and speed	4G-4.3 Estimate and approximate an understanding of inter-relatedness of distance, time, and speed.	5G-4.3 Calculate and interpret rates of change from graphical and numerical data. 5P-4.1 Approximate and interpret rates of change from graphical and numerical data. **Assessed by** 5G-4.3	6P-4.1 Approximate and interpret rates of change from graphical and numerical data.

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