North Carolina ABE/ASE Content Standards

Level 5 Mathematics, 9.0-12.9

Algebraic Concepts and Expressions MA.1

1 Number and Quantity: The Real Number System and Quantities. MA.1.1

1 Rewrite expressions involving radicals and rational exponents using the properties of exponents. For example: The expression 5[illegible]!" can be re-written as; (5a4 b12) 1/2 which can also be re-written as: 51/2.(a4) 1/2.(b12) 1/2 MA.1.1.1

2 Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. MA.1.1.2

3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MA.1.1.3

2 Algebra: Seeing Structure in Expressions MA.1.2

1 Interpret expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients MA.1.2.1

2 Use the structure of an expression to identify ways to rewrite it. MA.1.2.2

3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines. MA.1.2.3

3 Algebra: Arithmetic with Polynomials and Rational Expressions MA.1.3

1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. MA.1.3.1

2 Rewrite rational expressions. MA.1.3.2

Equations and Inequalities MA.2

1 Algebra: Creating Equations MA.2.1

1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions and simple rational and exponential functions. MA.2.1.1

2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. MA.2.1.2

3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non- viable options in a modeling context. MA.2.1.3

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4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. MA.2.1.4

2 **Algebra: Reasoning with Equations and Inequalities** MA.2.2

1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. MA.2.2.1

2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. MA.2.2.2

3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. MA.2.2.3

4 Solve quadratic equations with one variable. MA.2.2.4

5 Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables. MA.2.2.5

6 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve. MA.2.2.6

Algebraic Functions and Modeling MA.3

1 **Understand the concept of a function and use function notation and degrees of functions.** MA.3.1

1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). MA.3.1.1

2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. MA.3.1.2

3 Interpret functions that arise in application in terms of the context. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. MA.3.1.3

4 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. MA.3.1.4

5 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. MA.3.1.5

6 Analyze functions in different representations. Graph functions expressed symbolically and show key features (properties described above) of the graph, by hand in simple cases and using technology for more complicated cases. MA.3.1.6

7 Use properties of exponents to interpret expressions for exponential functions. MA.3.1.7

8 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). MA.3.1.8

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2 **Build a function that models a relationship between two quantities.** MA.3.2

1 Write a function that describes a relationship between two quantities. MA.3.2.1

3 **Construct and compare linear, quadratic, and exponential functions models and solve problems. Interpret expressions for functions in terms of the situation they model.** MA.3.3

1 Distinguish between situations that can be modeled with linear functions and with exponential functions. MA.3.3.1

2 Interpret the parameters in a linear or exponential function in terms of a context. MA.3.3.2

Geometry, Probability, and Statistics MA.4

1 **Geometry: Understand congruence and similarity.** MA.4.1

1 Experiment with transformations in a plane. 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. MA.4.1.1

2 Prove theorems involving similarity. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. MA.4.1.2

2 **Geometric Measure and Dimension: Explain formulas and use them to solve problems and apply geometric concepts in modeling situations.** MA.4.2

1 Explain perimeter, area, and volume formulas and use them to solve problems involving two- and three-dimensional shapes. MA.4.2.1

2 Apply geometric concepts in modeling of density based on area and volume in modeling. MA.4.2.2

3 **Summarize, represent, and interpret categorical and quantitative data on (a) a single count or measurement variable, (b) two categorical and quantitative variables, and (c) Interpret linear models.** MA.4.3

1 Represent data with plots on the real number line. MA.4.3.1

2 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). MA.4.3.2

3 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data. Recognize possible associations and trends in the data. MA.4.3.3

4 Interpret the slope and the intercept of a linear model in the context of the data. MA.4.3.4

5 Distinguish between correlation and causation. MA.4.3.5

4 **Using probability to make decisions.** MA.4.4

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1. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. MA.4.4.1
2. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. MA.4.4.2
3. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. Find the expected payoff for a game of chance. MA.4.4.3
4. Use probabilities to make fair decisions. MA.4.4.4
5. Analyze decisions and strategies using probability concepts. MA.4.4.5