

Content Area: Math
Grade/Course: Algebra / ACCN: MAX1100

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| Strand | Numbers and Operations |
| Standard 1: Numbers and Operations: NUMBER SENSE: Understand numbers, ways of representing numbers, relationships among numbers, and number systems | |

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| Topic | Numbers and Number Systems |
| Benchmark MA.A1.1.1 | Recognize situations that can be represented by matrices |
| Sample Performance Assessment (SPA) | The student: Decides if the information in a problem can be represented in a matrix, and if it can, shows how to input the data into a matrix. |

| Rubric | | | |
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| Advanced | Proficient | Partially Proficient | Novice |
| Consistently recognize situations that can be represented by matrices, and create situations that involve using matrices | Usually recognize situations that can be represented by matrices | Sometimes recognize situations that can be represented by matrices | Rarely recognize situations that can be represented by matrices |

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| Strand | Numbers and Operations |
| Standard 2: Numbers and Operations: OPERATION SENSE: Understand the meaning of operations and how they relate to each other | |

There are no benchmarks for this standard for this Grade/Course.

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| Strand | Numbers and Operations |
| Standard 3: Numbers and Operations: COMPUTATION STRATEGIES: Use computational tools and strategies fluently and, when appropriate, use estimation | |

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| Topic | Computational Fluency | | |
| Benchmark MA.A1.3.1 | Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers | | |
| Sample Performance Assessment (SPA) | The student: Applies one property, or a combination of properties, to simplify radical expressions (e.g., when adding the radicals $\sqrt{18} + \sqrt{8}$, uses a combination of properties to write the equivalent expression, $3\sqrt{2} + 2\sqrt{2}$, then adds the radicals to get $5\sqrt{2}$). | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with accuracy | Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with no significant errors | Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with a few significant errors | Apply arithmetic properties to operate on and simplify expressions that include radicals and other real numbers, with many significant errors |

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| Topic | Computational Fluency | | |
| Benchmark MA.A1.3.2 | Apply the laws of exponents to perform operations on expressions with integral exponents | | |
| Sample Performance Assessment (SPA) | The student: Applies the law of exponents to make it easier to simplify expressions that include integral exponents; in the case of negative exponents, the student rewrites the expression using positive exponents and simplifies (e.g., $3^{-2} = 1/3^2 = 1/9$). | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Apply the laws of exponents to perform operations on expressions with integral exponents, with accuracy | Apply the laws of exponents to perform operations on expressions with integral exponents, with no significant errors | Apply the laws of exponents to perform operations on expressions with integral exponents, with a few significant errors | Apply the laws of exponents to perform operations on expressions with integral exponents, with many significant errors |

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| Topic | Computational Fluency | | |
| Benchmark MA.A1.3.3 | Use addition, subtraction, and scalar multiplication of matrices to solve problems | | |
| Sample Performance Assessment (SPA) | The student: Represents the information in a problem with matrices, and then performs the appropriate operation on the matrices to solve the problem. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Use addition, subtraction, and scalar multiplication of matrices to solve problems, with accuracy | Use addition, subtraction, and scalar multiplication of matrices to solve problems, with no significant errors | Use addition, subtraction, and scalar multiplication of matrices to solve problems, with a few significant errors | Use addition, subtraction, and scalar multiplication of matrices to solve problems, with many significant errors |

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| Strand | Measurement |
| Standard 4: Measurement: FLUENCY WITH MEASUREMENT : Understand attributes, units, and systems of units in measurement; and develop and use techniques, tools, and formulas for measuring | |

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| Topic | Measurement Formulas |
| Benchmark MA.A1.4.1 | Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement |
| Sample Performance Assessment (SPA) | The student: Evaluates a formula to solve for a specific measure (e.g. after finding the temperature in Celsius, uses the formula, $F = 9/5C + 32$ to convert the temperature into Fahrenheit). |

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| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with accuracy | Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with no significant errors | Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with a few significant errors | Use formulas, functions, or conversion equations to solve problems dealing with determining a measurement based on another derived or given measurement, with many significant errors |

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| Strand | Geometry and Spatial Sense |
| Standard 5: Geometry and Spatial Sense: PROPERTIES AND RELATIONSHIPS: Analyze properties of objects and relationships among the properties | |
| There are no benchmarks for this standard for this Grade/Course. | |

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| Strand | Geometry and Spatial Sense |
| Standard 6: Geometry and Spatial Sense: TRANSFORMATIONS AND SYMMETRY: Use transformations and symmetry to analyze mathematical situations | |
| There are no benchmarks for this standard for this Grade/Course. | |

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| Strand | Geometry and Spatial Sense |
| Standard 7: Geometry and Spatial Sense: VISUAL AND SPATIAL SENSE: Use visualization and spatial reasoning to solve problems both within and outside of mathematics | |
| There are no benchmarks for this standard for this Grade/Course. | |

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| Strand | Geometry and Spatial Sense |
| Standard 8: Geometry and Spatial Sense: REPRESENTATIONAL SYSTEMS: Select and use different representational systems, including coordinate geometry | |

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| Topic | Coordinate Geometry | | |
| Benchmark MA.A1.8.1 | Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques | | |
| Sample Performance Assessment (SPA) | The student: Shows/explains how to graph a line when the slope and y-intercept are known; shows/explains how to graph a line using the slope and one point on the line; shows/explains how to graph a line using the x- and y-intercepts. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Show and explain how to graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with accuracy | Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with no significant errors | Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with a few errors | Graph linear equations using slope-intercept, point-slope, and x- and y-intercept techniques, with many significant errors |

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| Topic | Coordinate Geometry | | |
| Benchmark MA.A1.8.2 | Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line | | |
| Sample Performance Assessment (SPA) | The student: Shows/explains how to finds the slope of a line using two points on the line (or when given the graph of a line, or when given the equation of the line). | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Show and explain how to determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with accuracy | Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with no significant errors | Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with a few significant errors | Determine the slope of a line when given the graph of a line, two points on the line, or the equation of the line, with many significant errors |

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| Strand | Patterns, Functions, and Algebra |
| Standard 9: Patterns, Functions, and Algebra: PATTERNS AND FUNCTIONAL RELATIONSHIPS: Understand various types of patterns and functional relationships | |

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| Topic | Patterns | | |
| Benchmark MA.A1.9.1 | Determine if a linear pattern exists in a set of data and represent the data algebraically and graphically | | |
| Sample Performance Assessment (SPA) | The student: Uses an organized table of the data and/or a graph of the data to justify whether a linear pattern exists or not. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Show and explain how to determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with accuracy | Determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with no significant errors | Determine if a linear pattern exists in a set of data, and represent the data algebraically and graphically, with a few significant errors | Have difficulty determining if a linear pattern exists in a set of data, and is unable to represent the data algebraically and graphically |

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| Topic | Patterns | | |
| Benchmark MA.A1.9.2 | Compare and contrast the concepts of direct and inverse variation of a relation | | |
| Sample Performance Assessment (SPA) | The student: Finds a relation that is a direct variation and represents it on a graph. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Compare and contrast, in great detail, the concepts of direct and inverse variation of a relation | Compare and contrast, in sufficient detail, the concepts of direct and inverse variation of a relation | Compare and contrast, in some (but not enough) detail, the concepts of direct and inverse variation of a relation | Compare and contrast, in insufficient detail, the concepts of direct and inverse variation of a relation |

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| Topic | Functions | | |
| Benchmark MA.A1.9.3 | Determine the zeros of a linear or quadratic function algebraically and graphically | | |
| Sample Performance Assessment (SPA) | The student: Shows/explains how to use an algebraic method (or graph, or graphing calculator) to find the zeros of a function. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Show and explain how to determine the zeros of a linear or quadratic function algebraically and graphically, with accuracy | Determine the zeros of a linear or quadratic function algebraically and graphically, with no significant errors | Determine the zeros of a linear or quadratic function algebraically and graphically, with a few significant errors | Determine the zeros of a linear or quadratic function algebraically and graphically, with many significant errors |

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| Topic | Functions | | |
| Benchmark MA.AI.9.4 | Compare and contrast the properties of linear functions and exponential functions | | |
| Sample Performance Assessment (SPA) | The student: Graphs several linear functions and several exponential functions to compare the shape of the graphs. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Compare and contrast, in great detail, the properties of linear functions and exponential functions | Compare and contrast, in sufficient detail, the properties of linear functions and exponential functions | Compare and contrast, in some (but not enough) detail, the properties of linear functions and exponential functions | Compare and contrast, in insufficient detail, the properties of linear functions and exponential functions |

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| Strand | Patterns, Functions, and Algebra |
| Standard 10: Patterns, Functions, and Algebra: SYMBOLIC REPRESENTATION: Use symbolic forms to represent, model, and analyze mathematical situations | |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.A1.10.1 | Solve linear equations and inequalities in one variable using a variety of strategies (e.g., algebraically, by graphing, by using a graphing calculator) | | |
| Sample Performance Assessment (SPA) | The student: Shows/explains how to solve for the variable in a linear equation or inequality using a selected strategy (e.g., algebraic method, graphing, or using graphing technology), and shows how find the solution using a different strategy. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Solve linear equations and inequalities in one variable using a variety of strategies, with accuracy | Solve linear equations and inequalities in one variable using a variety of strategies, with no significant errors | Solve linear equations and inequalities in one variable using a variety of strategies, with a few significant errors | Solve linear equations and inequalities in one variable using a variety of strategies, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.A1.10.2 | Translate between verbal mathematical situations and algebraic expressions and equations | | |
| Sample Performance Assessment (SPA) | The student: Represents mathematical situations algebraically and determines a situation that could be represented by an algebraic expression or equation. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Translate between verbal mathematical situations and algebraic expressions and equations, with accuracy | Translate between verbal mathematical situations and algebraic expressions and equations, with no significant errors | Translate between verbal mathematical situations and algebraic expressions and equations, with a few errors | Translate between verbal mathematical situations and algebraic expressions and equations, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.A1.10.3 | Justify the steps used in simplifying expressions and solving equations and inequalities | | |
| Sample Performance Assessment (SPA) | The student: Uses concrete objects, pictorial representations, and the properties of real numbers to justify the steps used to simplify expressions and solve equations and inequalities. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Justify, in great detail, the steps used in simplifying expressions and solving equations and inequalities | Justify, in sufficient detail, the steps used in simplifying expressions and solving equations and inequalities | Justify, in some (but not enough) detail, the steps used in simplifying expressions and solving equations and inequalities | Justify, in insufficient detail, the steps used in simplifying expressions and solving equations and inequalities |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.AI.10.4 | Determine the equation of a line when given the graph of the line, the slope and a point on the line, or two points on the line | | |
| Sample Performance Assessment (SPA) | The student: Shows/explains how to determine the equation of a line when given the graph of a line, the slope and a point on a line, or two points on a line. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Show and explain how to determine the equation of a line when given the graph of the line, the slope and a point on the line, or two points on the line, with accuracy | Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with no significant errors | Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with a few significant errors | Determine the equation of a line when given: the graph of the line, the slope and a point on the line, or two points on the line, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.AI.10.5 | Solve systems of two linear equations in two variables algebraically and graphically | | |
| Sample Performance Assessment (SPA) | The student: Uses an algebraic strategy (e.g., elimination, substitution), solve a system of two linear equations in two variables, and uses a graph or graphing technology to show how to find the solution graphically. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Solve systems of two linear equations in two variables algebraically and graphically, with accuracy | Solve systems of two linear equations in two variables algebraically and graphically, with no significant errors | Solve systems of two linear equations in two variables algebraically and graphically, with a few significant errors | Solve systems of two linear equations in two variables algebraically and graphically, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.AI.10.6 | Factor first- and second-degree binomials and trinomials in one or two variables | | |
| Sample Performance Assessment (SPA) | The student: Selects and applies an appropriate technique to completely factor polynomials (e.g., using techniques such as finding a common factor in all terms, the difference of two squares, and the perfect squares of binomials, reverse FOIL). | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Factor first- and second-degree binomials and trinomials in one or two variables, with accuracy | Factor first- and second-degree binomials and trinomials in one or two variables, with no significant errors | Factor first- and second-degree binomials and trinomials in one or two variables, with a few significant errors | Factor first- and second-degree binomials and trinomials in one or two variables, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.AI.10.7 | Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology | | |
| Sample Performance Assessment (SPA) | The student: Solves quadratic equations by factoring algebraically (e.g., completing the square, using the quadratic formula), or by locating the intersection point(s) of the quadratic function and the x-axis on a graph. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with accuracy | Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with no significant errors | Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with a few significant errors | Solve quadratic equations in one variable algebraically, graphically, or by using graphing technology, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.A1.10.8 | Select and use a variety of strategies (e.g., concrete objects, pictorial representations, algebraic manipulation) to perform operations on polynomials | | |
| Sample Performance Assessment (SPA) | The student: Adds (or subtracts or multiplies) polynomials (or divides polynomials by monomials) by selecting and applying appropriate strategies. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Select and use a variety of strategies to perform operations on polynomials, with accuracy | Select and use a variety of strategies to perform operations on polynomials, with no significant errors | Select and use a variety of strategies to perform operations on polynomials, with a few significant errors | Select and use a variety of strategies to perform operations on polynomials, with many significant errors |

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| Topic | Numeric and Algebraic Representations | | |
| Benchmark MA.A1.10.9 | Analyze transformations of lines and understand how the transformation are represented in equations | | |
| Sample Performance Assessment (SPA) | The student: Writes the equation of a line before and after undergoing a transformation, and explains how the transformation is represented by the altered part of the equation. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Analyze transformation of lines and show how the transformations are represented in equations, with accuracy | Analyze transformations of lines and show how the transformations are represented in equations, with no significant errors | Analyze transformations of lines and show how the transformations are represented in equations, with a few significant errors | Analyze transformations of lines and show how the transformations are represented in equations, with many significant error |

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| Strand | Data Analysis, Statistics, and Probability |
| Standard 11: Data Analysis, Statistics, and Probability: FLUENCY WITH DATA: Pose questions and collect, organize, and represent data to answer those questions | |

There are no benchmarks for this standard for this Grade/Course.

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| Strand | Data Analysis, Statistics, and Probability |
| Standard 12: Data Analysis, Statistics, and Probability: STATISTICS: Interpret data using methods of exploratory data analysis | |

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| Topic | Data Interpretation | | |
| Benchmark MA.AI.12.1 | Compare data sets using statistical techniques (e.g., measures of central tendency, standard deviation, range, stem-and-leaf plots, and box-and-whisker graphs) | | |
| Sample Performance Assessment (SPA) | The student: Selects a representation that supports the desired purpose of the study and shows a visual comparison of the data sets (e.g., in studying the relationship between an 11th grader's height and arm span, the student displays chooses to represent the data in a scatter plot since scatter plots are designed to determine if correlations between two variables exist). | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Compare data sets selectively using appropriate statistical techniques, and justify the choice of technique | Compare data sets using appropriate statistical techniques | Compare data sets using suggested statistical techniques | Have difficulty comparing data sets using statistical techniques |

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| Topic | Data Interpretation | | |
| Benchmark MA.AI.12.2 | Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists) | | |
| Sample Performance Assessment (SPA) | The student: Sketches bivariate data in a scatter plot and determines the line of best fit. | | |
| Rubric | | | |
| Advanced | Proficient | Partially Proficient | Novice |
| Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with accuracy | Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with no significant errors | Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with a few significant errors | Display bivariate data in a scatter plot, describe its shape, and determine the line of best fit that models a trend (if a trend exists), with many significant errors |

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| Strand | Data Analysis, Statistics, and Probability |
| Standard 13: Data Analysis, Statistics, and Probability: DATA ANALYSIS: Develop and evaluate inferences, predictions, and arguments that are based on data | |
| There are no benchmarks for this standard for this Grade/Course. | |

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| Strand | Data Analysis, Statistics, and Probability |
| Standard 14: Data Analysis, Statistics, and Probability: PROBABILITY: Understand and apply basic notions of chance and probability | |
| There are no benchmarks for this standard for this Grade/Course. | |