STEM Course – Master Rubric

This competency rubric places emphasis on the importance of mastery of pre-requisite skills and concepts to move to meet the expectations of the competencies and key performance indicators.

Competency and Indicators	Level 1 – No Evidence	Level 2 – Partially Meets	Level 3 - Approaches	Level 4 - Meets	Level 5 - Exceeds
	Student does not meet prerequisite skills.	Student demonstrates prerequisite skills.	Student demonstrates understanding of simple indicators.	Student demonstrates understanding of complex indicators in an authentic task.	Student demonstrates understanding of indicators that goes beyond expectations.
CA-A1.A. Understand the concept of a function and use function notation.	A. Not yet able to understand a function or use function notation.	A. Recognize *x* is the independent variable and *f(x)* is the dependent variable. AND A. Determine if a relation is a function.	A. Write the relationship in words, as expression, or an equation not using function notation. AND A. Explain why an authentic task represents a function without explicit examples.	A. Use function notation to model a function from an authentic task. AND A. Explain why an authentic task represents a function with explicit examples.	A. Apply composite function properties in an authentic task. AND A. Explain why an authentic task does not represent a function with explicit examples.
CA-A1.B. Interpret the dependent and independent variables in the context of functions.	B. Not yet able to determine the independent or dependent variables within an authentic task.	B. Identify the independent **or** dependent variable within an authentic task.	B. Identify the independent and dependent variable within an authentic task.	B. Identify and interpret the independent and dependent variables within an authentic task.	B. Describe the relationship the dependent and independent variables have within an authentic task.
CA-A1.C. Create and interpret expressions for functions in terms of the situations they model including selecting appropriate domains for these functions.	C. Not yet able to write and explain a function from an authentic task which includes stating appropriate domain.	C. Identify the parts of a function given for an authentic task.	C. Write functions representing an authentic task.	C. Write and interpret functions representing an authentic task including stating appropriate domain.	C. Find and correct errors of functions which represent an authentic task. Explain errors and corrections. Defend function if no error exists.

CA-A1.D. Understand the relationship between a function and its graph.	D. Not yet able to explain the relationship between a function and its graph.	D. Identify key features of a graph.	D. Match a function to a graph.	D. Describe the type of relationship between a function and its graph within an authentic task.	D. Describe key parts of the graph and the corresponding parts (or process to find) making connections to the equation of a function.
CA-A1.E. Find the domain, including implied domains, and the range of a function.	E. Not yet able to find the domains, implied domains, and ranges of functions.	E. Find the domain and range of functions graphically.	E. Find the domains, implied domains, and ranges of functions using equations.	E. Find the domains, implied domains, and ranges of functions within an authentic task.	E. Explain and defend the implied domain of a function from an authentic task.
CA-A1.F. Analyze functions using different representations (verbally, graphically, algebraically). **Analyze: Identify key features such as domain, range, increasing, decreasing, intercepts, etc.*	F. Not yet able to analyze functions using different representations within an authentic task.	F. From one representation, analyze a function (verbally, graphically, or algebraically).	F. From various representations, analyze and interpret a function.	F. From various representations, analyze and interpret a function within an authentic task.	F. Justify the most appropriate representations of functions and defend interpretations within an authentic task.
CA-A2-LF.A. Identify dependent and independent variables in linear relationships and use this knowledge to model authentic situations.	A. Not yet able to identify the variables of an authentic task as independent or dependent.	A. Identify the independent **or** dependent variable within an authentic task.	A. Identify the independent and dependent variable within an authentic task.	A. Identify and interpret dependent and independent variables to model authentic tasks.	A. Describe the relationship of the two variables in an authentic task.
CA-A2-LF.B. Understand the relationship between graphs of lines and their equations including slope.	B. Not yet able to explain the relationship between lines and their equations.	B. Describe the features of a graph given a linear equation (slope, y-intercept, increasing/decreasing).	B. Describe the features of a graph given a linear equation (slope, y-intercept, increasing/decreasing) within an authentic task.	B. Describe the relationship between a graph of a line and its equation and defend within an authentic task.	B. Compare how changes within an authentic task effect the line and its equation.

CA-A2-LF.C. Graph a line using slope-intercept form of the linear equation.	C. Not yet able to graph a line in slope-intercept from an authentic task.	C. Identify the y-intercept and slope of a linear equation in slope-intercept form.	C. Graph a linear equation in slope-intercept form.	C. Given a linear equation for an authentic task, graph within an appropriate domain (label axes) and interpret key features.	C. Graph a linear equation in standard form (or another non-slope intercept form) derived from an authentic task.
CA-A2-LF.D. Determine the equation of a line (Slope intercept form) from its graph and from the point-slope formula.	D. Not yet able to write an equation of a line from its graph or applying the point-slope formula from information.	D. Identify the slope and y-intercept given the graph. AND D. Show partial understanding of simplification procedure when converting from point-slope form.	D. Write an equation in slope-intercept form given the graph of a line. AND D. Write the slope-intercept form of an equation given point-slope form.	D. Write the equation of a line in slope-intercept form given its graph from an authentic task. AND D. Write an equation of a line in slope-intercept form from an authentic task applying point-slope formula.	D. Find and correct errors when writing the equation of a line given its graph or point-slope formula from an authentic task. Explain errors and corrections. Justify the process if no error exists.
CA-A2-LF.E. Use graphs of lines to identify solutions to linear equations.	E. Not yet able to find solutions to a linear equation using its graph.	E. Find the solutions to a linear equation using its graph.	E. Find the solutions to a linear equation from an authentic task using its graph.	E. Find and interpret solutions to a linear equation from an authentic task using its graph.	E. Find and correct errors when finding a solution to a linear equation from its graph. Explain errors and corrections. Justify the process if no error exists.
CA-A2-LF.F. Solve linear inequalities, expressing the solutions sets using interval notation and graphing solution sets on number lines, and interpret their solutions in context.	F. Not yet able to solve a linear inequality or write solution in interval notation or graph its solution.	F. Solve a linear inequality. AND F. Graph a linear inequality (Ex. x < 5).	F. Solve, graph a linear inequality, and write the solution in interval notation.	F. Solve and graph a linear inequality from an authentic task. AND F. Interpret the solution set of a linear inequality in terms of	F. Find and correct errors to a linear inequality from an authentic task including writing solution in interval and graph. Explain errors and corrections. Justify the process if no error exists.

				the authentic task it represents.	
CA-A2-LF.G. Use and understand the slope criteria for parallel and perpendicular lines.	G. Not yet able to use or explain the relationship between slopes of parallel or perpendicular lines.	G. Given a slope, find the slope of a parallel line and the slope of a perpendicular line.	G. Given a slope and a point, write the equation of a parallel line and the equation of a perpendicular line.	G. Justify if two lines are parallel, perpendicular, or neither given information (a set of points, two lines, two equations).	G. From standard form, write the equation of a parallel line or a perpendicular line.
CA-A2-PF.H. Solve application problems and create models involving polynomial equations.	H. Not yet able to write or interpret solutions of a polynomial equation from an authentic task.	H. Identify independent and dependent variables of an authentic task. AND H. Identify appropriate formulas needed.	H. Solve a given polynomial equation from an authentic task.	H. Interpret solutions from a polynomial equation from an authentic task. AND H. Write a polynomial equation which represents an authentic task.	H. Find and correct errors with polynomial equations which represent an authentic task Explain errors and corrections. Justify process if no error is made.
CA-A2-PF.I. Factor quadratic polynomials over the rational numbers and identify prime/irreducible polynomials over the rational numbers.	I. Not yet able to factor.	I. Recall multiplication facts, factors, greatest common factor.	I. Factor quadratic polynomials with minor errors or that are not completely simplified.	I. Completely factor quadratic polynomials over the rational numbers and identify prime/irreducible polynomials over the rational numbers.	I. Write a quadratic polynomial that can be factored or is prime, and justify.
CA-A2-PF.J. Apply standard factoring techniques to polynomials.	J. Not yet able to factor.	J. Recall multiplication facts, factors, greatest common factor.	J. Factor polynomials with minor errors or that are not completely simplified.	J. Factor polynomials completely and verify the product of factors.	J. Find and correct errors when factoring a polynomial. Explain errors and corrections. Justify process if no errors exist.
CA-A2-PF.K. Solve quadratic equations by factoring,	K. Not yet able to solve a quadratic equation by factoring,	K. Solve a quadratic equation using one method.	K. Demonstrate different methods of	K. Demonstrate different methods of solving a quadratic	K. Defend best method for solving a quadratic

completing the square, and the Quadratic Formula.	completing the square, and Quadratic formula.		solving a quadratic equation.	equation from authentic tasks.	equation from an authentic task.
CA-A2-PF.L. Graph quadratic functions and be able to determine the quadratic function from the graph. *Vertex, standard, and factored forms can be used.*	L. Not yet able to graph a quadratic equation and write a quadratic function from its graph.	L. Identify the features of a quadratic function. AND L. Identify the features of a quadratic function given a graph.	L. Graph a quadratic function. AND L. Write a quadratic function given a graph.	L. Graph a quadratic function from an authentic task. AND L. Write the quadratic function from a graph in an authentic task.	L. Find and correct errors when graphing a quadratic function from an authentic task. Explain errors and corrections. justify process if no errors exist.
CA-A2-PF.M. Understand the relationship between zeros and factors of a polynomial of degree 2 and higher.	M. Not yet able to explain the relationship between factors and zeros of a polynomial function.	M. Identify the rational zeros of a factored polynomial. AND M. Given the rational zeros of a polynomial, write a possible polynomial function.	M. Explain the relationship between the factors and zeros of a polynomial function.	M. Explain the relationship between the factors and zeros of a polynomial function from an authentic task.	M. Given imaginary or irrational zeros, write a possible polynomial function.
CA-A2-PF.N. Solve polynomial equations and inequalities of degree 2 and higher. *Assume the polynomial is factorable.*	N. Not yet able to solve polynomial equation or inequality.	N. Factor and identify zeros of polynomials of degree 2 and higher. AND N. Evaluate a polynomial expression for a given input.	N. Solve a polynomial equation and inequality.	N. Solve a polynomial equation and inequality from an authentic task.	N. Find and correct errors when solving a polynomial equation or inequality from an authentic task. Explain errors and corrections. Justify process if no error exists.
CA-A2-RTF.O. Solve applications and create models involving rational equations.	O. Not yet able to write or interpret solutions of rational equations from an authentic task.	O. Identify independent and dependent variables of an authentic tasks. AND	O. Solve a given rational equation from an authentic task.	O. Write a rational equation which represents an authentic task. AND	O. Find and correct errors with rational equations which represent an authentic task. Explain errors and corrections. Justify

		O. Identify appropriate formulas needed.		O. Interpret solutions of rational equations from an authentic task.	process if no errors are made.
CA-A2-RTF.P. Simplify rational expressions.	P. Not yet able to simplify a rational expression.	P. Factor polynomial expressions in the numerator or denominator. AND P. Operate with fractions (add, subtract, multiply, divide).	P. Simplify a rational expression. AND P. Perform operations on rational expressions.	P. Simplify a rational expression from an authentic task.	P. Find and correct errors when simplifying a rational expression from an authentic task. Explain errors and corrections. Justify process if no errors exist.
CA-A2-RTF.Q. Solve rational equations.	Q. Not yet able to solve a rational equation.	Q. Simplify rational expressions. AND Q. Solve linear and quadratic equations. AND Q. Recognize division by 0 is undefined.	Q. Solve a rational equation. Identify extraneous solutions.	Q. Solve a rational equation from an authentic task. Interpret solutions.	Q. Find and correct errors when solving a rational equation from an authentic task. Explain errors and corrections. Justify process if no errors exist.
CA-A2-RTF.R. Solve rational inequalities algebraically. *Suggestion: Relate to graphical representations.*	R. Not yet able to solve a rational inequality.	R. Evaluate a rational expression for a given input. AND R. Recognize division by 0 is undefined.	R. Solve a rational inequality.	R. Solve a rational inequality from an authentic task. Interpret solutions.	R. Justify the process used to solve a rational inequality from an authentic task.
CA-A2-RDF.S. Solve applications and create models involving radical equations.	S. Not yet able to write or interpret solutions of radical equations from an authentic task.	S. Identify independent and dependent variables of an authentic tasks.	S. Solve a given radical equation from an authentic task.	S. Write a radical equation which represents an authentic task.	S. Find and correct errors with radical equations which represent an authentic task. Explain errors

		AND S. Identify appropriate formulas needed.		AND S. Interpret solutions of radical equations from an authentic task.	and corrections. Justify process if no errors made.
CA-A2-RDF.T. Convert between radical and rational exponent notation.	T. Not yet able to convert problems involving radical and rational exponents.	T. Identify the index of a radical.	T. Rewrite problems involving radical and rational exponents.	T. Rewrite problems from an authentic task involving radical and rational exponents.	T. Convert between rational exponents and radicals to simplify an expression.
CA-A2-RDF.U. Simplify expressions involving radicals and rational exponents using appropriate exponent rules.	U. Not yet able to apply exponent rules to simplify radical and rational exponent expressions.	U. Use properties of exponents. AND U. Operate with fractions. AND U. Convert between radicals and rational exponents.	U. Apply exponent rules to simplify radical and rational exponent expressions.	U. Apply exponent rules to simplify radical and rational exponent expressions from an authentic task.	U. Find and correct errors when applying exponent rules to simplify radical, rational, and exponent expressions from an authentic task. Explain errors and corrections. Justify process if no error is made.
CA-A2-RDF.V. Solve equations involving radical expressions. *Assume real numbers*	V. Not yet able to solve an equation with radicals.	V. Recognize when the index is even, the radicand cannot be negative (over the real numbers).	V. Solve equations with radicals. Identify extraneous solutions.	V. Solve equations with radicals from an authentic task. Interpret solutions.	V. Find and correct errors with solving radical equations from an authentic task. Explain errors and corrections. Justify process if no error is made.
CA-A3.A. Solve simple applications and create simple models involving exponential equations.	A. Not yet able to write or interpret solutions of an exponential equation from an authentic task.	A. Identify independent and dependent variables of an authentic tasks. AND	A. Solve exponential equations from a given authentic task.	A. Solve and interpret solutions of exponential equations from an authentic task. AND	A. Find and correct errors with exponential equations which represent an authentic task. Explain errors and corrections. Justify process if no errors made.

		A. Identify the key parts of an exponential equation.		A. Write an exponential equation from an authentic task.	
CA-A3.B. Distinguish exponential growth from linear and polynomial growth.	B. Not yet able to distinguish exponential growth from linear or polynomial growth.	B. Define characteristics of exponential growth, linear growth, and polynomial growth (from both equations and graphs).	B. Interpret key phrases in an authentic task relating to exponential growth, linear growth, and polynomial growth.	B. Distinguish between exponential growth, linear growth, and polynomial growth in an authentic task.	B. Mathematically justify and explain type of growth in an authentic task.
CA-A3.C. Graph and recognize the graph of exponential functions of the form f(x) = C b^x.	C. Not yet able to graph or write an exponential function.	C. Determine if a graph shows growth or decay. AND C. Identify the key parts of an exponential graph. AND C. Know the exponential form f(x) = C b^x.	C. Graph exponential growth and decay. Include the asymptote.	C. Graph an exponential function from an authentic task. Explain the significance of the asymptote. C. Write an exponential functions from its graph in an authentic task.	C. Prove solutions using both the graph and equation of an exponential function in an authentic task.
CA-A3.D. Solve simple exponential equations numerically. *No use of logarithms* *Indicate exact or estimated solutions*	D. Not yet able to numerically solve simple exponential equations	D. Define an exponent.	D. Numerically solve an exponential equation for exact or estimated solutions (tables, graphs, guess & check).	D. Numerically solve an exponential equation from an authentic task. Interpret the solution.	D. Find and correct errors in numerically solved exponential equations from an authentic task. Explain errors and corrections. Justify process if no errors are made.
CA-A3.E. Solve simple exponential equations algebraically. (Optional Indicator) *No use of logarithms*	E. Not yet able to algebraically solve an exponential equation from an authentic task.	E. Use common bases to rewrite equations	E. Algebraically solve an exponential equation.	E. Algebraically solve an exponential equation from an authentic task. Interpret the solution.	E. Find and correct errors in algebraically solved exponential equations from an authentic task. Explain errors and corrections.

					Justify process if no errors are made.
CA-A4.A. Solve applications and create models involving 2 x 2 systems of linear equations using both graphical and algebraic methods.	A. Not yet able to write or solve a 2X2 system of equations from an authentic task.	A. Identify independent and dependent variables of an authentic tasks. A. Solve or graph a linear equation.	A. Given a 2x2 system of equations from an authentic task, solve and interpret the solution (graphically or algebraically).	A. Write and solve a 2X2 system of equations from an authentic task. Interpret the solution. (Solve both graphically and algebraically.)	A. Determine and justify the best method for solving a 2X2 system from an authentic task.
CA-A4.B. Use linear inequalities and systems of linear inequalities in two unknowns to create models.	B. Not yet able to write a linear inequality or system of linear inequalities in two unknowns.	B. Identify independent and dependent variables of an authentic task. AND B. Interpret key phrases relating to the model.	B. Translate an authentic task into a linear inequality in two unknowns.	B. Write linear inequalities and systems of linear inequalities, in two unknowns, from authentic tasks.	B. Find and correct errors when writing inequality or system of inequalities from an authentic task. Explain errors and corrections. Justify process if no errors are made.
CA-A4.C. Graphically identify solutions sets to linear inequalities or systems of inequalities.	C. Not yet able to graphically determine solution sets of linear inequalities or systems of linear inequalities of authentic tasks.	C. Graph a linear inequality in two unknowns. AND C. Shade the solution to a system of linear inequalities in two unknowns.	C. Graph the solution to a system of linear inequalities with two unknowns. Justify the solution.	C. Determine solution sets from graphs to a linear inequality and system of linear inequalities of authentic tasks.	C. Mathematically justify and explain solutions and non-solutions to graphs and systems of linear inequalities.