**Quantitative Literacy - Numeracy**

Numeracy denotes the understanding and use of numbers in operation sense, estimation, measurement, and quantitative reasoning in authentic contexts. Students should regularly make sense of their results and judge them for reasonableness. Basic statistical measures and their uses are also included. While technology is encouraged in the course, students should also work on fraction and integer operations without calculators to improve their understanding of and comfort with them. After students have demonstrated adequate proficiency with basic operations without a calculator, use of a calculator is merited as determined by the instructor.

**QL-N1. Students can apply, analyze, and evaluate the characteristics of numbers in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Demonstrate operation sense and the effects of common operations on numbers in words and symbols.
2. Apply mathematical properties in numeric and algebraic contexts.
3. Use different types of mathematical summaries of data, such as mean, median, and mode.
4. Read, interpret, and make decisions based upon information from various data displays.
5. Demonstrate competency in the use of magnitude in the contexts of place values, fractions, and numbers written in scientific notation.
6. Demonstrate measurement sense that includes predicting, estimating, and then solving problems using appropriate units.

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| **Competency and Indicators** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-N1. Students can apply, analyze, and evaluate the characteristics of numbers in authentic modeling and problem solving situations.** | **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.** |
| **QL-N1.A. Demonstrate operation sense and the effects of common operations on numbers in words and symbols** | A. Not yet able to use or identify mathematical properties or statistical summaries | A. Identifymathematical properties and statistical summaries | A. Usemathematical properties and statistical summaries | A. Explain mathematical properties and statistical summaries | A. Use mathematical properties and statistical summaries to justify more advanced concepts |
| **QL-N1.B. Apply mathematical properties in numeric and algebraic contexts.** | B. Not yet able to use or identify mathematical properties or statistical summaries | B. Identifymathematical properties and statistical summaries | B. Usemathematical properties and statistical summaries | B. Explain mathematical properties and statistical summaries | B. Use mathematical properties and statistical summaries to justify more advanced concepts |
| **QL-N1.C. Use different types of mathematical summaries of data, such as mean, median, and mode.** | C. Not yet able to use or identify mathematical properties or statistical summaries | C. Identifymathematical properties and statistical summaries | C. Usemathematical properties and statistical summaries | C. Explain mathematical properties and statistical summaries | C. Use mathematical properties and statistical summaries to justify more advanced concepts |
| **QL-N1.D. Read, interpret, and make decisions based upon information from various data displays.** | D. Read only limited representations | D. Read various representations of data | D. Read and interpret various representations of data | D. Read and interpret representations of data and use this to make decisions | D. Create and use various representations of data |
| **QL-N1.E. Demonstrate competency in the use of magnitude in the contexts of place values, fractions, and numbers written in scientific notation.** | E. Not yet able to take units into account when solving | E. Choose appropriate units of measurement and form of number (scientific notation, decimal form, etc) for a given situation | E. Convert units of measurement or between forms of numbers (scientific notation, decimal form, etc.) while solving | E. Choose, convert and apply appropriate units and forms of numbers to solve problems in real world context | E. Explain why and how units are affected by operations |
| **QL-N1.F. Demonstrate measurement sense that includes predicting, estimating, and then solving problems using appropriate units.** | F. Not yet able to take units into account when solving | F. Choose appropriate units of measurement and form of number (scientific notation, decimal form, etc) for a given situation | F. Convert units of measurement or between forms of numbers (scientific notation, decimal form, etc.) while solving | F. Choose, convert and apply appropriate units and forms of numbers to solve problems in real world context | F. Explain why and how units are affected by operations |

**QL-N2. Students can perform operations on numbers and make use of those operations in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

A. Perform arithmetic operations on whole numbers, integers, fractions, and decimals including basic operations without a calculator.

B. Apply quantitative reasoning to solve problems involving quantities or rates.

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| **Competency and Indicators** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-N2. Students can perform operations on numbers and make use of those operations in authentic modeling and problem solving situations.** | **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.** |
| **QL-N2.A. Perform arithmetic operations on whole numbers, integers, fractions, and decimals including basic operations without a calculator.** | A. Not yet able to perform operations with decimals and fractions, or positive and negative integers without a calculator | A. Perform simple operations with decimals, fractions, and integers without use of a calculator | A. Fluently perform multiple operations with fractions, decimals, and integers without use of calculator | A. Choose and convert between fractions and decimals to represent and solve for real-world quantities and justify their choice without a calculator | A. Create and solve a real- world task that requires conversion and operations with decimals and fractions without a calculator |
| **QL-N2.B. Apply quantitative reasoning to solve problems involving quantities or rates.** | B. Not yet able to apply a problem solving strategy | B. Apply a given problem solving strategy | B. Choose and apply an appropriate problem-solving strategy | B. Justify choice of problem- solving strategy and identify pros and cons | B. Analyze methods used by others to solve similar problems |

**QL-N3. Students can propose various alternatives, determine reasonableness, and then select optimal estimates to justify solutions.**

*Key performance indicators to MEET this competency:*

A. Use estimation skills.

B. State convincing evidence to justify estimates.

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| **Competency and Indicators** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-N3. Students can propose various alternatives, determine reasonableness, and then select optimal estimates to justify solutions.** | **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.** |
| **QL-N3.A. Use estimation skills.** | A. Not yet able to use estimation skills accurately | A. Use basic estimation techniques to approximate a solution to a problem | A. Createan estimate of a reasonable solution for a problem | A. Determine the accuracy of their estimation | A. Justify choice of methods used to create estimates |
| **QL-N3.B. State convincing evidence to justify estimates** | B. Not yet able to analyze solutions for reasonableness | B. Eliminate unreasonable solutions and estimates | B. Determine if solution is reasonable in context of the problem  AND  B. Createan estimate of a reasonable solution for a problem | B. Determine if solution is appropriate in context of the problem and justify  AND  B. Determine the accuracy of their estimation | B. Compare estimations to find the most accurate and/or most reasonable solution |

**Quantitative Literacy - Algebra**

Students will experience an application-based approach to algebraic topics. The goal is not algebraic manipulation. Instead, students should use algebraic reasoning as one of multiple problem-solving tools in the course when it makes a task easier. This includes creating expressions, equations, and functions to solve problems that are more career-focused and personal to a student’s life. Choosing an appropriate method to solve a problem is an important part of developing the mathematical maturity students need for success in general education college math courses. Depth of understanding is more important than covering many topics.

**QL-A1. Students can demonstrate understanding of the characteristics of variables and expressions and apply this knowledge in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Use variables to accurately represent quantities or attributes in a variety of authentic tasks.
2. Predict and then confirm the effect that changes in variable values have in an algebraic relationship.
3. Interpret parts of expressions such as terms, factors, and coefficients.
4. Write expressions and/or rewrite expressions in equivalent forms to solve problems.

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| **Competency and Indicators** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-A1. Students can demonstrate understanding of the characteristics of variables and expressions and apply this knowledge in authentic modeling and problem solving situations.** | **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.** |
| **QL-A1.A. Use variables to accurately represent quantities or attributes in a variety of authentic tasks.** | A. Not yet able to apply vocabulary to identify parts of an expression or define the variables needed in an authentic task | A. Define the variables needed in an authentic task  AND  A. Given an authentic task student can identify the variable | A. Match correct expression to given task | A. Create an expression from an authentic task. Including naming the variable | A. Analyze authentic tasks to interpret variables and quantities |
| **QL-A1.B. Predict and then confirm the effect that changes in variable values have in an algebraic relationship.** | B. Not yet able to predict or confirm what changes in an authentic task would do to an expression | B. Can complete one of the following: confirm what changes in an authentic task would do to an expression | B. Predict what changes in an authentic task would do to an expression | B. Mathematically confirm predictions to authentic task changes | B. Predict and confirm, with support, the effect of changes in a variable on an algebraic relationship |
| **QL-A1.C. Interpret parts of expressions such as terms, factors, and coefficients.** | C. Not yet able to identify the parts of an expression | C. Group types of expressions discussing similarities | C. Identify the parts of an expression needed for an authentic task | C. Interpret parts of an expression in relation to an authentic task | C. Interpret and communicate the parts of an expression in relation to an authentic task |
| **QL-A1.D. Write expressions and/or rewrite expressions in equivalent forms to solve problems.** | D. Not yet able to identify equivalent expressions | D. Identify equivalent expressions given a set of expressions | D. Show that two expressions are equivalent and create an equivalent expression | D. Create multiple equivalent expressions  from an authentic task | D. Interpret and communicate how expressions are equivalent given an authentic task |

**QL-A2. Students can perform operations on expressions in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Perform arithmetic operations (addition, subtraction, multiplication) on polynomials in authentic tasks.
2. Demonstrate the relationship between zeros and factors of polynomials.

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| **Competency and Indicator** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-A2. Students can perform operations on expressions in authentic modeling and problem solving situations.** | **Student does not meet prerequisite skills.** | **Student demonstrates prerequisite skills.** | **Student demonstrates understanding of simple indicatos.** | **Student demonstrates understanding of complex indicators in an authentic task.** | **Student demonstrates understanding of indicators that goes beyond expectations.** |
| **QL-A2.A. Perform arithmetic operations (addition, subtraction, multiplication) on polynomials in authentic tasks.** | A. Not yet able to identify like terms, combine like terms, and apply addition and multiplication properties  AND  A. Not yet able to identify which operation would need to be performed given an authentic task | A. Perform addition and subtraction on first degree polynomials  AND   1. Explain like terms | A. Perform addition, subtraction, and multiplication on first degree polynomials AND  A. Set up and perform addition, subtraction, and multiplication with first degree polynomials from an authentic task  AND  A. Identify which operation would need to be performed given an authentic task | A. Perform addition, subtraction, and multiplication on first and second degree polynomials  AND  A. Set up and perform addition, subtraction, and multiplication with first and second degree polynomials from an authentic task  AND  A. Identify which operation would need to be performed given an authentic task | A. Perform addition, subtraction, and multiplication on higher degree polynomials |
| **QL-A2.B. Demonstrate the relationship between zeros and factors of polynomials** | B. Not yet able to find zeros from a graph or visual representation  AND  B. Not yet able to determine that a zero is needed to be found for a task | B. Find zeros from a graph or visual representation  AND  B. Determine that a zero is needed to be found for a task | B. Interpret meaning of zeros from a 1st and 2nd degree authentic task | B. Factor and solve 2nd degree polynomials with integer roots  AND  B. Find and interpret meanings of zeros from 1st and 2nd degree authentic tasks | B. Factor and solve 2nd degree polynomials with integer roots  AND  B. Find and interpret meanings of zeros from higher degree polynomials in authentic tasks |

**QL-A3. Students can create, solve, and reason with equations and inequalities in the context of authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Create equations and inequalities that describe numbers or relationships.
2. Compare and contrast expressions and equations.
3. Use and justify reasoning while solving equations.
4. Develop and solve equations and inequalities in one variable.

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| **Competency and Indicator** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-A3. Students can create, solve, and reason with equations and inequalities in the context of authentic modeling and problem solving situations.** | **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.** |
| **QL-A3.A. Create equations and inequalities that describe numbers or relationships.** | A. Not yet able to describe a relationship or a system | A. Explain if an authentic task would be set-up as an equation or inequality | A. Match the appropriate equation or inequality given an authentic task | A. Create an appropriate equation or inequality given an authentic task | A. Create and solve their own authentic task for equations |
| **QL-A3.B. Compare and contrast expressions and equations.** | B. Not yet able to distinguish between an expression and an equation in an authentic task | B. Distinguish between an expression and an equation in an authentic task. | B. Answer questions about an authentic task and the equations and expressions used for solving the task | B. Compare and contrast expressions and equations in an authentic task. | B. Create and defend questions and analyze authentic tasks involving equations and expressions |
| **QL-A3.C. Use and justify reasoning while solving equations.** | C. Not yet able to justify reasoning skills | C. Prove a solution to an equation or inequality | C. Order given steps for solving an equation or inequality | C. Solve equations and compound inequalities and can justify answer mathematically, explain steps and reasons taken to solve an equation or inequality | C. Find and correct error in a given problem explaining how error was made and how it should be corrected |
| **QL-A3.D. Develop and solve equations and inequalities in one variable.** | D. Not yet able to create and solve their own authentic task for equations and inequalities | D. Solve an equation with integer solutions and solve a singular (as opposed to compound) inequality | D. Solve an equation or compound inequality with real solutions including no solution or infinitely many solutions | D. Develop and solve an appropriate equation or inequality given an authentic task | D. Create and solve their own authentic task for inequalities |

**Quantitative Literacy – Functions & Modeling**

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decision making. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical, statistical, and geometric methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data. The use of functions is one way situations can be modeled. Constructing, evaluating, and using models, especially functions, are essential to this component of the course. While function notation may be included, it is not a requirement of the course. Emphasis should be placed on how functions work and how they can be used to model a given situation.

**QL-FM1. Students can apply, analyze and evaluate the characteristics of functions in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Use variables in a variety of mathematical contexts to represent quantities or attributes.
2. Predict and then confirm the effect that changes in variable values have in an algebraic relationship.
3. Understand the concept of a function.
4. Interpret functions.
5. Analyze functions using different representations (descriptions, tables, graphs, and equations).
6. Represent common types of functions using words, algebraic symbols, graphs, and tables.
7. Identify important characteristics of functions in various representations.

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| **Competency and Indicator** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-FM1. Students can apply, analyze and evaluate the characteristics of functions in authentic modeling and problem solving situations.** | **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.** |
| **QL-FM1.A. Use variables in a variety of mathematical contexts to represent quantities or attributes.** | A. Not yet able to identify when a variable should be used. | A. Identifies when a variable is necessary  AND  A. Translates given mathematical sentences into equations accurately 50% of the time | A. Translate a given mathematical sentence into an equation using appropriate numbers and variables  AND  A. Identify the independent and dependent variables | A. Translate a given mathematical sentence or situation into an equation with appropriate numbers and variables  AND  A. Identify the independent and dependent variables in authentic tasks | A. Make general statements about translating mathematical sentences or situations into equations  AND  A. Make general statements about independent and dependent variables |
| **QL-FM1.B. Predict and then confirm the effect that changes in variable values have in an algebraic relationship.** | B. Not yet able to make a prediction about the algebraic relationship | B. Not yet able to make a correct prediction about the algebraic relationship | B. Make a correct prediction about the algebraic relationship and confirm the answer mathematically | B. Make a correct prediction, confirm the answer mathematically, and can interpret that answer in an authentic task | B. Analyze and correct others’ predictions including what may have led them to that prediction |
| **QL-FM1.C. Understand the concept of a function.** | C. Not yet able to identify functions | C. Identifies a function in one of the representations (graph, table, equation)  not able to explain why it is a function | C. Identifies a function in one or more representations (graph, table, equation) and can explain why it is or is not a function | C. Identifies a function in two or more representations (graph, table, equation) and can explain why it is or is not a function in the context of the situation | C. Create examples of  functions and non-functions in a variety of representations |
| **QL-FM1.D. Interpret functions** | D. Not yet able to identify any key features of a given function | D. Identify key features given a function | D. Identify key features given a function; interpret those features or can model the function in another representation | D. Identify key features given a function; interpret key features, model the function in another representation, and solve authentic tasks involving the function | D. Generalize key features of functions and how they are modelled in various representations (Example: what a y-intercept is on a graph, equation, table, or in a situation) |
| **QL-FM1.E. Analyze functions using different representations (descriptions, tables, graphs, and equations).** | E. Not yet able to model or analyze functions in any representation | E. Model and analyze characteristics of only linear functions | E. Model and analyze characteristics of linear and quadratic functions | E. Model and analyze characteristics of linear, quadratic, and exponential functions in a variety of authentic tasks | E. Model and analyze characteristics of rational or radical functions |
| **QL-FM1.F. Represent common types of functions using words, algebraic symbols, graphs, and tables.** | F. Not yet able to model or analyze functions in any representation | F. Model and analyze characteristics of only linear functions | F. Model and analyze characteristics of linear and quadratic functions | F. Model and analyze characteristics of linear, quadratic, and exponential functions in a variety of authentic tasks | F. Model and analyze characteristics of rational or radical functions |
| **QL-FM1.G. Identify important characteristics of functions in various representations.** | G. Not yet able to identify any key features of a given function | G. Identify key features given a function | G. Identify key features given a function; interpret those features or can model the function in another representation | G. Identify key features given a function; interpret key features, model the function in another representation, and solve authentic tasks involving the function | G. Generalize key features of functions and how they are modelled in various representations (Example: what a y-intercept is on a graph, equation, table, or in a situation) |

**QL-FM2. Students can build and use functions, including linear, nonlinear, and geometric models in authentic modeling and problem solving situations.**

*Key performance indicators to MEET this competency:*

1. Translate problems from a variety of contexts into mathematical representations and vice versa.
2. Build a function that models a relationship between two quantities.
3. Build new functions from existing functions.
4. Construct and compare models such as linear and nonlinear models and use them to solve problems.
5. Interpret expressions for functions in terms of the situation they model.
6. Apply geometric concepts in modeling situations.

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| **Competency and Indicator** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-FM2. Students can build and use functions, including linear, nonlinear, and geometric models in authentic modeling and problem solving situations.** | **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.** |
| **QL-FM2.A. Translate problems from a variety of contexts into mathematical representations and vice versa.** | A. Not yet able to translate problems into any other form of representation | A. Translate between tables and graphs (between two visual representations) and sometimes equation | A. Translate between visual representations (tables/graphs), equations, and sometimes written descriptions | A. Translate between tables, graphs, equations, and written descriptions in a variety of authentic tasks | A. Choose an efficient model to analyze problems in a variety of context |
| **QL-FM2.B. Build a function that models a relationship between two quantities.** | B. Identify a relationship between two quantities but not yet able to build a function to represent it | B. Identify the relationship between two quantities and build a linear function to represent it | B. Identify the relationship between two quantities in both linear and quadratic functions and build the corresponding functions to represent it | B. Identify and model the relationship between two quantities in linear, quadratic, and exponential functions  AND  B. Students can build needed additional functions from these existing functions, and use those functions to solve authentic tasks | B. Identify and model relationships between two quantities in a variety of functions, build new functions, and justify their choice of function |
| **QL-FM2.C. Build new functions from existing functions.** | C. Identify a relationship between two quantities but not yet able to build a function to represent it | C. Identify the relationship between two quantities and build a linear function to represent it | C. Identify and model the relationship between two quantities in both linear and quadratic functions | C. Identify and model the relationship between two quantities in linear, quadratic, and exponential functions  AND  C. Students can build needed additional functions from these existing functions, and use those functions to solve authentic tasks | C. Identify and model relationships between two quantities in a variety of functions, build new functions, and justify their choice of function. |
| **QL-FM2.D. Construct and compare models such as linear and nonlinear models and use them to solve problems.** | D. Not yet able to construct or compare different models | D. Construct models in a few different representations | D. Construct a variety of models  AND  D. Students can draw some useful conclusions from comparing models | D. Construct a variety of models  AND  D. Students can draw useful conclusions from comparing models  AND  D. Students can use models and comparisons to solve authentic tasks | D. Analyze problems and construct an appropriate model in an authentic task |
| **QL-FM2.E. Interpret expressions for functions in terms of the situation they model.** | E. Not yet able to mathematically solve situations | E. Solve situations mathematically but are not yet able to interpret pieces of the expression | E. Solve situations and provide an interpretation for individual pieces of the function/expression | E. Solve situations mathematically and provide an interpretation of the function as a whole as well as what the answer means in the context of the situation | E. Defend and analyze interpretations of function and what the answer means in the context of an authentic text |
| **QL-FM2.F. Apply geometric concepts in modeling situations.** | F. Identify a geometric relationship but not yet able to apply it | F. Identify a geometric relationship and able to apply it given the task and the geometric application needed | F. Identify multiple geometric relationships needed to solve an authentic task | F. Identify and apply multiple geometric relationships needed to solve an authentic task | F. Identify and model a variety of geometric concepts and justify their properties and applications |

**QL-FM3. Students can evaluate mathematical models and explain the limitations of those models.**

*Key performance indicators to MEET this competency:*

1. Identify the reasonableness of a linear model for given data and consider alternative models.
2. Use reasoning that supports that abstract mathematical models used to characterize real-world scenarios or physical relationships are not always exact and may be subject to error from many sources.

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| **Competency and Indicator** | **Level 1 – No Evidence** | **Level 2 – Partially Meets** | **Level 3 - Approaches** | **Level 4 - Meets** | **Level 5 - Exceeds** |
| **QL-FM3. Students can evaluate mathematical models and explain the limitations of those models.** | **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.** |
| **QL-FM3.A. Identify the reasonableness of a linear model for given data and consider alternative models.** | A. Not yet able to determine the reasonableness of a linear model | A. Select the correct linear model for a given task | A. Identify the reasonableness of a linear model for given data | A. Identify the reasonableness of a linear model for given data and consider alternative models in an authentic task | A. Analyze the reasonableness of various models given an authentic task |
| **QL-FM3.B. Use reasoning that supports that abstract mathematical models used to characterize real-world scenarios or physical relationships are not always exact and may be subject to error from many sources.** | B. Not yet able to relate models to real world concepts | B. Relate models to real world concepts | B. Use abstract mathematical models to characterize real-world scenarios or physical relationships with guidance and support | B. Use reasoning that supports that abstract mathematical models used to characterize real-world scenarios or physical relationships are not always exact and may be subject to error from many sources | B. Use error analysis to identify potential error sources influencing data, models, and/or results. Explain the effect the error/variable has on the data, model, or results |