



INVESTIGATE THE WORLD

How well does the student use mathematics to model and investigate a given issue, situation, or event?

	Emerging	Developing	Proficient	Advanced
MATH11-12.INV1.MODEL	Designs a mathematical model to illustrate a situation or to diagram a problem, or applies a model that has been successful previously in similar situations.	Develops a comprehensive mathematical model using all relevant information to describe a situation or to diagram a problem, reflects on the process and considers possible revisions, or adapts a previous model to be applicable to a new situation or problem.	Develops a comprehensive mathematical model using all relevant information to describe a situation or to solve a problem, reflects on the process and makes effective revisions, or integrates one or more familiar models to represent a new situation or problem.	Uses additional contextual information or relationships in the mathematical model or presents and considers several models and selects the best model for the given context.
MATH11-12.INV2.RLTNS	Describes how the mathematical relationships in a model reflect a situation or the elements of a problem, or predicts when and/or how a model could be generalized to similar situations.	Distinguishes how the mathematical relationships in a model reflect a situation or the elements of a problem and analyzes the parameters of the problem or situation for possible limitations of the model.	Demonstrates how mathematical relationships in the model reflect the given situation or problem, using all the relevant information provided and noting reasonable restrictions from the context.	Evaluates and accurately articulates why the model selected is the best choice and explains the mathematical limitations based on the assumptions used to create the model.
MATH11-12.INV3.RPRSN	Distinguishes between appropriate mathematical tools, procedures, and representations to explore the issue, situation, or event and can articulate why a particular tool or procedure was selected.	Effectively employs appropriate mathematical tools, procedures, or representations to explore the given issue, situation, or event.	Creatively employs familiar mathematical tools, procedures, or representations in a unique way to explore and analyze the given issue, situation, or event.	Evaluates and uses appropriate mathematical tools, procedures, and representations to explore, manipulate, and analyze the issue, situation, or event elegantly.

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MATH11-12.INV4.SELEC	Generates a range of appropriate strategies and differentiates between applicability of the strategies to the given situation.	Formulates multiple appropriate solution strategies and evaluates how one or more will represent a correct approach and solve the problem.	Incorporates multiple solution strategies to arrive at a correct approach and solution to the problem, and revises strategy when appropriate.	Identifies or derives additional information to enhance the model that leads to the use of innovative approaches to the problem or to novel solutions.
MATH11-12.INV5.STRTG	Selects and applies a reasonable strategy to verify the solution and differentiates appropriateness of possible strategies.	Generates multiple appropriate strategies to verify the solution with respect to the mathematics and the given context, and justifies the selection of a particular strategy using precise mathematical terminology.	Selects multiple appropriate strategies to verify the solution with respect to both the mathematics and the given context revises strategy when appropriate and justifies the selection and revision using precise mathematical terminology.	Applies appropriate strategies to verify the solution with respect to both the mathematics and the given context, and goes beyond the scope of the task to interpret additional impacts of the solution.

RECOGNIZE PERSPECTIVES

How well does the student recognize the impact of his/her mathematical analyses on themselves and others?

	Emerging	Developing	Proficient	Advanced
MATH11-12.PERS1.ARGUE	Draws a conclusion or generates an incomplete argument to justify a conclusion only partially supported by the mathematical data or information.	Presents a viable conjecture or conclusion and generates a convincing argument that is supported by the mathematical data and some analysis.	Presents a viable conjecture or conclusion based on the mathematical context and justifies the position by detailed analysis and evaluation of the mathematical data and revises conjectures based on analysis and evaluation.	Defends and validates conjecture, conclusions, arguments, and decisions with additional mathematical analyses, supported by external research, or by public review, and incorporates comments and critique into conjecture or conclusions as appropriate.
MATH11-12.PERS2.VRIFY	Understands diversity in and uses knowledge of the target culture(s) to effectively communicate in the target language.	Collaborates and seeks external verification or validation of the appropriateness of their model, tools, procedures, solutions, analyses, conclusions, arguments, or decisions, and considers possible revisions based external critique.	Collaborates and seeks external verification or validation of the appropriateness of their model, tools, procedures, solutions, analyses, conclusions, arguments, or decisions, and makes revisions based on external critique to strengthen outcomes.	Collaborates to validate work with professional sources or a larger, more global community.
MATH11-12.PERS3.IMPLC	Expresses and evaluates some implications of a conclusion, conjecture, or argument arising from a mathematical model or process and uses data or information from the model as support.	Evaluates some implications of the conjecture, conclusion, decision, or arguments in the context of a wider range of reference, including national and global scales.	Evaluates the implications of the conjecture, conclusion, decision, or argument within the global context and uses the evaluation to revise or amend the conjecture, conclusion, decision, or argument within a global context.	Extends the implications within the global context, uses the mathematics of the given situation to support or address the implications beyond the context of the issue, situation, or event, including consideration of ethics and compassion.

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MATH11-12.PERS4.PERSP	Recognizes, articulates, and addresses different perspectives using precise mathematical language when appropriate.	Recognizes, articulates, and addresses different perspectives by revising original ideas, using precise mathematical language when appropriate.	Recognizes, articulates, and addresses different perspectives and revises original conclusions, decisions, or opinions when appropriate, incorporating specific elements of these perspectives and using precise mathematical language.	Recognizes and supports different perspectives with additional mathematical analyses or external research and justifies perspective and constructively critiques differing perspectives using precise mathematical language and data.
MATH11-12.PERS5.POSTN	Articulates a valid conjecture that reflects the mathematical process procedure model that results in a mathematically valid conclusion and engages in mathematical discourse to justify conjecture.	Engages in mathematical discourse justifying conjectures, conclusions, and procedures, critiquing the reasoning of others, and uses external critique to analyze, review, and begin to revise conjecture, conclusion, or procedure.	Strengthens the conjectures, conclusions, or procedures through additional mathematical analyses or research and engages in mathematical discourse to interpret or evaluate and amend the conclusions, arguments, and decisions.	Strengthens the conjectures, conclusions, or procedures through additional mathematical analyses, research, or discourse and incorporates other mathematics and external research into the conclusions, arguments, and decisions.

COMMUNICATE IDEAS

How clearly and accurately does the student communicate and defend his/her mathematical thinking, approaches, representations, solution, and decisions?

	Emerging	Developing	Proficient	Advanced
MATH11-12.COMM1.COMM	Explains and justifies complex mathematical reasoning, concepts, procedures, and relationships using precise mathematical language in a way that is mostly organized and sequenced.	Explains and justifies complex mathematical reasoning, concepts, procedures, and relationships using precise mathematical language in an organized and sequenced way, referencing visual representations.	Explains and justifies complex mathematical reasoning, concepts, procedures, and relationships using precise mathematical language in an organized and sequenced way, referencing a variety of mathematical models for clarity when appropriate.	Explains and justifies complex mathematical concepts, procedures, and relationships using detailed and elegant visual representations.
MATH11-12.COMM2.DEFNS	Defends a conclusion, conjecture, decision, or argument with some mathematical concepts, procedures, or data from the model using precise mathematical language.	Defends a complex conclusion, conjecture, decision, or argument with relevant and accurate concepts, procedures, or data from the model using precise mathematical language.	Defends multiple conjectures, conclusions, decisions, or arguments with relevant and accurate concepts, procedures, or data from one or more related models using precise mathematical language.	Uses additional data, deeper analyses, or a secondary model to support and defend decisions, conclusions, or arguments using precise mathematical language.
MATH11-12.COMM3.SYMBL	Decontextualizes a mathematical idea using mathematical terms, symbols, and conventions, and begins to contextualize by some evaluation of the process using mathematical language.	Decontextualizes a mathematical idea correctly using precise mathematical terms, symbols, and conventions, and contextualizes by evaluation of the process using precise mathematical terminology and symbols.	Decontextualizes a mathematical idea in multiple ways by correctly using precise mathematical terms, symbols, and conventions, and contextualizes by evaluation of the process using precise mathematical terminology and symbols.	Decontextualizes a mathematical idea in multiple ways by using mathematical terms, symbols, and conventions, and contextualizes by evaluation of the process in precise mathematical language and enhancing meaning through use of common language.

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MATH11-12.COMM4.GRAMM	Engages in clear oral and written mathematical discourse using mathematical terminology, symbols, and conventions correctly and generally free of distracting errors in grammar, usage, and punctuation.	Engages in clear oral and written mathematical discourse that is free of mathematical misconception and errors in grammar, usage, and mechanics.	Engages in clear oral and written mathematical discourse using precise mathematical terminology and language, as well as correct grammar, usage, and mechanics, so that the communication of mathematical meaning is elevated and enhanced.	Engages in clear oral and written mathematical discourse using precise mathematical terminology and language, as well as correct grammar, usage, and mechanics so that the communication of mathematical meaning is elevated and enhanced.
MATH11-12.COMM5.MEDIA	Selects an appropriate medium and uses it in an effective way to communicate mathematical ideas.	Selects appropriate media and uses them efficiently to communicate and evaluate mathematical ideas.	Selects appropriate media and uses them effectively to communicate mathematical ideas, evaluates and refines media choices and mathematical ideas.	Selects appropriate media and uses advanced features and tools to elegantly and efficiently communicate and analyze mathematical ideas strategically.

TAKE ACTION

How well does the student advocate for, engage in, and reflect on plausible and responsible actions that are supported by his/her mathematics?

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MATH11-12.ACT1.ADVCT	Advocates for a course of action that is plausible, responsible, and supported by mathematics.	Advocates for multiple possible course of action that are plausible, responsible, and supported by mathematics.	Extends elements of a course of action beyond the scope of the task's audience to a new audience, or beyond the scope of the task.	Extends advocacy beyond the scope of the task's audience to new audiences, or extends the courses of action beyond the scope of the task.
MATH11-12.ACT2.ACTN	Identifies a plan of action supported by the mathematics that is mostly viable, manageable, and/or responsible that is related to the conclusion, argument, or decision.	Develops and implements a plan of action supported by the mathematics that is viable, manageable, and/or responsible that is primarily consistent with the argument, conclusion, or decision.	Develops and implements a viable, manageable, and responsible plan of action supported by the mathematics that is consistent with the argument, conclusion, or decision.	Plans novel or innovative actions or continues to engage in the action beyond the scope of the task.
MATH11-12.ACT3.IMPRT	Describes the importance of the plan of action, with some connection to the global community, supported by the data or conclusions.	Articulates the importance of the plan(s) of action within the context of the global community and identifies the limitations and potential improvements, supported by the data or conclusions.	Articulates the importance of the plan(s) of action within the context of the global community and analyzes and evaluates the limitations and potential improvements, supported by the data or conclusions.	Develops new insights and can articulate the changes in personal views, attitudes, or mathematical understanding as a result of the action(s).