

# SEEDS Student Learning Outcome/Rubric

## Quantitative Reasoning

### Student Learning Outcome:

- *Students analyze, explore, and develop arguments through the use of mathematical and/or statistical reasoning; demonstrate an appreciation of the application of quantitative and mathematical reasoning to the broader world.*

Criterion	Exemplary/Excellent	Proficient/Good	Basic/Satisfactory	Below Basic/Needs Improvement
<b>Interpretation</b>	Identifies all relevant mathematical information and clearly explains it.	Identifies some relevant mathematical information and clearly explains it	Identifies some relevant mathematical information and vaguely explains it	No relevant information identified.
<b>Calculation</b>	Calculations are logical, based on the context of the problem, and are correct, leading to a successful completion of the problem.	Calculations are somewhat connected to the context and / or contain some errors. Students can identify the reasonableness of their solution (indicating the answer is close to correct or correct)	Calculations are somewhat connected to the context and contain errors. Students are challenged to identify that their responses are not reasonable.	Calculations given are not related to the problem, or no work is present.
<b>Use of Tools and Technologies</b>	Uses <b>optimal</b> tools and technologies needed to <b>successfully complete</b> the analysis	Uses <b>appropriate</b> tools and technologies needed to <b>successfully complete</b> the analysis	Uses appropriate tools and technologies to complete the analysis, <b>but uses them inappropriately</b>	Uses tools and technology that are <b>inappropriate</b> for the analysis.

<b>Communication</b>	Clearly articulates the process, reasoning, and/or solution using precise mathematical/statistical language.	Clearly articulates the process, reasoning, and/or solution using precise mathematical/statistical language with teacher support -or- clearly articulates the process, reasoning, and/or solution using imprecise mathematical/statistical language	Vaguely articulates the process, reasoning, and/or solution using imprecise mathematical/statistical language	No relevant explanation is provided.
<b>Logical and Mathematical Reasoning</b>	Student develops a complete and valid argument along with evidence and/or justification to support a proposition/conjecture and/or conclusion.	Student develops an adequately complete and valid argument along with evidence and/or justification to support a proposition/conjecture and/or conclusion.	Student develops a vague argument and/or makes minor errors in the development of an argument that supports a proposition/conjecture and/or conclusion.	Unable to develop an argument that supports a proposition or conclusion.
<b>Ethical and Critical Context</b>	Evaluates and proposes solutions to complex questions about mathematical ethics that reflect multiple perspectives or worldviews; evaluates one's own position in the analysis and acknowledges conflicts (i.e., acknowledges and considers how their own personal biases, societal biases, etc. may influence how the problem was solved or what assumptions were	Synthesizes diverse questions and assumptions and asks increasingly complex questions about broader implications of mathematics; shows a growing understanding of mathematics' potential power and influence.	Draws connections between mathematical work and its possible real world ramifications; shows some awareness of the interaction between mathematics and society.	Unable to identify an ethical dilemma in mathematical work and/or describe its origins or implications.

	or were not considered)			
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**Modeled on several different rubrics, including AAC&U Value rubric and Carleton College.**

**Glossary.**

- **Interpretation:** Ability to glean and explain mathematical information presented in various forms (e.g. equations, graphs, diagrams, tables, words).
- **Calculation:** Ability to perform arithmetic and mathematical calculations.
- **Use of Tools and Technologies:** Uses (and potentially identifies and selects) tools and technologies appropriate for a given purpose. Tools may include, but are not limited to statistical software, research databases or artificial intelligence.
- **Ethical and Critical Context:** Human beings do mathematics; thus, there are potential ethical dilemmas and implications of mathematical work which may affect entities at the individual, group, societal and/or environmental level.