

## NTN Knowledge and Thinking Rubric for Math Problem Solving, Grade 12

The ability to reason, problem-solve, develop sound arguments, and create new ideas by applying and adapting the knowledge, skills, and strategies of a discipline.



NewTech Network

	EMERGING	E/D	DEVELOPING	D/P	PROFICIENT College Ready	P/A	ADVANCED College Level
<b>PROBLEM SOLVING</b> <i>What is the evidence that the student understands the problem and the mathematical strategies that can be used to arrive at a solution?</i>	<ul style="list-style-type: none"> <li>Does not provide a model</li> <li>Ignores given constraints</li> <li>Uses few, if any, problem solving strategies and tools</li> </ul>		<ul style="list-style-type: none"> <li>Creates a limited model to simplify a complicated situation</li> <li>Attends to some of the given constraints</li> <li>Uses inappropriate or inefficient problem solving strategies and tools</li> </ul>		<ul style="list-style-type: none"> <li>Creates a model to simplify a complicated situation</li> <li>Analyzes all given constraints, goals and definitions</li> <li>Uses appropriate problem solving strategies and tools</li> </ul>		<ul style="list-style-type: none"> <li>Creates a model to simplify a complicated situation and identifies limitations of model</li> <li>Analyzes all given constraints, goals and definitions and implied assumptions</li> <li>Uses novel problem solving strategies and tools and/or extends previous knowledge correctly to a given problem</li> </ul>
<b>REASONING AND PROOF</b> <i>What is the evidence that the student can apply mathematical reasoning/procedures in an accurate and complete manner?</i>	<ul style="list-style-type: none"> <li>Provides partially correct or incorrect solutions without justifications</li> <li>Results are not interpreted in terms of context</li> </ul>		<ul style="list-style-type: none"> <li>Provides partially correct solutions with justification or correct solutions without logic or justification</li> <li>Results are interpreted partially or incorrectly in terms of context</li> </ul>		<ul style="list-style-type: none"> <li>Constructs logical, correct, complete solution with justifications</li> <li>Results are interpreted correctly in terms of context, including addressing reasonableness of final answer</li> </ul>		<ul style="list-style-type: none"> <li>Constructs logical, correct, complete solution with justifications and identifies any sources of error.</li> <li>Results are interpreted correctly in terms of context, including addressing reasonableness of final answer, and makes connections to similar math content in different contexts</li> </ul>
<b>COMMUNICATION AND REPRESENTATION</b> <i>What is the evidence that the student can communicate mathematical ideas to others?</i>	<ul style="list-style-type: none"> <li>Does not use representations (diagrams, tables, graphs, formulas) or uses few representations in ways that confuse the audience</li> <li>Uses incorrect definitions or mathematical notation (units of measure, labeled axes, equation formats, etc.)</li> </ul>		<ul style="list-style-type: none"> <li>Uses representations (diagrams, tables, graphs, formulas) that provide help to the audience follow to the chain of reasoning in a limited way; extraneous representations may be included</li> <li>Uses imprecise definitions or incomplete mathematical notation (units of measure, labeled axes, equation formats, etc.)</li> </ul>		<ul style="list-style-type: none"> <li>Uses multiple representations (diagrams, tables, graphs, formulas) to help the audience follow the chain of reasoning; only relevant representations are included</li> <li>With few exceptions, uses precise definitions and accurate mathematical notation (units of measure, labeled axes, equation formats, etc.)</li> </ul>		<ul style="list-style-type: none"> <li>Uses multiple representations (diagrams, tables, graphs, formula) and key explanations to enhance the audience's understanding of the solution; only relevant representations are included</li> <li>Uses precise definitions and accurate formal mathematical notation (units of measure, labeled axes, equation formats, etc.)</li> </ul>

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