

Creativity in Progress Rubric (CPR) on Proving

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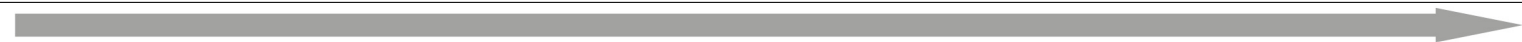

MAKING CONNECTIONS:

	Beginning	Developing	Advancing
Between Definitions/Theorems NA <input type="checkbox"/>	Recognizes some relevant definitions/theorems from the course or textbook with no attempts to connect them in their proving	Recognizes some relevant definitions/theorems from the course and attempts to connect them in their proving	Implements relevant definitions/theorems from the course and/or other resources outside the course in their proving
Between Representations ¹ NA <input type="checkbox"/>	Provides a representation with no attempts to connect it to another representation	Provides multiple representations and recognizes connections between representations	Provides multiple representations and uses connections between different representations
Between Examples NA <input type="checkbox"/>	Generates one or two specific examples with no attempt to connect them	Generates one or two specific examples and recognizes a connection between them	Generates several specific examples and uses the key idea synthesized from their generation

¹ We define a *mathematical representation* similar to NCTM's (2000) definition. It includes written work in the form of diagrams, graphical displays, and symbolic expressions. We also include linguistic expressions as a form of lexical or oral representation. For example, a student can use the lexical or oral representation, "the intersection of sets A and B "; a Venn Diagram to depict his/her mathematical thinking; a symbolic representation $A \cap B$; or set notation $\{x|x \in A \text{ and } x \in B\}$ (which is also a symbolic representation). Note the last two representations are in the same category, e.g. symbolic, but they are still considered two different representations.

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TAKING RISKS:

	Beginning	Developing	Advancing
Tools and Tricks ² NA <input type="checkbox"/>	Uses a tool or trick that is algorithmic or conventional for the course or the student	Uses a tool or trick that is model-based or partly unconventional ³ for the course or the student	Creates a tool or trick that is unconventional for the course or the student
			
Flexibility ⁴ NA <input type="checkbox"/>	Begins a proof attempt (or more than one proof attempt), but uses only one approach	Acknowledges and/or uses more than one proving approach, but only draws on one proof technique	Uses more than one proof technique
			
Posing Questions NA <input type="checkbox"/>	Recognizes there should be a question asked, but does not pose a question ⁵	Poses questions clarifying a statement of a definition or theorem	Poses questions about reasoning within a proof
			
Evaluation of Proof Attempt NA <input type="checkbox"/>	Examines surface-level ⁶ features of a proof attempt	Examines an entire proof attempt for logical or structural flow	Examines and <i>revises</i> an entire proof attempt for logical or structural flow
			

² Based on the Originality category from Leikin (2009).

³ Learned in a different context.

⁴ A proof attempt is a continuous, sustained line of reasoning focused on a single theorem or conjecture. A proof approach is a proof attempt in which a new or different (to the prover) idea is introduced. Finally, a proof technique is a proof approach that addresses the overall logical structure of the proof. Common proof techniques include induction, proof by cases, direct proof, contradiction, and contrapositive.

⁵ For example, a student writes a “?” next to something.

⁶ Surface-level features include technical, computational, and line-to-line logical details.