

## Creativity in Progress Rubric (CPR) on Proving

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<b>MAKING CONNECTIONS:</b>	<b>Beginner</b>	<b>Developing</b>	<b>Satisfactory</b>
Between Definitions or Theorems	Introduces few definitions/theorems (some of them may be irrelevant)	Recognizes some relevant definitions/theorems from the course or textbook and attempts to connect them in their proving	Implements definitions/theorems from the course and/or prior knowledge (e.g. a prior course work)
Between Representations <sup>1</sup>	Attempts a connection between two representations	Demonstrates connections between multiple representations either to enhance an idea or help understanding	Utilizes different representations to strengthen the proof
Between Examples	Generates one or two specific examples for the proof	Attempts to make connections between specific and general examples	Able to move freely back and forth between specific and general examples
Between Proof Techniques <sup>2</sup> and Previous Proofs	Does not show a connection between proof techniques of previous proofs	Attempts to utilize a proof technique due to its success in previous proofs	Recognizes previous success with proof techniques and groups certain mathematical concepts with certain proof techniques

<sup>1</sup> We define a *mathematical representation* as is a very general relationship that expresses similarities between objects. For example, we can visually represent  $y = x^2$  as a parabola with vertex at the origin and “pointing” up.

<sup>2</sup> We define a *proof technique* as a method of approaching a proving attempt of a theorem. For example, proof by contradiction and induction are two different proof techniques.

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<b>TAKING RISKS:</b>	<b>Beginner</b>	<b>Developing</b>	<b>Satisfactory</b>
Attempting a Proof	Attempts a proof	Attempts a proof with some indication of directed thought	Attempts a proof with some indication of exhaustive thought towards the proof
Proof Technique Flexibility	Attempts one proof technique	Implements a proving technique completely	Scratchwork (verbal or written) indicates thinking of different proving approaches.
Completeness	Provides an incomplete proof	Provides a complete verbal or written argument without a rigorous written proof	Provides a complete proof written rigorously
Evaluation of the Attempt	Checks work locally	Recognizes a unsuccessful proving attempt	Recognizes the key idea that makes the proving attempt unsuccessful or successful

<b>CREATING IDEAS:</b>	<b>Beginner</b>	<b>Developing</b>	<b>Satisfactory</b>
Originality <sup>3</sup>	Tries to create original ideas for the proving attempt	Displays original ideas that are somewhat expected but impressive	Creates a whole new idea never expected or unusual for the course
Posing Questions	Poses questions clarifying a statement of a definition or theorem	Poses questions about reasoning within a proof	Poses questions that take account global understanding or modification of hypothesis of the theorem posed
Conjectures	Poses a trivial or incorrect conjecture, or rewords a previous theorem	Extends theorems or definitions in the form of corollaries or poses conjectures from patterns	Poses and attempts to prove a conjecture that leads to or indicates a generalization of prior ideas

<sup>3</sup> We define *originality* as the ability to create new, novel, unique, and/or unusual ideas, relative to both the student and the course.