

Creativity in Progress Reflection (CPR) on Problem Solving

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MAKING CONNECTIONS

	Beginning	Developing	Advancing
Between Definitions/Formulas/Theorems NA <input type="checkbox"/>	Recognizes some relevant definitions/formulas/theorems from the course with no attempts to connect them in a solution	Recognizes some relevant definitions/formulas/theorems from the course and attempts to connect them in a solution	Uses relevant definitions/formulas/theorems from the course or other resources outside the course in a solution
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 those examples
Between Solutions NA <input type="checkbox"/>	Attempts to connect multiple solutions to each other	Connects multiple solutions to each other	Connects multiple solutions to each other and generalizes common properties

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 a lexical, oral, or physical representation for "function", an input/output table, a graph of the function, the symbolic representations $x \mapsto y$, $f(x) = y$, or (x, y) . Note the last representations are in the same category, e.g. symbolic, but they are still considered three 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 usual for the course or the student	Uses a tool or trick that is partly unusual ³ for the course or the student	Creates a tool or trick that is unusual for the course or the student
Flexibility ⁴ NA <input type="checkbox"/>	Introduces one solution path	Introduces more than one solution path	Uses more than one solution path
Posing Questions NA <input type="checkbox"/>	Recognizes there should be a question asked, but does not pose a question ⁵	Poses questions clarifying a step within a solution	Poses questions about reasoning within a solution
Evaluation of Solution Attempt NA <input type="checkbox"/>	Checks surface-level ⁶ features of a solution attempt	Checks an entire solution attempt for reasoning	Revises or validates an entire solution attempt for reasoning

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

³ Learned in a different context.

⁴ A solution attempt is a continuous, sustained line of reasoning focused on a single problem. A solution approach is a solution attempt in which a new or different (to the solver) idea is introduced.

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

⁶ Surface-level features include technical, computational, and step-by-step logical details.