

## Anchor Paper Scoring and Rationales

**Task: Money in the Piggy Bank**

**Student: A**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Developing	<p>The student demonstrates a partial understanding of the concepts and skills because they understand that they must include coins and determine the total. However the student has an incorrect solution that does not meet either task parameter (total must be between \$2.00 and \$3.00 and Rafael’s total must be more than Carmen’s).</p> <p>To move to Proficient, the student needs to understand the value of different coins and how they impact the total value of Carmen and Rafael’s collections.</p>
<b>Problem Solving</b>	Developing	<p>The student’s strategy of only adding pennies demonstrates a limited understanding of the problem. In addition, while the solution is relevant to the problem, it is not reasonable because it does not meet either parameter.</p>
<b>Communication and Reasoning</b>	Developing	<p>Although the student does not include any reasoning or justification, the student does use limited mathematical language (\$ and . symbols) to partially communicate their thinking. In addition, the student did count the collection of one bill and pennies correctly for Carmen and Rafael.</p>
<b>Representations and Connections</b>	Developing	<p>By using the optional graphic organizer, the student does have a representation to model the problem. However, the representation is limited and does not meet the parameters.</p>

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**Student: B**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Advanced	The student demonstrates an understanding of the concepts and skills associated with the task and is able to solve with a valid and correct solution. In addition, the student uses relationships among concepts (that 4 quarters = \$1.00) to make generalizations. The student generalized that adding four quarters each to Rafael and Carmen automatically gave each a total of \$2.00 so the student only needed to consider the other coins to meet the parameters of the task.
<b>Problem Solving</b>	Advanced	The student uses a well-developed and efficient strategy by recognizing that giving Carmen and Rafael each 4 quarters will result in each having \$2.00, and then understanding the value of coins to recognize that giving Carmen 5 more pennies and giving Rafael 3 more quarters will result in a correct solution.
<b>Communication and Reasoning</b>	Advanced	The student provides a comprehensive explanation as to how they solved the problem. The communication includes accurate mathematical language (less than, more than), as well as correct symbolic notation of money amounts (\$2.05 and \$2.75).
<b>Representations and Connections</b>	Proficient	<p>The student used an accurate representation to model the problem, and is able to make a connection (that 4 quarters is equal to \$1.00) to the context of the problem.</p> <p>To move to Advanced, the student should label their entire counting strategy, and should use symbolic notation for comparing the amounts (<math>\\$2.05 &lt; \\$2.75</math>) in addition to using words.</p>

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**Student: C**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Proficient	<p>The student demonstrates an understanding of the concepts and skills associated with the task and is able to solve the problem with a valid and correct solution.</p> <p>To move to Advanced, the student should explain their rationale for choosing the coins that they used. This rationale would likely include the generalization of adding four quarters to each Rafael and Carmen automatically gives them each a total of \$2.00, so the student would only need to consider the other coins.</p>
<b>Problem Solving</b>	Advanced	<p>The student uses a well-developed strategy to solve the problem. Their strategy demonstrates an understanding of the underlying mathematical concepts.</p>
<b>Communication and Reasoning</b>	Advanced	<p>The student's reasoning is comprehensive; they use labels on their money, symbolic notation to compare the collections, and include a table that demonstrates another way to add up the money.</p>
<b>Representations and Connections</b>	Advanced	<p>The student uses multiple representations to model the problem (the coins on the graphic organizer, symbolic notation, and a table). The student deepens their understanding by making connections between the representations.</p>

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**Student: D**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Proficient	<p>The student demonstrates an understanding of the concepts associated with the task, and applies these concepts to obtain a valid and accurate solution.</p> <p>To move to Advanced, the student should explain why they chose the coins they did and how their solution meets the parameters of the task.</p>
<b>Problem Solving</b>	Proficient	<p>The student's strategy of adding four quarters to both Carmen and Rafael's collections, then adding pennies to Carmen and dimes to Rafael demonstrates an understanding of the problem. The student confirms the reasonableness of the solution by writing the total amounts of each collection.</p>
<b>Communication and Reasoning</b>	Developing	<p>The student's reasoning and justification of their solution steps is limited. They noted how much they gave Carmen and Rafael, and while their solution is correct, they made no mention of why they chose the coins they used or how their solution connects to the task parameters.</p> <p>To move to Proficient, the student should better explain their thinking and provide justification for how they know their solution is accurate.</p>
<b>Representations and Connections</b>	Proficient	<p>The student uses the graphic organizer provided as an appropriate representation for the problem. The student also fully labels Rafael's collection, and mostly labels Carmen's collection.</p>

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**Student: E**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Proficient	The student displays an understanding of the concepts involved in the task. Originally the student gave Rafael four quarters and three dimes for a total of \$2.30, however they realized that their solution did not meet the parameter of Rafael having more money than Carmen. So the student self-corrected and gave Rafael seven quarters instead, resulting in a total of \$2.75.
<b>Problem Solving</b>	Proficient	The student's strategy of giving both Carmen and Rafael four quarters, then giving Carmen dimes and then giving Carmen dimes and giving Rafael quarters demonstrates an understanding of the problem. By recognizing that Rafael's original total of \$2.30 was not enough, the student confirmed the reasonableness of their final solution.
<b>Communication and Reasoning</b>	Developing	<p>The student's reasoning and justification of their solution steps is limited. They noted how much they gave Carmen and Rafael, and while their solution is correct, they made no mention of why they chose the coins they used or how their solution connects to the task parameters.</p> <p>To move to Proficient, the student should better explain their thinking and provide justification for how they know their solution is accurate.</p>
<b>Representations and Connections</b>	Proficient	The student used the graphic organizer provided as an appropriate representation to model the problem. The student uses accurate labels to count the money in both Carmen and Rafael's collections.

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**Student: F**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Proficient	The student displays an understanding of the concepts associated with the task. They understood both parameters of the task and ensured that their solution met both of the task parameters. Their solution is valid and correct.
<b>Problem Solving</b>	Proficient	The student chose to draw their own picture as their problem solving strategy. Their picture demonstrates an understanding of the task and of the underlying mathematical concepts (how to count collections of bills and coins). The student produces a solution that is relevant to the problem.
<b>Communication and Reasoning</b>	Developing	<p>The student's reasoning and justification of their solution is limited. While the student uses symbolic money notation to express how they counted each collection, the student makes no connections to the task parameters.</p> <p>To move to Proficient, the student should use words to explain why they chose the coins they used and how they know their solution met the task parameters.</p>
<b>Representations and Connections</b>	Proficient	The student created their own pictorial representation to model the problem. They had the correct number of coins for both Carmen and Rafael, and they used accurate labels to show the totals of each collection.

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**Student: G**

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Developing	The student demonstrates a partial understanding of the concepts associated with the task. They understand how to count money accurately and they understand that Carmen must have less money than Rafael. However, they do not understand that the dollar bill in each collection should be included in the total amount.
<b>Problem Solving</b>	Developing	<p>The student's problem solving strategy shows a limited understanding of the concepts. The student does not understand that the dollar bills should be included when determining the values of the collections. While their solution is relevant, it is not reasonable, as it does not meet one of the parameters of the task (that both collections must be between \$2.00 and \$3.00).</p> <p>To move this student to Proficient, the teacher should help the student understand that bill and coins must be considered when determining the total value of the collection.</p>
<b>Communication and Reasoning</b>	Developing	The student's solution has limited reasoning and justification for their solution. While they explained what they did to solve the problem, they did not make any connections to the task parameters or explain how they knew their solution was accurate.
<b>Representations and Connections</b>	Proficient	The student used the provided graphic organizer to create an appropriate representation to model the problem. They used accurate labels to maintain a running total the value of the coins. However, they forgot to include the dollar bill in their final count. The student could also benefit from a review of writing money amounts appropriately (i.e. as \$1.65 rather than as \$1.00 and 65¢).

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Student: H

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
<b>Mathematical Understanding</b>	Advanced	The student has a strong understanding of the mathematical concepts that are required for this task (counting collections of bills and coins), and solves the problem with an accurate and reasonable solution. In addition, the student is able to make connections among mathematical concepts.
<b>Problem Solving</b>	Advanced	The student uses a problem solving strategy that displays a strong understanding of the underlying concepts of the task. In addition, the student's problem solving strategy is well developed and efficient.
<b>Communication and Reasoning</b>	Advanced	The student's reasoning and justification are comprehensive. They use both words and mathematical symbols to communicate their thinking.
<b>Representations and Connections</b>	Advanced	The student uses the provided graphic organizer as an appropriate representation to model the problem. The student uses accurate labels to maintain a running count of the amount in each collection, and also uses symbols (< and >) to compare the amounts in the two collections.