

Anchor Paper Scoring and Rationales - Task: It's Your Lucky Day

Name: Student A

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	<p>Student A demonstrates a partial understanding of the concepts and skills associated with this task. The student accurately determines the probability of each individual event presented but does not know how to combine those individual events to determine the likelihood of the compound situation. This student also makes necessary adjustments that reflect an understanding of the difference between independent and dependent events.</p> <p>The solution is either incomplete or inaccurate. It appears that both Jamie and Todd have the same two probabilities listed, yet Student A chooses Jamie as the piece of advice that should be followed. It is unclear whether the student understands the interaction of the two probabilities or whether the student believes that the probability of the second event is the most important.</p>
Problem Solving	Developing	<p>This student moves to an efficient problem solving strategy based on the background knowledge relating to the probability of single events; however, Student A displays limited understanding in regards to how to combine the probabilities of the two single events.</p> <p>The solution provided is relevant to the task, but the student does not investigate its reasonableness.</p>
Communication and Reasoning	Developing	<p>Student A provides limited mathematical language to communicate thinking. The student argues that Jamie's advice is the preferred "because you have a 60% chance then 66.$\bar{6}$% chance which is a better chance." There is no communication about the reasoning in relation to why the other two pieces of advice were dismissed.</p>

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Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Representations and Connections	Developing	<p>This student uses an incomplete representation to model the problem. Each individual event is represented appropriately, but there is no evidence of combining the separate events.</p> <p>A partial mathematical connection is evident. The student does make a connection back to the task when reflecting on the representations presented; however, the connection is not complete given that two of pieces of advice rendered the same series of probabilities (just in a different order). Student A does not address this commonality.</p>

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Name: Student B

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	Although this student does come to a valid conclusion in regards to the task, Student B does not demonstrate an understanding of all of the concepts and skills associated. The student does discriminate between independent and dependent events; however, fractional representations for probability are misrepresented as part/part. This student thinks about the probability in a part/whole form as evidenced by one comment regarding a 50% chance. The student shows no evidence of understanding how to represent the probability of two events.
Problem Solving	Developing	Student B applies a problem solving strategy that displays a limited understanding of how to determine the probability of two events. This student draws a picture to simulate the task and logically reasons through the choices presented. This strategy has limitations when applied to different instances of the same concept.
Communication and Reasoning	Proficient	This student uses mathematical language when communicating thinking. Student B applies logic to effectively reason through the task and all possible combinations of events. Mathematical evidence is provided to support the claims made in response to the task.
Representations and Connections	Developing	This student's drawing as a simulation and method to problem solve has limitations. The representation does not thoroughly connect to the mathematics outlined in the 8.11 standard. It enables the student to choose from the three pieces of advice, but it does not allow the student to produce a probability of success for the two events. Although probability, as a ratio, is misrepresented, Student B does seem to connect these misrepresentations appropriately in response to the task.

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Name: Student C

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Proficient	Student C demonstrates an understanding of both the difference between independent and dependent events as well as their application to compound probability. The skills presented lead to a valid conclusion in response to the task.
Problem Solving	Advanced	<p>This student uses tree diagrams to determine an accurate ratio to represent the probability for each of the three pieces of advice. These ratios are converted, appropriately, to decimals and percents. Each of these responses are confirmed by a second problem solving strategy.</p> <p>Although very small, this student has applied one problem solving strategy in a very comprehensive and efficient manner. Then, a second strategy is used to confirm results. The work is sectioned off and organized.</p>
Communication and Reasoning	Developing	This student provides limited communication of their thought processes. An appropriate solution is provided, but the explanations and justifications are minimal.
Representations and Connections	Advanced	This student provides multiple representations for the task provided. Each representation is labeled by either "bowl #" or "advice #." Student C has connected the prior knowledge of tree diagrams to the algorithm that finds the product of simple probabilities to determine the probability of two events. This connection provides a deeper understanding as it confirms the results of the multiplication.

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Name: Student D

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	This student displays a partial understanding of the concepts and skills associated with the task. Student D effectively determines the probability of simple events. The task is treated as if it were one jelly bean being selected from either bowl 1, bowl 2, or both bowls poured together. This misinterpretation leads Student D to an incorrect solution.
Problem Solving	Developing	Student D displays a limited understanding of how to interpret the probability of two events. This student applies problem solving strategies that are appropriate for simple events but not for two events. The solution is relevant, but this student does not attempt to confirm the reasonableness or realize that they have, in effect, combined the two bowls into one when considering Jamie's advice.
Communication and Reasoning	Developing	Communication and reasoning is limited for this student. Mathematical calculations are completed and analyzed, but little communication is provided about the reasoning applied in the work. The reasoning contains some misconceptions.
Representations and Connections	Developing	Student D uses an incomplete and inaccurate representation to model the problem. This student does make appropriate mathematical connections based on their calculations; however, the work is not relevant to the problem presented where two events should be looked at together.

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Name: Student E

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Advanced	Student E demonstrates an understanding of the difference between independent and dependent events and applies that understanding when determining the probability of compound events. The work provided leads to a valid and correct solution. This student weaves the concepts of simple probability, independent/dependent events, and compound probability together effortlessly.
Problem Solving	Advanced	Student E has revisited this task after some instruction has occurred. This student demonstrates an increase in efficiency with the strategies used to approach the task. The revised problem solving strategy displays an understanding of the mathematical concept. Task repetition has enabled this student to confirm the reasonableness of the solution in relation to earlier exploration.
Communication and Reasoning	Advanced	Student E communicates appropriately when reflecting on the task. Mathematical language is used to justify the work provided. Reasoning and communication are especially effective when describing why selecting the second jelly bean from a given bowl would represent a dependent event. This student also communicates their own reflections in regards to the mathematical solution and how it relates to them personally.
Representations and Connections	Advanced	This student has represented the mathematics being explored accurately. Each representation is labeled appropriately. The mathematics is connected back to the task. The student's writing provides evidence that there is a deeper understanding of dependent events as a result of their experience with this task. The ability to recognize a dependent event has surpassed the point of looking for the key words of "without replacement."

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Name: Student F

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Advanced	Student F demonstrates an understanding of the concepts and skills associated with the task. Mathematical concepts and skills were applied, leading to a valid solution. This student goes a step beyond expectations. When the task led to two acceptable pieces of advice, Student F explores the worst-case scenario where you end up eating two bad jelly beans in order to select the best advice.
Problem Solving	Advanced	Student F is revisiting to this task a second time, after some experience with the math concept. This student moves directly to an efficient problem solving strategy that applies the algorithm of multiplying individual probabilities to determine the overall probability of two events.
Communication and Reasoning	Proficient	This student uses mathematical language when communicating. Evidence is supplied to support both the original discovery that two students provided equally valuable advice as well as the claim that one of the two should be favored based on the likelihood of selecting two bad jelly beans.
Representations and Connections	Advanced	Student F uses a representation with accurate labels to explore and model the problem. This student makes multiple mathematical connections that are relevant. The student used a second set of representations to extend thinking beyond the expectation of determining whose advice would most likely have you tasting only good jelly beans.