Determining What Students Know Rubric

Learning Objectives:

- Explain how to effectively determine what students know by assessing prior knowledge and asking guiding questions
- Identify features of effective responses to support students
- Apply strategies to determine if students have the necessary prior knowledge to solve a math problem

Research Recommendation(s)

Studies have shown that when a tutor begins a session, it is important they understand what the student already knows and can "learn what students know". Research states a tutor should begin the session by having a student explain what they know. In addition, it is important for tutors to not make assumptions about students' knowledge and assume students have knowledge of concepts that they may not know. For this reason on Question (2), Option C is the most desired response or correct answer.

"Let's talk about how to begin, Cindy. What do you know about the triangle?"

Research demonstrates that by determining what a student knows, a tutor can leverage student responses to efficiently gauge their level of understanding at the start of the session and use this as a launching point for the rest of the session. In addition, asking a student to explain what they already know will also uncover misconceptions they have so that tutors can correct them. Lastly, a tutor should ask questions and offer support as a student attempts the problem themselves. This effortful learning is called *productive struggle*. It's important to empower a student to find the answer themselves based on their prior knowledge and logic before teaching them a concept explicitly. To summarize, researchers suggest a tutor should:

- Assess a student's prior knowledge.
- Guide the conversation to catch student's misconceptions or errors.
- Support productive struggle.

(YUP, 2021)

Experts believe that the best approach on Question (10) is Option B:

"Roberto, upon looking at this problem, what do you know?"

This approach assesses his prior knowledge by asking him to explain how he began solving the problem and what he thinks his next steps should be. In addition, asking Roberto to explain his thoughts on solving the problem is a good way for a tutor to guide the conversation to catch Roberto's misconceptions and to know where to take the rest of the session.

PREDICT RESPONSES

Correct (1): Tutors should use open-ended questions to assess students' prior knowledge, encourage productive struggle, and prompt students to articulate what they already know. If a student explicitly writes a term, tutors can follow up with an open-ended prompt to assess their understanding.

Incorrect (0): Tutors should avoid yes/no content-specific questions and responses that do not help assess the student's existing knowledge. Encouraging remarks alone without assessing understanding or questions that directly teach content without exploration are also incorrect.

Tutor response	**Rationale**
Cindy, are you familiar with the types of triangles and the relationships of the triangle's sides and angles?	0 This is a content-specific question, and it is a "yes or no" question. For both of these reasons, it is not a good example of how to determine student's knowledge.
No problem, let's try to do this together.	0 Although encouraging the response does not assist with determining a student's prior knowledge.
What do you know about the triangle?	1 This response is an "open" question asking a student what they know and is not specific to a certain knowledge component.
Thanks for setting up the problem and sharing the diagram, what have you tried so far? What about the general rules for triangles, is there anything special about this one?	1 This response asks the student what they have tried so far to gauge the student's knowledge and is "open." The second question is content-specific and a "yes or no", however, if the first part of the response is "correct."
Roberto, this is a very good start. You have written PEDMAS, what is that?	1 Although content-specific, the tutor is asking what PEMDAS is as an open question given the student wrote it on his paper.

EXPLAIN RESPONSES

Explained responses for determining what students know

Key: tutor response should ask open-ended questions. (Keywords: reviewing, revisiting, rethinking, going through the problem again and etc.)

Correct (1): The tutor demonstrates that they understand the importance of students explaining what they already know or the importance of asking students open-ended questions to assess their prior knowledge

Incorrect (0): The tutor does not demonstrate that they understand the importance of students explaining what they already know or the importance of asking students open-ended questions to assess their prior knowledge

Tutor response	**Rationale**
It encouraged the student and also tried to understand what the student's thought process was.	1 Understanding the student's thought process is how the tutor determines what the student knows.
It makes Roberto feel accomplished about the first step and gives him an opportunity to succeed on the next step without handing him a solution.	1 Not giving away the solution and allowing for self-reliance allows the tutor to see how the student does on their own, which is a great approach to determining what students know.
It gives him a hint on what to do next, while complimenting what he has already done but not giving away the answer.	1 Not giving away the answer allows the tutor to determine what the student knows through observation, and is the recommended approach.
Help him remember what he has learned	0 The purpose is not just for the student to remember their learning, but for the tutor to understand what the student has learned as well.
It gives him a chance to speak.	0 This response is too vague