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Please enjoy this complimentary excerpt from *The Five Practices in Practice, Successfully Orchestrating Mathematics Discussions in Your Middle School Classroom* by Margaret (Peg) Smith and Miriam Gamoran Sherin. The following excerpt helps you assess student thinking in ways that take them from where they are now and move them towards the lesson goals.

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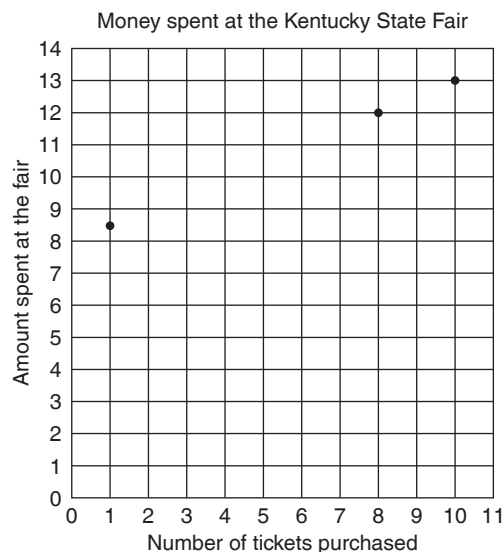
## Assessing Student Thinking

As you monitor students' progress, you want to interact with students in ways that take them from where they are now and move them towards the lesson goals. Jacobs and Philipp (2015) highlight the importance of this goal when they explain that teaching that “builds on children’s ways of thinking can lead to rich instructional environments and gains in student achievement” (p. 101). Using the State Fair Task (below) think about what questions you would ask to assess students' thinking.

### The State Fair task

#### The State Fair

You are going to the Kentucky State Fair in August. You are trying to figure out how much you should plan to spend. The graph below shows how much three different people spent after going through the main gate and then buying their ride tickets. Every ride ticket is the same price.



1. After entering the fair, you decide to buy four ride tickets. What will be your total cost for attending the fair? How do you know?
2. Describe how the cost increases as you buy more tickets. Be specific.
3. After entering the fair, you decide you want to go on a lot of rides. What will be the total cost for attending the fair and then purchasing 15 ride tickets?
4. Write a description, in words or numbers and symbols, that can be used to find the total cost after entering the fair and purchasing any number of tickets.
5. How does the ticket price appear in your description or expressions?
6. How does the ticket price appear in the graph?

#### Extension

1. If you went to the Kentucky State Fair, how many ride tickets could you buy with \$25.00?
2. If you could enter the Kentucky State Fair for free, how would the graph look different?

Source: Jennifer Mossotti. Ferris wheel photo by Hannah Morgan on Unsplash.

To start, be on the lookout for those strategies that you anticipated that students might use. Once you recognize that a student is using one of the anticipated approaches, you can examine the assessing questions you designed for that approach. The assessing (and advancing) questions in the monitoring chart are not meant to be a script. Rather, they are intended as a reference for you to use to help you consider what questions you want to ask particular students. For example, when Mrs. Mossotti sees a student making a table, she does not automatically ask “Does this mean you can only buy 1 ticket, 8 tickets, or 10 tickets?” Instead she looks at what this particular student is doing or saying and decides what question is appropriate to ask.

When selecting an assessing question to use in class, there are two main considerations. First, aim to meet students where they are in their current thinking about the task. Ball, Lubienski, and Mewborn (2001) emphasize that “sizing up students’ thinking and responding” depends on the details of what a student is doing (p. 451). Be sure to ask about the students’ ideas, about what they have written or drawn. Using students’ own terminology can often be helpful. Be aware that what you anticipated students might do is not always what they end up doing. Asking students specific questions about their work is an important way to uncover how they are thinking about the task and their solution. As Mrs. Mossotti explained,

*I [anticipate] all of these very clean solution paths. They'll either make a table or they will do the set of operations. But then, in real life, when I actually sit down and see what they're producing, the work is all over the place or it's part of this path [and] part of this path. So even though I anticipated certain solution paths, [it doesn't usually look like that].*

Assessing questions are important because they can help you uncover what students are doing, whether or not that aligns with what you anticipated.

Second, assessing questions are most useful when they make students’ thinking visible in ways that can then help you move their thinking forward towards the lesson goals. You want to understand not only *what* a student did but *why*. Understanding the reasons behind a student’s strategy often provides the clues you need to help the student reconsider her position or move deeper into the task.

What does this look like in practice?

In Analyzing the Work of Teaching 4.2, you will investigate what Mrs. Mossotti does to support her students as they work on the task.

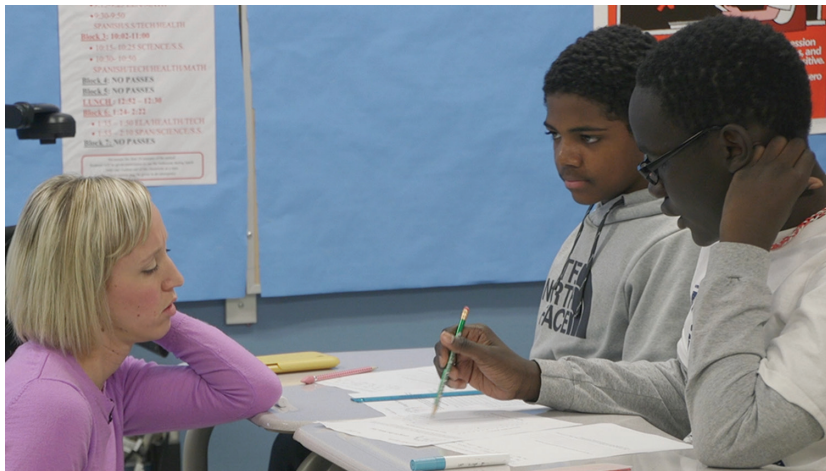
## TEACHING TAKEAWAY

Look and listen *carefully*. Modify your planned assessing questions in real time based specifically on what the students are doing and saying, rather than what you thought they would do or say.



## Analyzing the Work of Teaching 4.2

### Assessing Student Thinking



<http://bit.ly/2BobuXI>

Video Clip 4.2

As students worked on the State Fair problem, Mrs. Mossotti circulated around the room checking in with each group. In this video clip, she first talks briefly with Serenity and Adnawmy and then talks with Crispin and Nazier about the progress they are making.

As you watch Video Clip 4.2, consider the following questions:

1. What assessing questions does Mrs. Mossotti ask the students?
2. How do her assessing questions help Mrs. Mossotti make sense of how the students are thinking about the problem? How do her assessing questions help Mrs. Mossotti diagnose challenges the students are facing?

## Assessing Student Thinking—Analysis

As Mrs. Mossotti approaches Serenity and Adnawmy she notices that they have not gotten started. She uses a series of assessing questions to try to figure out what they are finding challenging. When Serenity comments “It’s hard,” Mrs. Mossotti asks “What do you mean?” offering Serenity an opportunity to say more about “what’s hard.” In responding, Serenity states that “I don’t know how much one ticket is.” Mrs. Mossotti has now gone from knowing nothing about why the students have not been able to get started to knowing something important about a challenge Serenity is having interpreting the graph. Mrs. Mossotti’s next assessing question involves directing Serenity to the point (1, 8.50) on the graph and asking “this one is not the cost for one ticket then?” In doing so, Mrs. Mossotti makes an effort to unpack further how Serenity understands the graph. When Serenity continues to be confused, Mrs. Mossotti draws on the assessing question she had prepared in case students had trouble getting started. “Give me an estimation for these four ride tickets?” Again, Mrs. Mossotti’s goal here is to explore how Serenity understands the graph.

As Mrs. Mossotti talks with Crispin and Nazier she asks several assessing questions in order to better understand their thinking. First, looking at the points they have drawn on the graph she asks “How do you know that these [points] go here?” and follows up with “What’s the pattern that you’re noticing?” Crispin explains that they are noticing a pattern with even numbers of tickets “that it skips two boxes and goes down,” Mrs. Mossotti next turns to Nazier and asks “Where are other points [on the graph], based on this pattern that Crispin’s noticing?” After Nazier indicates one point on the graph, Mrs. Mossotti further assesses their understanding by asking about the total cost for an odd number of tickets. “How would you know where the points are for, like 7 or for 3?” Throughout this discussion Mrs. Mossotti’s questions aim to uncover the students’ thinking — she is not asking them to think differently, rather her goal is to better understand how they have approached the problem. Having assessed their understanding, Mrs. Mossotti notes in her monitoring chart that “Crispin and Nazier see pattern of even ticket amounts increasing by \$1.00.”

It is worth noting that in her conversation with students, Mrs. Mossotti does not always use the assessing questions she had prepared in advance word-for-word, and in addition, she also uses several assessing questions that she had not prepared in advance. This is to be expected! Developing assessing questions prior to instruction helped Mrs. Mossotti get her head around how she might draw out students’ thinking in specific cases. In the moment, however, as she interacts with students, she also develops new questions based on what students are doing and saying.