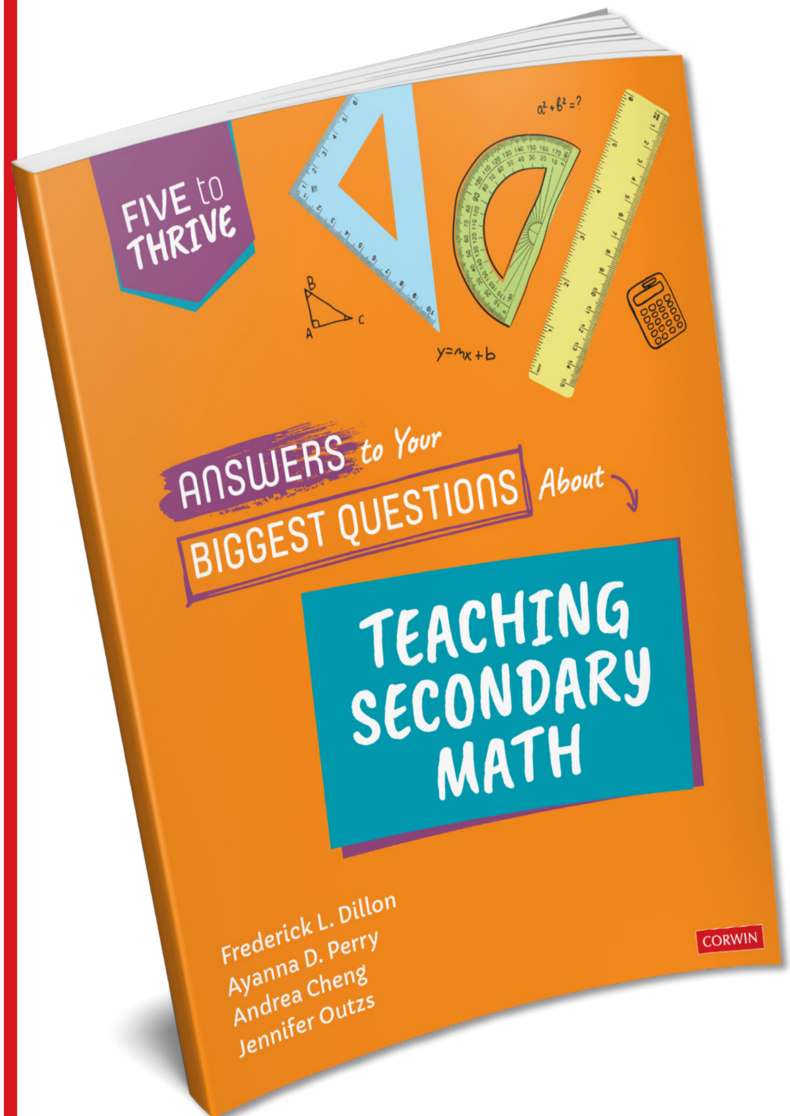

Thank you

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How Do I Prepare for Classroom Discourse?

Meaningful discourse supports students in providing clear justification of their ideas and connecting their ideas to important mathematical concepts and others' solution strategies. It requires three things to be successful:

1. The implementation of worthwhile tasks
2. Adept questioning on the part of the teacher and students
3. Protected time for students to engage in the work of reasoning and sensemaking

Given these components of meaningful discourse, you can see why it takes planning and does not just *happen* in a classroom. We've discussed *anticipating* and *monitoring*, two of the *Five Practices for Orchestrating Productive Classroom Discussions* (Smith & Stein, 2011). Here, we focus on the final three practices: *selecting*, *sequencing*, and *connecting*.

Once you have anticipated what students will do with the worthwhile task you selected (see Anticipating, p. 102), you will want to (a) devise a plan for *selecting* the strategies and solutions you want to share with students, (b) decide on the order that you want to *sequence* those solutions, and (c) draft questions you can ask to support students in making *connections* between the representations you selected.

Teaching in Flexible Settings

Anticipating discusses how to make a monitoring document to keep track of students' solutions and strategies during teaching. In a hybrid or virtual setting, using a virtual monitoring document will help you track student responses and can serve as a form of classroom data (see Classroom Data, p. 136).

To demonstrate how selecting, sequencing, and connecting can be used in a classroom, we will share a possible scenario for anticipating, selecting, sequencing, and connecting strategies for a worthwhile task.

Suppose that the learning goals for our lesson are as follows:

> Students will
>
> - develop a model of a linear relationship,
> - look for and express the regularity in the pattern, and
> - explain what their solution(s) mean and how they connect to other representations.

To meet these learning goals, you select the following worthwhile task.

Given the figures below, how many 1-by-1 squares would be in the 100th figure?

Explain your reasoning.

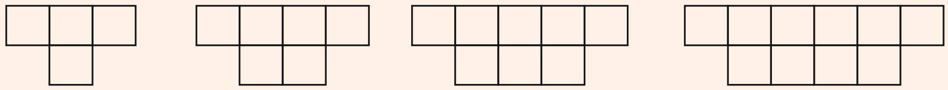


Figure 1 Figure 2 Figure 3 Figure 4

Given the learning goal, students will need to see and connect multiple solution pathways in addition to finding a solution on their own.

Anticipating: You record the following solutions with justifications. While anticipating, it is important to record complete solutions as well as potential missteps, so that you notice them, either in part or in whole, when your students produce them during class. You also anticipate that students will use a solid line (as will the technology), so you prepared to discuss domain and range for the context of the problem.

Algebraic representation

Figure $x = 2(x) + 2$. Figure (100) = 2(100) + 2= 202 blocks. Work check: Figure (3) = 2(3) + 2 = 8.

Visual representation

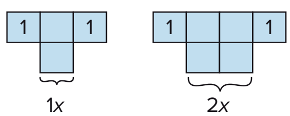


Figure 1 Figure 2

So, Figure 100 is 100 plus 2 more; x is 2 individual blocks. Then the 100th figure is 202 blocks.

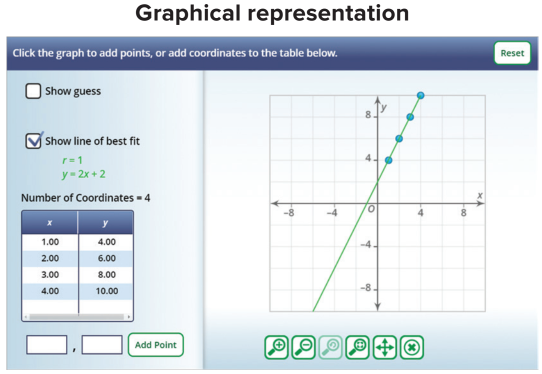
Potential tabular misstep

Trying to multiply in the tabular representation: students might try to multiply the 10th line by 10 to get to 100. In response, have them check the relationship between Figure 2 and Figure 4.

Tabular representation

x	How x and y relate	y
1	+3	4
2	+4	6
3	+5	8
4	+6	10
5	+7	12
6	+8	14
x	$+(x + 2)$	$2x + 2$
100	+102	202

Graphical representation



Source: NCTM Resource Line of Best Fit, nctm.org.

I found the graph and the line of best, I entered 100 in as x and found y was 202. Figure 100 has 202 blocks.

HOW DO I SELECT, SEQUENCE, AND CONNECT STUDENT RESPONSES?

SELECTING

You want to select solution paths that support students in engaging in the sensemaking described in your learning goal. For this task, students need to see all four representations because the learning goal is focused on developing and connecting models of a linear relationship. Your learning goal also requires a focus on repeated reasoning, which may be a reason to highlight the tabular strategy.

SEQUENCING

There are many factors to consider when deciding how to sequence solutions and strategies. For example, you might decide to share the most visual responses first and end with the most abstract. Once you've decided on the principle for sequencing, you can decide on the order for sharing the solutions and strategies. One important consideration for open-middle tasks is that there is one answer. The name *open middle* refers to tasks that have a *closed beginning*, meaning that they all start with the same initial problem, a *closed end*, meaning that they all end with the same answer, and an *open middle*, meaning that there are multiple ways to approach and ultimately solve the problem (Kaplinsky & Johnson, 2016). For our task, if your sequencing principle is most visual to least visual, you might order the responses in this way: visual, tabular, and then graphical. This ordering has the added benefit of showing the strategies that demonstrate Math Practice 8: Look for and express regularity in repeated reasoning.

> I used to let whoever volunteered show their answer. When I read about selecting and sequencing student work, I realized how I had been cutting off the process of students thinking and sharing. Now, I plan what pathways I want students to see and in what order.
>
> —EIGHTH-GRADE TEACHER