

## ESTABLISHING PURPOSE

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**What are the key content standards I will focus on in this lesson?**

Content Standards:

A.REI.II. Explain why the x-coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately (e.g., using technology to graph the functions, make tables of values, or find successive approximations).

Standards for Mathematical Practice:

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Look for and make use of structure.

2

**What are the learning intentions (the goal and why of learning, stated in student-friendly language) I will focus on in this lesson?**

*Content:* To understand that a system of equations is a set of two or more equations with the same unknowns.

*Language:* To articulate the meaning of solutions of systems of equations both abstractly and within a context.

*Social:* To communicate our thinking to our peers even before we completely understand a topic.

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**When will I introduce and reinforce the learning intention(s) so that students understand it, see the relevance, connect it to previous learning, and can clearly communicate it themselves?**

I will open the day with an explanation of the learning intentions and brief expansion of each. I really want to emphasize the social intention today so that students can practice thinking out loud as they problem solve. Transparent struggle is important for collaboration. I will also reiterate the language intention as we discuss and write stories for our graphs.

## SUCCESS CRITERIA

### 4 What evidence shows that students have mastered the learning intention(s)? What criteria will I use?

*I can statements:*

- I can explain the meaning of graphs and tables by analyzing their labels, units, values, and behavior.
- I can explain how to locate a solution to a system of equations by examining a graph.
- I can explain how to locate a solution to a system of equations by generating and analyzing a table of values.
- I can explain the meaning of a solution to a system of equations mathematically and within a context.

### 5 How will I check students' understanding (assess learning) during instruction and make accommodations?

During direct/deliberate instruction, I will be using the think-pair-share protocol so students can process the concepts with a peer, and I can formatively assess their conversations and responses. This will also give me the chance to note who will need additional guided practice when we transition to collaborative work time. Finally, today's task comprehensively addresses and assesses each success criterion. I will collect the task at the end of the day and use the data to create tomorrow's study-group stations.

## INSTRUCTION

### 6 What activities and tasks will move students forward in their learning?

Think-pair-share/direct/deliberate instruction combo: Students will be asked to process questions in think-pair-share format, and I will model specific skills and strategies based on their responses/need. I want to give them the chance to make discoveries and teach each other first.

Collaborative task: *Analyzing systems*

There are four questions aligned to success criteria. Students will continue to discuss and explain different representations of systems (graphs, tables, equations) while focusing on making meaning of their solutions.

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### What resources (materials and sentence frames) are needed?

1. Printed copies of the task for each learner
  2. Chromebooks for Desmos online graphing calculator
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### How will I organize and facilitate the learning? What questions will I ask? How will I initiate closure?

1. Think-pair-share

Organize students into pairs and instruct the learning intentions of the day. Have students record success criteria in their notebooks.

- a. Project an image of a graph of a system in a context and give students these questions:
  - What are the key features of this graph that will help communicate its meaning?
  - Which function,  $f(x)$  or  $g(x)$ , is representing the following situation [read situation describing the behavior of one graph]?
  - Describe the situation represented by the other function. What key features made you describe it in that way?
  - What does this point of intersection represent mathematically?
  - What does the intersection mean in the context?
  - In the context, what was happening before the intersection, and what happens after the intersection?
- b. Project another image of a graph of a system in a different context. Model the sense-making process by answering the preceding questions again in a think-aloud. Explicitly link my think-aloud to Success Criteria 1, 2, and 4 when I model that behavior.
- c. Project two sets of data within a table labeled in a context and have students answer the following questions:
  - How can we figure out what these data represent?
  - Which dataset represents the following situation [read situation describing the behavior of one dataset]?
  - Describe the situation represented by the other dataset. What key features made you describe it in that way?
  - How do these two datasets compare?
  - If these datasets were graphed, would they ever intersect? How can you tell?
  - In the context, what is meant by the  $x$ -value where they are equal?

- d. Project another image of two sets of data within a table labeled in a context. Model the sense-making process by answering the preceding questions again in a think-aloud. Explicitly link my think-aloud to Success Criteria 1, 3, and 4 when I model that behavior.
- e. Project two explicit functions,  $f(x)$  and  $g(x)$ , and have students answer the following questions:
- How can we determine if these two functions will ever equal each other?
  - How can graphing help?
  - How can making a table of values help?
  - At what approximate value of  $x$  will these two functions equal each other?
- f. Project two more functions. Model the sense-making process of finding their solution(s) by answering and working through each of the preceding questions. Explicitly link my think-aloud to each success criterion when I model that behavior.

## 2. Pair Work: Analyzing Systems Task

Students work in their pairs to answer four questions aligned to each success criterion. The first question provides a labeled graph of a system of two functions and asks students to explain in writing what the graph means by referencing key details from the image itself. The second question asks them to locate the solution to the system and explain their process and why it works. The third question provides two datasets and asks students to infer the solution to this system and explain their logic. The final question asks students to explain the meaning of each prior solution within the context.

## 3. Closure: Share-Out

- Explain what is meant by the "solution" of a system of equations.
- How does this relate to their graphs?
- How does this relate to tables of values?
- Take a minute and reread through your *I can* statements and check the boxes that you are feeling confident about.