



## UNIT SYNOPSIS

In this unit, students will learn to solve systems of linear equations for two variables algebraically, by graphing on paper, by graphing on the calculator, by using substitution, and by using elimination! They will learn that just as equations can have no solutions or infinitely many solutions, so too can systems of equations.

For the last three lessons of this unit, students will transfer these skills to systems of linear inequalities and will discuss solutions as shaded regions that may be bounded or unbounded. By the conclusion of this unit, students should understand that the solution, or solutions, to a system are all the points that are shared between the equations and/or inequalities in the system. Students will explore this concept more deeply in Algebra 2, where students are expected to solve systems of linear and quadratic equations and inequalities.

## CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
<p><b>A.2(I)</b> write systems of two linear equations given a table of values, a graph, and a verbal description</p> <p><b>A.3(D)</b> graph the solution set of linear inequalities in two variables on the coordinate plane</p> <p><b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</p>	<p><b>A.2(H)</b> write linear inequalities in two variables given a table of values, a graph, and a verbal description</p> <p><b>A.3(F)</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist</p> <p><b>A.3(G)</b> estimate graphically the solutions to systems of two linear equations with two variables in real-world problems</p> <p><b>A.3(H)</b> graph the solution set of systems of two linear inequalities in two variables on the coordinate plane.</p>

<p><b>Focus on Disciplinary Literacy</b></p> 	<p>Mathematical Process Standard <b>(F)</b> – analyze mathematical relationships to connect and communicate mathematical ideas</p>
	<p>Mathematical Process Standard <b>(G)</b> – display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication</p>

## LEARNING SUPPORTS BY LESSON

There is a checkmark for the math support if the lesson	Lessons →	L1	L2	L3	L4	L5	L6	L7	L8	L9
	Math Supports									
makes a connection to prior content or from a previous unit or academic year	Access Prior Knowledge	✓	✓	✓	✓	✓	✓	✓	✓	✓
uses familiar contexts or experiences to make the learning relevant to students	Real-World Connections	✓	✓	✓	✓	✓	✓	✓	✓	✓
makes use of graphic organizers	Graphic Organizers									
includes tools like rulers, protractors, patty paper, algebra tiles, etc.	Tools or Manipulatives									
incorporates tables, reference charts, displays, pictures, models, or color-coding	Visual Aids	✓	✓		✓	✓	✓	✓	✓	✓
includes definitions, examples vs. nonexamples, cognates, etc.	Vocabulary Supports									
includes strategies that support language development	Language Supports									
asks students to discuss with their partner to prepare for whole class discussion	- Turn and Talk	✓	✓	✓	✓	✓	✓		✓	✓
teacher facilitates a whole class discussion to debrief key learnings	- Guided Discussion	✓	✓	✓	✓		✓	✓	✓	✓
asks students to think independently, test their idea with a partner, and share whole group	- Think, Pair, Share									
includes sentence stems to support students with explanations	- Sentence Stems									
provides opportunities for students to work with a partner or a group	Peer Collaboration	✓	✓	✓	✓	✓	✓	✓	✓	✓
uses mnemonics such as SohCahToa	Mnemonics									
includes websites or equipment that enhances the lesson	Technological Support					✓				
content can be presented in different forms	Different Modalities									
uses hands-on tools or manipulatives to represent the math	- Concrete						✓			
uses drawings to represent the math	- Pictorial	✓	✓		✓	✓	✓	✓	✓	✓
uses numbers and number sentences to represent the math	- Abstract	✓	✓	✓	✓	✓	✓	✓	✓	✓

# The EFFL Model

## Experience First, Formalize Later (EFFL) Model

### Opening

For every new lesson, the teacher begins by making the goals of the lesson crystal clear. The teacher does more than simply read the objective to the class. They make connections to previous learning, share how this learning fits into a bigger picture, or explain why this learning is important for future learning.

### Activity / Interaction With New Material (INM)

For this part of the lesson, students work in pairs or groups of four to experience new content through an activity. Students might be discussing a proposed scenario, working with other groups, or doing a simulation. The student activity is designed for students to be able to do without the help of the teacher. Of course, the teacher is watching and listening in to conversations in order to formatively assess student understanding. The teacher provides questions, cues, and prompts (not answers!) to help push groups forward when they are stuck or have made a mistake. As students begin to finish the activity, the teacher identifies students to write their work on the board. Most often, the teacher selects student work that will easily allow them to connect the experience to formal learning. Students write their work on the whiteboard in a single-color marker.

### Debrief Activity

Once students have recorded their responses in their workbook (see blue writing to the right), the teacher calls the whole group back together for a debrief. It is in this discussion that the teacher will help students formalize the learning. The teacher connects the student activity experience to new vocabulary, definitions, formulas, and algorithms. The formal learning is attached specifically to the experiences of the activity so that students can enhance their constructed understanding of the new content. The teacher writes all of the formal learning in a different color in the margins of the activity (see red writing to the right). The students add these ideas in the margins on their activity page and often think of this as the formal “notes” of the lesson. In all of the answer keys we provide on Math Medic, the teacher formal learning points are provided in the margins in a different color.

**Got Solutions?**  
In math class we solve lots of problems. But are there some problems that just don't HAVE a solution?

② Consider the line  $y = 2x - 5$ .  
④ Give the ordered pairs of at least 4 points that are on this line.  
Every pt. on the line is a solution to the equation.  
(0, -5) (1, -3) (2, -1) (4, 3)

⑤ Graph the line.

⑥ Is the point  $(-17, -39)$  on this line? How do you know?  
because it satisfies the equation  $y = 2x - 5$   
 $-39 = 2(-17) - 5$   
 $-39 = -34 - 5$   
 $-39 = -39$  ✓  
Yes!  $x = -17$  and  $y = -39$  make the equation true.

### QuickNotes

In this part of the lesson, the teacher uses the whole experience of the activity and the formalization in the debrief to summarize the learning from the lesson. Notice that we use the box to constrain the amount of formal “notes” that the teacher can provide.

**QuickNotes: Interpreting Solutions to Linear Systems Graphically**

A solution  $(x,y)$  to a linear system satisfies BOTH equations in the system and is on the graph of BOTH equations (intersection pt).  
A linear system can have 0, 1, or  $\infty$  many solutions

parallel lines  
0 solutions  
same  $m$ , diff.  $b$

intersecting lines  
1 solution  
diff.  $m$

coinciding lines  
 $\infty$  many solutions  
same  $m$ , same  $b$

### Student Practice

Now that students have arrived at some new learning, they need to be able to apply it in new contexts. Most often we have students complete these questions in pairs and occasionally we select one question to use as an exit ticket. If we have time, we have students write solutions on the whiteboard.

### Extra Practice

We typically give students around 3-5 “Extra Practice” problems for each lesson. We choose problems that are closely aligned with the Learning Objectives of the lesson. It is our belief that “less is more” here. We would rather students spend their Extra Practice time thinking deeply about just a few problems, rather than surface level thinking on many problems. When possible, we provide the answers at the bottom of the page, so they can immediately assess their understanding.

Slightly modified version of: <https://www.calc-medic.com/post/experience-first-formalize-later#:~:text=%E2%80%9CExperience%20First%2C%20Formalize%20Later%E2%80%9D,at%20formal%20definitions%20and%20formulas.>

## Before You EFFL!

Here are helpful resources that you guide you in the right direction before your first EFFL lesson!

### Why Should We EFFL?

The article advocates for the Experience First, Formalize Later (EFFL) teaching model, emphasizing its effectiveness in fostering deep understanding and flexible thinking in students. The author compares traditional teaching to a game of "Simon Says," where students merely mimic instructions without grasping underlying concepts. In contrast, EFFL encourages students to engage actively with problems, enhancing their ability to understand and apply calculus concepts creatively.

### Tips for Lesson Planning

The article offers practical advice for effective lesson planning beyond the exhaustive and overly detailed approaches often emphasized during teacher training. It underscores the importance of thoughtful preparation but rejects the notion that teachers need to script every minute or detail of a class session.

### Making the Most of Your EFFL Lesson Debrief

The article discusses the significance of the debriefing phase in the Experience First, Formalize Later (EFFL) lesson model, emphasizing its role in reinforcing learning and highlighting student contributions. The debrief session is seen as crucial for integrating academic vocabulary, emphasizing key lesson understandings, and valuing students' mathematical insights.

## While You EFFL!

While each lesson may be unique in context and skills, all lessons benefit from the following practices:

### Teacher Look Fors:

- Utilizing the Do Now to spark students' interest in the Activity.
- Use questioning to promote small group discussion and exploration, guided by monitoring questions.
- Connects Experience First to formal concepts using a **colored pencil/pen** to take notes along the margin during the Debrief.
- Facilitates whole-class discussions for students to reflect, share insights, and provides feedback that reinforces key concepts.
- Tracks time to adapt lesson pacing and support based on student response and engagement.

### Students Look Fors:

- In the Activity, students engage in group work and discourse.
- Exploring the activity, testing hypotheses and approaches (trial & error).
- Take notes on key ideas and concepts using different **colored pencil/pen** to take notes along the margin.
- Share thoughts and ideas that demonstrate their approach to their work.

### Other considerations

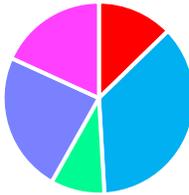
- During the **Experience First** phase, if most of your students seem stuck or disengaged, take a moment to pause, reset, and provide clear instructions. Some problems of the Activity are more suitable to do a whole-class discussion as a means to save some instructional time for Student Practice or the Exit Ticket. You are encouraged to adapt the EFFL (Experience First, Formalize Later) process to meet your students' needs while maintaining a focus on student-centered instruction.

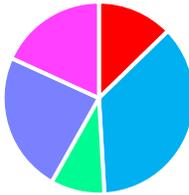
# ROADMAP

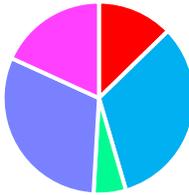
AT A GLANCE: Unit 6 – Linear Systems			
Day	Date	Lesson	Lesson Title
<p>There are 4 flexible Success Days that you can use anywhere in the unit. Because this unit is very close to the Fall IA window, <b>the Unit 6 exam is entirely optional</b>, but it exists for your convenience as another opportunity to practice on EdCite and identify opportunities for growth. Please use any Success Days you have accumulated during this semester to help students further develop their conceptual understanding of Unit 6 topics and any topics from Units 1 – 5 that data indicate you should revisit before the Fall IA.</p>			
1		1	Introduction to Linear Systems
2		2	Interpreting Solutions to Linear Systems Graphically
3		3	Solving Linear Systems Using Substitution
4		4	Solving Linear Systems Using Elimination
5		5	Solving Linear Systems By Graphing With Technology
6		6	Graphing Linear Inequalities (Day 1)
7		7	Graphing Linear Inequalities (Day 2)
8		8	Systems of Inequalities (Day 1)
9		9	Systems of Inequalities (Day 2)
10			Success Day
11			<b>OPTIONAL Unit 6 Exam</b> (or Success Day)
12			Success Day
13			Success Day



Lesson 2: Interpreting Solutions to Linear Systems Graphically		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.3(F)</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist</p> <p>◆ <b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 6 Student Workbook</li> <li>Class set of red pens and various colored pencils/pens for graphing</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; background-color: red; border: 1px solid black;"></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="width: 20px; background-color: cyan; border: 1px solid black;"></td> <td>INM (20 min)</td> </tr> <tr> <td style="width: 20px; background-color: limegreen; border: 1px solid black;"></td> <td>Debrief (5 min)</td> </tr> <tr> <td style="width: 20px; background-color: blue; border: 1px solid black;"></td> <td>Student Practice (13 min)</td> </tr> <tr> <td style="width: 20px; background-color: magenta; border: 1px solid black;"></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to explain what the graph of a linear system looks like whether it has 0, 1, or infinitely many solutions by describing the slopes and y-intercepts of the equations. Additionally, students should be able to identify unique solutions to a graphically represented system of equations as the point where the lines intersect.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2c, 3c, 4c</li> <li>✓ Student Practice: 1, 2, 3</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For <b>Do Now</b>: This Do Now spirals in previous content, specifically on generating equations from a given situation and evaluating that equation with a given input. It can be skipped or replaced if necessary.</p>		Do Now (7 min)		INM (20 min)		Debrief (5 min)		Student Practice (13 min)		Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li>☐ emphasize the <b>big idea</b> of this lesson during the final Debrief: not every system of equations has a unique solution.</li> <li>☐ while students work together, actively monitor using the questions provided in the green boxes on TE pp. 16 &amp; 18.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li>☐ accurately graph equations on the coordinate plane.</li> <li>☐ Make the connection between the graphical representation of a solution and what it actually means (i.e. when lines never intersect, they have no solution; when lines intersect, their point of intersection is the solution)</li> </ul>
		Do Now (7 min)										
	INM (20 min)											
	Debrief (5 min)											
	Student Practice (13 min)											
	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>System of linear equations</li> </ul>	<p>For <b>INM</b>: As you circulate and monitor, remember to check that students are graphing correctly. If they are not graphing correctly, the rest of the lesson will be inaccessible.</p> <p>For <b>Disciplinary Literacy</b>: When Debriefing INM #s 4-5, try to get students to voice why #4 has infinitely many solutions and why #5 has NO solutions. They should be able to explain it using what they see in the graph AND by considering the slopes and y-intercepts.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief</p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can graph equations given in Standard Form.</li> <li> Students can determine whether two lines intersect or not.</li> <li> When given an equation in Standard Form, you can manipulate it to get it into slope-intercept form if you feel more comfortable graphing in that form, OR generate a table of ordered pairs to plot.</li> <li> When two lines intersect, they have a solution at their point of intersection. When two lines are parallel, they have no solution.</li> </ul>										

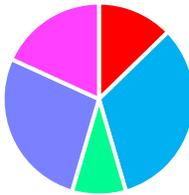
Lesson 3: Solving Linear Systems Using Substitution		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</p> <p>◆ <b>A.3(G)</b> estimate graphically the solutions to systems of two linear equations with two variables in real-world problems</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 6 Student Workbook</li> <li>Class set of red pens</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; background-color: red; border: 1px solid black;"></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="width: 20px; background-color: cyan; border: 1px solid black;"></td> <td>INM (20 min)</td> </tr> <tr> <td style="width: 20px; background-color: limegreen; border: 1px solid black;"></td> <td>Debrief (5 min)</td> </tr> <tr> <td style="width: 20px; background-color: blue; border: 1px solid black;"></td> <td>Student Practice (13 min)</td> </tr> <tr> <td style="width: 20px; background-color: magenta; border: 1px solid black;"></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to solve a system of linear equations using substitution. They should also be able to manipulate a two-variable equation to solve for one variable so that it can be substituted into another equation. Students first learned how to manipulate multi-variable equations at the end of Unit 1.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 3c, 4c</li> <li>✓ Student Practice: 1, 2</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: This Do Now spirals in previous content, specifically on determining how many solutions exist for a system of equations. It can be skipped or replaced if necessary.</p> <p>For <b>INM</b>: Know that the INM questions get progressively more challenging, requiring students to come up with more sophisticated and clever strategies as they move through the activity.</p> <p>For <b>Debrief</b>: Instead of having one debrief at the end of the INM, facilitate a Debrief between each INM question.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief</p> </div>		Do Now (7 min)		INM (20 min)		Debrief (5 min)		Student Practice (13 min)		Exit Ticket (10 min)	<p><b>Lesson Look Fors</b></p> <p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> while students work together, actively monitor using the questions provided in the green boxes on TE pp. 26-28.</li> <li><input type="checkbox"/> engage in mini debrief cycles between each INM question (i.e. there will be four cycles of student work / teacher debrief)</li> </ul> <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> work with their partners to reason through the INM.</li> <li><input type="checkbox"/> when things get confusing, refer to the question part above (e.g. if 2c is tricky, look at what you did in 2b and build on that)</li> </ul>
	Do Now (7 min)											
	INM (20 min)											
	Debrief (5 min)											
	Student Practice (13 min)											
	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li><b>substitution</b></li> </ul>		<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can generate a system of equations that represents a scenario.</li> <li> Students can solve a system of equations and identify which part of the solution is requested in the context of the situation.</li> <li> Define your variables before setting up and solving a system of equations to ensure you're actually answering what the question asks for.</li> </ul>										

Lesson 4: Solving Linear Systems Using Elimination		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 6 Student Workbook</li> <li>Class set of red pens</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;"><span style="color: red;">■</span></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: blue;">■</span></td> <td>INM (20 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: green;">■</span></td> <td>Debrief (5 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: purple;">■</span></td> <td>Student Practice (13 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: pink;">■</span></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to solve systems of equations using elimination. They should also be able to choose an appropriate strategy for eliminating one variable by adding equations, subtracting them, or scaling one before adding/subtracting.</p> <p><b>Opportunities to CFU</b></p> <p>✓ INM: <span style="margin-left: 200px;">✓ Student Practice: 1, 2</span></p>	<span style="color: red;">■</span>	Do Now (7 min)	<span style="color: blue;">■</span>	INM (20 min)	<span style="color: green;">■</span>	Debrief (5 min)	<span style="color: purple;">■</span>	Student Practice (13 min)	<span style="color: pink;">■</span>	Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li>while students work together, actively monitor using the questions provided in the green boxes on TE p. 38</li> <li>engage in mini debrief cycles between each INM question (i.e. there will be three cycles of student work / teacher debrief)</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li>work with their partners to reason through the INM.</li> <li>when things get confusing, refer to the question part above (e.g. if 2c is tricky, look at what you did in 2b and build on that)</li> </ul>
	<span style="color: red;">■</span>	Do Now (7 min)										
<span style="color: blue;">■</span>	INM (20 min)											
<span style="color: green;">■</span>	Debrief (5 min)											
<span style="color: purple;">■</span>	Student Practice (13 min)											
<span style="color: pink;">■</span>	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>elimination</li> <li>scale an equation</li> </ul>	<p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: This Do Now is not required for the lesson and can be skipped or replaced; however, it is a visual way to practice systems of equations.</p> <p>For <b>Debrief</b>: As always, the Debrief is crucial, as that is where you formalize the learning students just engaged in. Keep referring to the gas station purchases shown for each question to illustrate scaling equations up/down and adding/subtracting equations.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief</p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can generate a system of equations that represents a scenario.</li> <li> Students can solve a system of equations and explain their solution in the context of the situation..</li> <li> Define your variables before setting up and solving a system of equations to ensure you don't mix up your answers (e.g. for the ET, make sure you don't mix up which pie is \$4 and which is \$14).</li> </ul>										

Lesson 5: Solving Systems of Equations by Graphing with Technology		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.3(F)</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist</p> <p>◆ <b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</p> <p>◆ <b>A.2(I)</b> write systems of two linear equations given a table of values, a graph, and a verbal description</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 6 Student Workbook</li> <li>Class set of red pens</li> <li>Class set of calculators</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; background-color: red; border: 1px solid black;"></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="width: 20px; background-color: cyan; border: 1px solid black;"></td> <td>INM (18 min)</td> </tr> <tr> <td style="width: 20px; background-color: lightgreen; border: 1px solid black;"></td> <td>Debrief (3 min)</td> </tr> <tr> <td style="width: 20px; background-color: blue; border: 1px solid black;"></td> <td>Student Practice (17 min)</td> </tr> <tr> <td style="width: 20px; background-color: magenta; border: 1px solid black;"></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to use their calculator to solve and graph systems of equations. Students have already learned how to solve systems of equations by substitution, elimination, and graphing by hand. Using the calculator is the final piece before we move on to systems of linear inequalities.</p> <p><b>Opportunities to CFU</b></p> <p>✓ INM: 2c, 2f, 3c                      ✓ Student Practice: 1, 2</p> <p><b>Other Notes to Inform Your Planning</b> For <b>Do Now</b>: This Do Now spirals in previous lessons. It is not required for the INM and can be skipped/replaced if necessary.  For <b>INM</b>: This is a calculator lesson. Based on your classroom culture, you might wish to have students follow the directions on their own or with a partner. You might also choose to model each step and have students check each other's calculators to make sure nobody gets left behind.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>INM #2f</p> </div> <p>For <b>Disciplinary Literacy</b>: When you get to 2f, ask students what it means to get “true” or “false” in the calculator.</p>		Do Now (7 min)		INM (18 min)		Debrief (3 min)		Student Practice (17 min)		Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Model the steps to use the calculator OR set clear expectations for students to follow the directions</li> <li><input type="checkbox"/> Set the expectation that all students need to do this on their own calculator, and that if students need help, their partner can coach them, but NOT press the buttons for them.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Follow the workbook (and/or their teacher) to graph systems of equations.</li> <li><input type="checkbox"/> be able to explain what they see on the calculator (e.g. they should be able to tell you what the point of intersection represents beyond just the ordered pair)</li> </ul>
		Do Now (7 min)										
	INM (18 min)											
	Debrief (3 min)											
	Student Practice (17 min)											
	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>System of linear equations</li> </ul>		<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can use their calculator to graph a system of equations and identify its solution.</li> <li> Students can interpret the solution to a system of equations in context.</li> <li> Students know how to use the calculator to graph equations given in slope-intercept form AND/OR standard form.</li> <li> Students know how to use the calculator to test their solutions.</li> </ul>										



Lesson 7: Graphing Linear Inequalities (Day 2)		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.3(D)</b> graph the solution set of linear inequalities in two variables on the coordinate plane</p> <p>◆ <b>A.2(H)</b> write linear inequalities in two variables given a table of values, a graph, and a verbal description</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 6 Student Workbook</li> <li>Castle Attack Cards (enough copies per group)</li> <li>Whiteboard space for students</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"><span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span></td> <td>Do Now (7 min)</td> </tr> <tr> <td><span style="display: inline-block; width: 15px; height: 15px; background-color: cyan; border: 1px solid black;"></span></td> <td>Castle Attack! (20 min)</td> </tr> <tr> <td><span style="display: inline-block; width: 15px; height: 15px; background-color: lightgreen; border: 1px solid black;"></span></td> <td>Debrief (5 min)</td> </tr> <tr> <td><span style="display: inline-block; width: 15px; height: 15px; background-color: purple; border: 1px solid black;"></span></td> <td>Student Practice (13 min)</td> </tr> <tr> <td><span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black;"></span></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> This lesson offers more opportunities to practice what students learned in Lesson 6. By the end of this lesson, students should have greater confidence in their ability to graph a single linear inequality on the coordinate plane and explain how/why it represents a given scenario. In Lessons 8 and 9, students will build on this confidence to graph systems of inequalities.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ Castle Attack: Choose any card(s)</li> <li>✓ Student Practice: 1 &amp; 2</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For the <b>Do Now</b>: The provided Do Now is helpful for activating prior knowledge, but it is not married to the INM and can be replaced with a spiraled review question of your choice.</p> <p>For <b>Castle Attack</b>: Please carefully read the directions in the pink box on TE p65.</p> <p>For <b>Debrief</b>: Go over questions students struggled with the most.</p> <p>For <b>Student Practice</b>: A problem set has been provided for Student Practice, but if students are enjoying and learning during Castle Attack, it is okay to spend more time on it. Alternatively, if you are worried about culture and classroom management, you can cut Castle Attack short to allow more time for the problem set.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Castle Attack</p> </div>	<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span>	Do Now (7 min)	<span style="display: inline-block; width: 15px; height: 15px; background-color: cyan; border: 1px solid black;"></span>	Castle Attack! (20 min)	<span style="display: inline-block; width: 15px; height: 15px; background-color: lightgreen; border: 1px solid black;"></span>	Debrief (5 min)	<span style="display: inline-block; width: 15px; height: 15px; background-color: purple; border: 1px solid black;"></span>	Student Practice (13 min)	<span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black;"></span>	Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> give clear directions for “Castle Attack” so the activity can flow smoothly.</li> <li><input type="checkbox"/> ensure they have space on their desk to keep printed and cut problems organized</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> talk with their partners about the math problem they’re working on at the time.</li> <li><input type="checkbox"/> persevere through challenge. <b>If neither partner knows how to solve a problem, that is okay!</b> They can try a different problem and come back to it later. If they’re totally stuck, they can ask for help.</li> </ul>
<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span>	Do Now (7 min)											
<span style="display: inline-block; width: 15px; height: 15px; background-color: cyan; border: 1px solid black;"></span>	Castle Attack! (20 min)											
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<span style="display: inline-block; width: 15px; height: 15px; background-color: pink; border: 1px solid black;"></span>	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>inequality</li> <li><b>solution to a linear inequality</b></li> </ul>		<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li><b>Do</b> Students can generate an inequality that represents a provided scenario.</li> <li><b>Do</b> Students can graph a single linear inequality on the coordinate plane.</li> <li><b>Know</b> When you graph a linear inequality, use a solid line for <math>\geq</math> and <math>\leq</math> symbols and a dashed line for <math>&gt;</math> and <math>&lt;</math> symbols.</li> <li><b>Know</b> When you graph a linear inequality, you need more than just a line – you must shade the solution set.</li> <li><b>Know</b> You can figure out which side to shade by testing <math>(0,0)</math>. If <math>(0,0)</math> gives a true equation, shade the side containing the origin; if it gives a false equation, shade the other side.</li> </ul>										

Lesson 8: Systems of Inequalities (Day 1)		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.3(H)</b> graph the solution set of systems of two linear inequalities in two variables on the coordinate plane.</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Unit 6 Student Workbook</li> <li>▪ Class set of red pens</li> <li>▪ Class set of two different colored highlighters</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Lesson Structure:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;"><span style="color: red;">■</span></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: blue;">■</span></td> <td>INM (18 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: green;">■</span></td> <td>Debrief (5 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: purple;">■</span></td> <td>Student Practice (15 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: pink;">■</span></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to use the constraints of a problem to write and graph inequalities and use the graph to identify solutions. In the previous lesson, students graphed one inequality. In this one, they're graphing a system.</p>	<span style="color: red;">■</span>	Do Now (7 min)	<span style="color: blue;">■</span>	INM (18 min)	<span style="color: green;">■</span>	Debrief (5 min)	<span style="color: purple;">■</span>	Student Practice (15 min)	<span style="color: pink;">■</span>	Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> while students work together, actively monitor using the questions provided in the green boxes on TE p. 77</li> <li><input type="checkbox"/> emphasize that the solution set to a system of linear inequalities is where the two shaded regions overlap.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> use highlighters to shade and find the solution set.</li> <li><input type="checkbox"/> Explain what each region of the shaded graph represents.</li> </ul>
	<span style="color: red;">■</span>	Do Now (7 min)										
<span style="color: blue;">■</span>	INM (18 min)											
<span style="color: green;">■</span>	Debrief (5 min)											
<span style="color: purple;">■</span>	Student Practice (15 min)											
<span style="color: pink;">■</span>	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ <b>constraint</b></li> <li>▪ solution to a linear inequality</li> </ul>	<p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2, 3c, 5</li> <li>✓ Student Practice: 1, 2</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: This Do Now CANNOT be skipped; it sets up the INM. (If you need to spiral in a previous objective, you can add a question.)</p> <p>For <b>INM</b>: This lesson requires the use of different colors to shade. Yellow and blue highlighters or colored pencils are ideal, as they make green. (Or yellow and pink to reveal orange.) Try to avoid color combos that could be confusing or wind up looking too similar.</p> <p>For <b>Disciplinary Literacy</b>: When debriefing INM #5, highlight that multiple students have different answers that all work. Get students to explain WHY they all work.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>INM #5</p> </div>	<p><b>Student Know/Do Chart</b></p> <p> Students can graph the solution set of a system of linear inequalities.</p> <p> The solution set to a system of linear inequalities occurs where the shading for each inequality overlaps.</p>										



## Recommended Success Day Materials and Resources

### A.2(I): write systems of linear equations

- IM: Modeling Systems of Linear Equations (TE / SW)
- More Practice: Write Systems of Equations

### A.3(F)/A.3(G): Graph systems of equations

- Bluebonnet: Solve Systems of Equations by Graphing
- More Practice: Graph Systems of Linear Equations Practice

### A.5(C): solve systems of equations

- Bluebonnet: General Practice for Solving Systems
- BIM: Solving Systems of Equations (TE / SW)
- IM: Identify Solutions to Systems of Equations (TE / SW)
- Over 100 Practice Questions
- More Practice: Solve Systems of Linear Equations
- More Practice: Solve Systems of Linear Equations (substitution emphasis)
- Sirius A.5(C) Practice

### A.3(D): Graph the solution set of linear inequalities

- Bluebonnet: Graphing Inequalities
- Graphing Practice (skip first two pages)
- IM: How Can I Graph a Two-Variable Inequality? (TE / SW)
- IM: Real-World Linear Inequalities (TE / SW)
- Reteach Lesson
- General Review of Linear Inequalities (focus on pp 9-17)
- More Practice: Graph a Two-Variable Inequality

### Unit 6 Tech Enhanced Question Practice

This problem set offers multiple opportunities to practice graphing systems of equations and solution sets to inequalities and systems of inequalities. It is not mandatory, and it can be retaken as many times as the student wishes to take it. You'll need to click "copy assignment" to be able to assign it to your students.

If student data indicates a pause point is not necessary, you can opt to move forward and reserve a Success Day to use at a later date.

### A.3(H): Graph solution set of SYSTEMS of inequalities

- Bluebonnet: Systems of Inequalities
- IM: Graph solution set to systems of inequalities (TE / SW)
- IM: Solve Systems of Linear Inequalities (TE / SW)

Standard(s)	Notes for Intellectual Preparation & Lesson Planning
<ul style="list-style-type: none"> <li>◆ <b>A.2(I)</b> write systems of two linear equations given a table of values, a graph, and a verbal description</li>   <li>◆ <b>A.3(D)</b> graph the solution set of linear inequalities in two variables on the coordinate plane</li>   <li>◆ <b>A.5(C)</b> solve systems of linear equations with two variables for mathematical and real-world problems</li>   <li>◆ <b>A.3(F)</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist</li>   <li>◆ <b>A.3(G)</b> estimate graphically the solutions to systems of two linear equations with two variables in real-world problems</li>   <li>◆ <b>A.3(H)</b> graph the solution set of systems of two linear inequalities in two variables on the coordinate plane.</li>   <li>◆ <b>A.2(H)</b> write linear inequalities in two variables given a table of values, a graph, and a verbal description</li> </ul>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Ensure you can access UE6 on EdCite.</li> </ul> <p><b>Notes to Inform Your Planning</b></p> <p>Review the Unit 6 Exam on Curriculum Corner. Internalize and create an exemplar for the assessment prior to teaching the unit as part of unpacking the unit. Use your exemplar to spar with the solutions provided in the Assessment Companion on Curriculum Corner.</p> <p><b>There is no scanning deadline for this optional exam.</b></p> <p><b>For any test items that are not multiple choice, verify that student responses marked incorrect by Edcite truly are incorrect. (Edcite occasionally does not recognize all possible equivalent correct responses.)</b></p>

# UNPACKED STANDARDS

Focus standards for this unit.

		Standard Breakdown	
Standard	Specificity	STAAR Alignment	
<p><b>A.2(1)</b> write systems of two linear equations given a table of values, a graph, and a verbal description</p>	<p><b>Concepts</b></p> <ul style="list-style-type: none"> <li>- Systems of Two Linear Equation</li> <li>- Table</li> <li>- Graph</li> <li>- Verbal Description</li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>- Write</li> </ul> <p><b>Clarifications (Including, but not limited to):</b></p> <ul style="list-style-type: none"> <li>- Emphasizes writing systems of linear equations from multiple representations, which reinforces writing equations given specified representations.</li> <li>- Students may be expected to use the representations listed in the mathematical process standards to acquire and demonstrate mathematical understanding.</li> <li>- A verbal description may be a mathematical description or set in real-world context.</li> <li>- Linear equations may be written in various forms including slope-intercept form and standard form.</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>- Systems Limited to Two Equations</li> <li>- Equations Limited to Two Variables</li> </ul>	<p><b>2025 – Q4</b></p> <p>A system of equations is graphed on the grid.</p> <p>A system of linear equations is shown on a coordinate plane.</p>	<p>Ⓐ <math>y = x + 2</math> <math>y = -4x + 17</math></p> <hr/> <p>Ⓑ <math>y = x + 2</math> <math>y = -4x + 15</math></p> <hr/> <p>Ⓒ <math>x + y = 2</math> <math>4x + y = 17</math></p> <hr/> <p>Ⓓ <math>x + y = 2</math> <math>4x + y = 15</math></p>
			<p>Which system of equations best represents the system shown on the graph?</p>
		<p><b>2025 – Q34</b></p> <p>The perimeter of a rectangular garden is 48 meters. The length of the garden, <math>y</math>, is 6 meters more than twice the width, <math>x</math>.</p> <p>Which system of equations can be used to find the length and width of the garden in meters?</p>	
		<p>Ⓐ <math>2x + 2y = 48</math> <math>y = 6x + 2</math></p>	
		<p>Ⓑ <math>x + y = 48</math> <math>y = 2x + 6</math></p>	
		<p>Ⓒ <math>2x + 2y = 48</math> <math>y = 2x + 6</math></p>	
		<p>Ⓓ <math>x + y = 48</math> <math>y = 6x + 2</math></p>	

**A.5(C)** solve systems of two linear equations with two variables for mathematical and real-world problems

**Concepts**

- Systems of linear equations with two variables
- Mathematical problems
- Real-world problems

**Skills**

- Solve

**Clarifications (Including, but not limited to):**

- Methods of solution may include substitution, elimination, and graphing
- Students should be able to verify their solutions
- Students may be expected to use tools such as concrete models to solve problems.
- Students may be expected to justify their solutions.

**2025- Q11**

What is the value of  $x$  in the solution to this system of equations?

$$3x - 5y = 12$$

$$y = -6x + 2$$

(A)  $\frac{22}{3}$

(B)  $-\frac{10}{3}$

(C)  $\frac{2}{3}$

(D)  $-\frac{18}{3}$

**2025 – Q24**

A system of linear equations is shown.

$$y = -0.5x + 4$$

$$3x + 6y = 24$$

Which statement about the system is true?

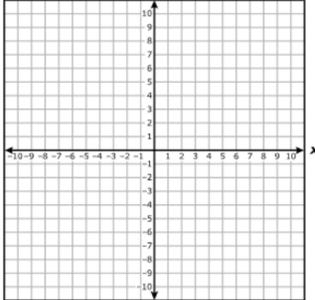
(A) The system has no solutions.

(B) The system has exactly one solution.

(C) The system has exactly two solutions.

(D) The system has infinitely many solutions.

Standard Breakdown

Standard	Specificity	STAAR Alignment
<p><b>A.3(F)</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist.</p>	<p><b>Concepts (Know)</b></p> <ul style="list-style-type: none"> <li>- Systems of Linear Equations</li> <li>- Coordinate Plane</li> <li>- Solutions</li> </ul> <p><b>Skills (Do)</b></p> <ul style="list-style-type: none"> <li>- Graph</li> <li>- Determine</li> </ul> <p><b>Clarifications Including, but not limited to:</b></p> <ul style="list-style-type: none"> <li>- Builds on the recognition of the point of intersection as a point which satisfies both of the graphed linear equations</li> <li>- Systems will include those with one solution, no solution or infinite solutions</li> </ul>	<p><b>2025 – Q45</b></p> <p>A system of equations is shown.</p> $x + y = -8$ $2x + 2y = 10$  <p>Which statement is true about this system of equations?</p> <p><input type="radio"/> (A) There are infinitely many solutions.</p> <p><input type="radio"/> (B) The only solution is <math>(-8, 5)</math>.</p> <p><input type="radio"/> (C) The only solution is <math>(5, -8)</math>.</p> <p><input type="radio"/> (D) There is no solution.</p> <p><b>2024 – Q45</b></p> <p>The function <math>f(x) = -4x + 8</math> represents the first of two equations in a system of linear equations. The second equation in the system has a different slope than the first equation.</p> <p>Which statement is true about the solution to the system of equations?</p> <p><input type="radio"/> (A) The system has no solutions.</p> <p><input type="radio"/> (B) The system has exactly one solution.</p> <p><input type="radio"/> (C) The system has exactly two solutions.</p> <p><input type="radio"/> (D) The system has infinitely many solutions.</p>

## VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards\*\* in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6 <sup>th</sup> / 7 <sup>th</sup> Grade	Algebra I	Algebra II
<p><b>6.9A</b> write one-variable, one-step equations and inequalities to represent constraints or conditions within problems</p> <p><b>6.9B</b> represent solutions for one-variable, one-step equations and inequalities on number lines</p> <p><b>6.9C</b> write corresponding real-world problems given one-variable, one-step equations or inequalities.</p> <p><b>6.10A</b> model and solve one-variable, one-step equations and inequalities that represent problems, including geometric concepts</p> <p><b>6.10B</b> determine if the given value(s) make(s) one-variable, one-step equations or inequalities true</p> <p><b>7.10A</b> write one-variable, two-step equations and inequalities to represent constraints or conditions within problems</p> <p><b>7.10B</b> represent solutions for one-variable, two-step equations and inequalities on number lines</p> <p><b>7.10C</b> write a corresponding real-world problem given a one-variable, two-step equation or inequality.<b>7.11A</b> model and solve one-variable, two-step equations and inequalities</p> <p><b>7.11B</b> determine if the given value(s) make(s) one-variable, two-step equations and inequalities true</p>	<p><b>A.2I</b> write systems of two linear equations given a table of values, a graph, and a verbal description</p> <p><b>A.3D</b> graph the solution set of linear inequalities in two variables on the coordinate plane</p> <p><b>A.5C</b> solve systems of linear equations with two variables for mathematical and real-world problems</p> <p><b>A.3G</b> estimate graphically the solutions to systems of two linear equations with two variables in real-world problems</p> <p><b>A.3F</b> graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist</p> <p><b>A.3H</b> graph the solution set of systems of two linear inequalities in two variables on the coordinate plane.</p>	<p><b>A2.3A</b> formulate systems of equations, including systems consisting of three linear equations in three variables and systems consisting of two equations, the first linear and the second quadratic</p> <p><b>A2.3B</b> solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution ·</p> <p><b>A2.3C</b> solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation</p> <p><b>A2.3D</b> determine the reasonableness of solutions to systems of a linear equation and a quadratic equation in two variables</p> <p><b>A2.3E</b> formulate systems of at least two linear inequalities in two variables.</p> <p><b>A2.3F</b> solve systems of two or more linear inequalities in two variables.</p> <p><b>A2.3G</b> determine the reasonableness of solutions to systems of a linear equation and a quadratic equation in two variables.</p>