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### How to Use This Addendum

Make sure you're ready to teach by noting the **Necessary Materials and Pre-Lesson Prep** you will need to gather or complete prior to the lesson

Find high-leverage instructional moves in the **Lesson Look Fors**. This is what leaders should see when observing your instruction

Note how your lesson objective ties to your state **Standards**

Plan purposeful questioning and responses using **Opportunities to CFU**

Use the **Mathematical Goal of the Lesson** to keep you focused on the appropriate student outcome

Plan to stress **Important Vocabulary** in the lesson. New vocab for the unit is indicated in bold

Plan instruction around what students need to Know & Do to be successful on the Exit Ticket using the identified **Student Criteria for Success**

Find recommended lesson modifications, content knowledge boosters, and/or high-leverage instructional moves that may not be in your Teacher Edition located in **Other Notes to Inform Your Planning**

Lesson 9: Find related multiplication facts by adding and subtracting equal groups in array models		Date: _____														
<p><b>Standard(s)</b></p> <p><b>3.4K</b> solve one-step and two-step problems involving multiplication and division within 100 using strategies based on objects; pictorial models, including arrays, area models, and equal groups; properties of operations; or recall of facts</p>	<p><b>Notes for Intellectual Preparation &amp; Lesson Planning</b></p> <p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>• (S) Multiply by 2 (1–5) Pattern Sheet</li> <li>• (S) Personal white board</li> <li>• (S) Threes array no fill template</li> <li>• (S) Blank paper</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Lesson Agenda</th> <th style="text-align: left;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now (source: fluency #1)</td> <td>5 min</td> </tr> <tr> <td>II. Fluency*</td> <td>8 min</td> </tr> <tr> <td>III. Concept Development</td> <td>25 min</td> </tr> <tr> <td>IV. Student Practice</td> <td>15 min</td> </tr> <tr> <td>V. Student Debrief</td> <td>7 min</td> </tr> <tr> <td>VI. Exit Ticket*</td> <td>5 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b></p> <p>Students learn they can use decomposition to break a larger number into two smaller numbers as a strategy for multiplication. The goal of this lesson is simply for student to understand how to interpret and create an array that demonstrates such decomposition. Students will build on this understanding in subsequent lessons. This lesson also supports the goal of student thinking in terms of counting units, an overarching goal for academy math.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ Concept Development, by way of</li> <li>✓ eliciting student responses</li> <li>✓ Problems Set problems: #2, #3</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p><b>For Do Now:</b> Use the Multiply by 2 (1–5) Pattern Sheet for your Do Now. 3 minutes for completion, 2 minutes whole group classwork check.</p> <p><b>For Fluency:</b> Complete the Group Counting activity (notice the inclusion of 4s in preparation for upcoming lessons) and Forms of Multiplication activity.</p> <p><b>For Concept Development:</b> Consider prepping personal whiteboard in advance. Spend no more than 12 minutes for CD Problem 1 and 13 minutes for CD Prob 2.</p> <p><b>For Student Practice:</b> consider creating an extra set of Qs like 1-3 in case students struggle with entry-level understanding. If they don't, move on to Qs 4 and above.</p> <p><b>For Student Debrief:</b> consider using the Eureka assigned Exit Ticket for whole group debrief exercise; Suggested strategy – guided discourse.</p> <p><b>For Exit Ticket:</b> Use Homework problems 2 &amp; 3 for this lesson's Exit Ticket.</p> <p><small>Though not formally discussed yet, this is a foundation to understanding of distributive property. Students visually see multiplying the sum of two or more addends by a number will give the same result as multiplying each addend individually by the number and then adding the products together.</small></p>	Lesson Agenda	Time	I. Do Now (source: fluency #1)	5 min	II. Fluency*	8 min	III. Concept Development	25 min	IV. Student Practice	15 min	V. Student Debrief	7 min	VI. Exit Ticket*	5 min	<p><b>Lesson Look Fors</b></p> <p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Have established a signaling routine for choral response or work show during the respective fluency activities</li> <li><input type="checkbox"/> Use a think aloud to describe why they shade what portions of the array, or use a different symbol in the array</li> <li><input type="checkbox"/> Make the focus of the lesson understanding the visual representations</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Explain what they see in the array and how it relates to a given number sentence.</li> </ul> <p><b>Student Criteria for Success</b></p> <ul style="list-style-type: none"> <li>Shading, brackets, and/or dotted lines on an array will have mathematical significance</li> <li>-brackets can identify parts or wholes</li> <li>-dotted lines and shading represent decompositions</li> <li>We count units; In an array, counting rows is the same as counting units.</li> <li>Addition/subtraction and multiplication math facts (up to 4)</li> <li>Interpret an array</li> <li>-identify decompositions within an array</li> <li>-Relate an annotated or labeled array to one or more number sentences</li> <li>Addition/subtraction (+/- up to 4)</li> <li>Multiplication (2, 3, and 4)</li> </ul>
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<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>• array</li> <li>• bracket</li> <li>• columns</li> <li>• rows</li> <li>• unit(s)</li> </ul> <p><small>In this lesson, students are NOT responsible for the vocabulary distributive property. Please withhold as it will come up in later lessons.</small></p>	<p><b>Important Vocabulary</b></p> <p>7 threes = 5 threes + 2 threes</p> $7 \times 3 = 5 \times 3 + 2 \times 3$ $21 = 15 + 6$	<p><b>Student Criteria for Success</b></p> <p>Shading, brackets, and/or dotted lines on an array will have mathematical significance</p> <p>-brackets can identify parts or wholes</p> <p>-dotted lines and shading represent decompositions</p> <p>We count units; In an array, counting rows is the same as counting units.</p> <p>Addition/subtraction and multiplication math facts (up to 4)</p> <p>Interpret an array</p> <p>-identify decompositions within an array</p> <p>-Relate an annotated or labeled array to one or more number sentences</p> <p>Addition/subtraction (+/- up to 4)</p> <p>Multiplication (2, 3, and 4)</p>														

## UNIT SYNOPSIS

This unit introduces students to functions in general before focusing on linear functions. In the first half of this unit, students learn how to determine whether a relation is a function or not. They also learn how to interpret function notation  $[f(a) = b]$ , but they do NOT practice evaluating functions until later units. Students get to interpret graphs of functions, identifying intervals when the graph is increasing or decreasing. Students also learn about domain and range and the difference between discrete and continuous data and how their difference results in different types of notation.

In the second half of the unit, students focus on linear functions. First, they learn how to determine whether a function is linear or not. Then, they learn more about slope as rate of change. Last, they learn about the slope of vertical and horizontal lines.

## CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
<p><b>A.2(A)</b> determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</p> <p><b>A.2(C)</b> write linear equations in two variables given a table of values, a graph, and a verbal description</p> <p><b>A.3(B)</b> calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems</p>	<p><b>A.12(A)</b> decide whether relations represented verbally, tabularly, graphically, and symbolically define a function</p> <p><b>A.12(B)</b> evaluate functions, expressed in function notation, given one or more elements in their domains</p> <p><b>A.2(G)</b> write an equation of a line that is parallel or perpendicular to the x- or y-axis and determine whether the slope of the line is zero or undefined</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
	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, or 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.

(-17, -39)  
Is the point  $(-17, -39)$  on this line? How do you know?  
-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  
same  $m$ , diff.  $b$   
0 solutions

intersecting lines  
diff.  $m$   
1 solution

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

### 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:

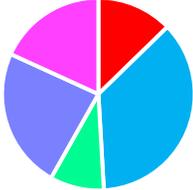
- In the Activity, students engage in group work and discourse.
- Exploring the activity, testing hypotheses and approaches (trial & error).
- Take notes on key ideas and concepts using different **colored pencil/pen** to take notes along the margin.
- Share thoughts and ideas that demonstrate their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

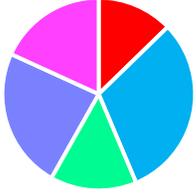
### Other considerations

- 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

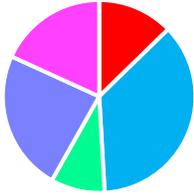
AT A GLANCE: Unit 3 – Introduction to Functions			
Day	Date	Lesson	Lesson Title
There are 3 flexible Success Days that you can use anywhere in the unit. <ul style="list-style-type: none"> <li>• Consider using 1 day between Lessons 4 and 5 to administer optional Topic Quiz 3.</li> <li>• Consider using 1 day to review before the Unit 3 Exam.</li> <li>• If you don't need to use all 3 success days, you can/should save unused days for later.</li> </ul>			
1		1	Definition of a Function
2		2	Use and Interpret Function Notation
3		3	Interpreting Graphs of Functions
4		4	Domain and Range
5			Success Day (Ideal time to administer <b>optional Unit 3 Topic Quiz</b> )
6		5	Identifying Linear Functions
7		6	Slope as Rate of Change
8		7	Slope of Vertical and Horizontal Lines
9			Success Day
10			<b>Unit 3 Exam</b>
11			Success Day

Lesson 1: Definition of a Function		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.12(A)</b> decide whether relations represented verbally, tabularly, graphically, and symbolically define a function</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 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; height: 15px; background-color: red;"></td> <td>Do Now (7 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: cyan;"></td> <td>INM (20 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: limegreen;"></td> <td>Debrief (5 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: purple;"></td> <td>Student Practice (13 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: pink;"></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 determine whether a relation is a function or not. This is most likely the first time students have ever heard of functions, and it appears at this point in the year to preface our lessons on linear functions before we explore quadratic and exponential functions in the second semester.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2, 3, 4</li> <li>✓ Student Practice: 1a, 1b, 4</li> </ul>		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><input type="checkbox"/> set up the INM by reading the “What in the World Cup” box to the class and setting expectations before releasing students to think through #s 4-6</li> <li><input type="checkbox"/> stamp that in a function, each input can only lead to one output.</li> <li><input type="checkbox"/> Annotate the table during the debrief as shown in TE page 9.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> use the table to provide evidence for their responses in #s 2-6.</li> <li><input type="checkbox"/> explain the difference between a relation and a function.</li> </ul>
		Do Now (7 min)										
	INM (20 min)											
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	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>domain</li> <li>function</li> <li>range</li> <li>relation</li> </ul>	<p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: The Do Now spirals in the distributive property and combining like terms; it is not connected to the INM. If you need to spiral in a different concept, it is OK to replace this Do Now.</p> <p>For <b>INM</b>: The INM presents historical World Cup data to introduce functions. Students should be able to work with their partner to answer questions about the table without teacher support. Consider bringing the class back together after a few minutes to ensure they are reading the table correctly (getting #s 2-3 correct). #s 4, 5, and 6 really set up what it means to be a function because they repeatedly ask “Does knowing ___ determine ___?” which the lesson eventually connects to “Does knowing <math>x</math> determine <math>y</math>?” Additionally, INM#7 sneaks in some practice opportunities, but can be deprioritized if you run out of time.</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 4, 5</p> </div>	<p><b>Student Know/Do Chart</b></p> <p> Students can determine whether <math>y</math> is a function of <math>x</math> for a set of ordered pairs.</p> <p> Functions map a set of inputs to a set of outputs. Each input can be mapped to only ONE output.</p>										

Lesson 2: Use and Interpret Function Notation		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.12(B)</b> evaluate functions, expressed in function notation, given one or more elements in their domains*</p> <p>*While this is the TEKS that is most closely aligned to this lesson, this lesson only has students evaluate functions by looking at graphs (as opposed to equations). In this foundational lesson, students will learn how to read function notation and what it represents so that when they get to the lesson that has them evaluate functions as equations during A.12(B), it will have meaning.</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 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 (17 min)</td> </tr> <tr> <td style="text-align: center;"><span style="color: green;">■</span></td> <td>Debrief (8 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></p> <p>By the end of this lesson, students should be able to use function notation to describe a function’s input and corresponding output. Student should also be able to interpret statements that use function notation in the context of the given situation. The focus of this lesson is NOT for students to substitute values to evaluate a function (e.g. “Find <math>f(5)</math> when <math>f(x) = 2x + 4</math>). Students will get to that in a later lesson. The focus of this lesson is to understand the meaning <math>f(a) = b</math> and to be able to identify what <math>a</math> and <math>b</math> represent in the context of a situation.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 3, 6, 7</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 can be skipped or replaced if necessary, although it does present the opportunity to revisit when a relation is or isn’t a function.</p> <p>For <b>INM</b>: Save #s 6-7 for AFTER the Debrief as a CFU before releasing students to work on Student Practice together.</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>For <b>Debrief</b>: Debriefing the INM is crucial for helping students make the leap from ordered pairs to function notation. It is when discussing INM #s 3 – 5 that students are able to formalize that <math>(73, 254)</math> is the same as <math>f(73) = 254</math>.</p>	<span style="color: red;">■</span>	Do Now (7 min)	<span style="color: blue;">■</span>	INM (17 min)	<span style="color: green;">■</span>	Debrief (8 min)	<span style="color: purple;">■</span>	Student Practice (13 min)	<span style="color: pink;">■</span>	Exit Ticket (10 min)	<p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> hold students accountable for justifying their INM responses with what they see on the graph.</li> <li><input type="checkbox"/> set students up for the INM by reading “How Long Will It Take to Stop” to the class, and then allowing students to work through #s 2-5 with their team.</li> </ul> <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> refer to the provided graphs to justify their interpretations.</li> <li><input type="checkbox"/> be able to interpret function notation. (e.g. in INM #5: “<math>f(65) = 200</math> in this situation means that if you are driving 65 mph, it will take 200 feet to come to a total stop.)</li> </ul>
<span style="color: red;">■</span>	Do Now (7 min)											
<span style="color: blue;">■</span>	INM (17 min)											
<span style="color: green;">■</span>	Debrief (8 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>evaluate a function</li> <li>function</li> <li><math>f(a) = b</math></li> <li>interpret a function</li> </ul>		<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can evaluate and interpret a graphed function.</li> <li> You should look at the labels of the <math>x</math>- and <math>y</math>-axes to help you interpret a function in context.</li> <li> <math>f(a) = b</math> means that when you input <math>a</math> into function named <math>f</math>, you get an output of <math>b</math>.</li> </ul>										

Lesson 3: Interpreting Graphs of Functions		Date: _____								
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors								
<p>◆ <b>A.2(A)</b> determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 Student Workbook</li> <li>Class set of red pens and highlighters</li> </ul>	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li>set students up for the INM by reading “How Hot is Janelle’s Coffee?” to the class, and then allowing students to work through #s 2-9 with their team.</li> <li>introduce inequality notation when debriefing INM#8</li> <li>model use of highlighters to annotate the graph as shown on TE p37.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li>use highlighters to indicate where a graph is increasing or decreasing.</li> <li>write the domain and range of continuous data using inequality notation.</li> </ul>								
	<p><b>Lesson Structure:</b></p> <table border="1"> <tr> <td></td> <td>Do Now (7 min)</td> </tr> <tr> <td></td> <td>INM (18 min)</td> </tr> <tr> <td></td> <td>Debrief (7 min)</td> </tr> <tr> <td></td> <td>Student Practice (13 min)</td> </tr> <tr> <td></td> <td>Exit Ticket (10 min)</td> </tr> </table>  <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to identify and interpret key features of a function from its graph, including the domain, range, intervals of increasing/decreasing, intercepts, maxima, and minima. They should also be able to determine an appropriate domain for a function based on the provided context. This lesson connects to what students learned in Lesson 2.4 on compound inequalities.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2, 3, 4, 8</li> <li>✓ Student Practice: 1 - 6</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: The Do Now can be skipped or replaced if necessary; however, this Do Now is a great way to activate prior knowledge as it comes from a foundational ET IDEA students took in 6<sup>th</sup> grade.</p> <p>For <b>Debrief</b>: As you debrief each question with the class, keep emphasizing function notation from previous lesson. Connect INM #8 to what students learned in Unit 2. When debriefing #8, stamp that inequality notation is how we mathematically record domain and range in some cases. (Later they will learn that this only applies to continuous, not discrete, data.)</p>			Do Now (7 min)		INM (18 min)		Debrief (7 min)		Student Practice (13 min)
	Do Now (7 min)									
	INM (18 min)									
	Debrief (7 min)									
	Student Practice (13 min)									
	Exit Ticket (10 min)									
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>domain</li> <li>function</li> <li>interval</li> <li>maximum value</li> <li>minimum value</li> <li>range</li> <li>restriction</li> <li>x-intercept</li> <li>y-intercept</li> </ul>	<p><b>Focus on Disciplinary Literacy</b></p>  <p>Debriefing #8</p>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can identify the domain and range of a function and express the domain and range using inequality notation.</li> <li> Students can identify the maximum value given a graph.</li> <li> The maximum value is a function’s highest output. On a complete graph, it is the “peak” of the line shown.</li> <li> The domain is all x-values included in a function.</li> <li> The range is all y-values included in a function.</li> </ul>								

Lesson 4: Domain and Range		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.2(A)</b> determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 Student Workbook</li> <li>Class set of red pens</li> <li>Stations Cards (in TE or HERE)</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: limegreen; 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 identify the domain and range of a set of data and represent the domain and range using inequalities for continuous data and set notation for discrete data. In the previous lesson, students were introduced to inequality notation. This lesson presents scenarios in which set notation more accurately represents domain and range.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 4, 5</li> <li>✓ Student Practice: 1, 2, 4</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: The Do Now spirals in Unit 2, but it also activates prior knowledge that will help students distinguish between “discrete” and “continuous” data.</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>allow students to attempt several guesses in INM #1, praising guesses and NOT shunning mistakes. Mistakes help students get to the right answer by eliminating other possibilities!</li> <li>allow students to work through INM #2 (Can You Spot the Difference?) and #3 before debriefing them. Debrief #s 2 and 3 before releasing them to try #4.</li> <li>Debrief #4 before releasing students to try #5.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li>struggle with INM #2, but apply what they learn in INM #3 to make sense of #2.</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>continuous data</li> <li>discrete data</li> <li>domain</li> <li>function</li> <li>range</li> <li>set notation</li> </ul>	<p>For <b>INM</b>: Students WILL struggle with INM #2, and that’s okay! They don’t need to “get it right” before moving on to #3. When they try #3, they might get an a-ha moment and return to #2 with their answer. At any rate, once you debrief #s 2-3, it should help them with #s 4-5.</p> <p>For <b>Student Practice</b>: Student Practice is set up for Stations work, but if you worry about running out of time, consider printing the cards 2-4 to a sheet and making task cards for students instead.</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 of #3</p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can determine whether a set of data is discrete or continuous.</li> <li> Students can use set notation to describe the domain of discrete data.</li> <li> When data is represented as points on a graph, the data is discrete. When data is represented as a line, it is continuous.</li> <li> Discrete data is represented in set notation; continuous data is represented in inequality notation.</li> </ul>										

Lesson 5: Identifying Linear Functions		Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors
<p><b>NOTE:</b> This lesson is not tied to a specific standard but exists to prepare students to work with linear functions in this unit AND to be able to contrast linear functions with the quadratic and exponential functions they will encounter in later units. This standard may be most closely related to</p> <p>◆ <b>A.2(C)</b> write linear equations 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 3 Student Workbook</li> <li>Class set of red pens</li> <li>Class set of another colored pen or pencil</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Lesson Structure:</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: red; margin-right: 5px;"></span> Do Now (7 min)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: cyan; margin-right: 5px;"></span> INM (20 min)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: lime; margin-right: 5px;"></span> Debrief (5 min)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: blue; margin-right: 5px;"></span> Student Practice (13 min)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: magenta; margin-right: 5px;"></span> Exit Ticket (10 min)</li> </ul>  </div> <p><b>Mathematical Goal of this Lesson</b> By the end of this lesson, students should be able to determine whether a function is linear given a table, graph, or set of ordered pairs. The main goal of this lesson is for students to determine whether a function is linear or not, but the y-intercept and slope are introduced since linear functions have a constant slope. Slope and y-intercept will be more deeply explored in later lessons.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2, 5</li> <li>✓ Student Practice: 1, 2, 3</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: The Do Now juxtaposes a linear function with a non-linear function to give students the opportunity to notice the difference not just in the shape of the graphs, but for the context of the situation, how the waitlist is growing at a much different rate than actual enrollment, which is constant. Also, this Do Now CAN'T be skipped because it sets up the INM.</p> <p>For <b>Debrief</b>: When debriefing #3, emphasize that <math>f(0)</math> is the initial value when <math>x = 0</math>, which we also call the y-intercept because it results in a point on the y-axis. For #4, use the graph to help students visualize that the slope is the rate of change, and show how for linear functions, you can more or less SEE the constant change occurring.</p>	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> use the questions provided in the green box on TE p73 to help students notice the difference between linear and non-linear functions.</li> <li><input type="checkbox"/> when debriefing, use INM #3 to introduce “y-intercept” and use INM #4 to introduce “slope.”</li> <li><input type="checkbox"/> for INM #5, ensure students can connect their response to “common sense” thinking (e.g. <math>x \geq 0</math> because years can't be negative in this case).</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> explain why a function is or isn't linear.</li> <li><input type="checkbox"/> begin to be able to explain what the slope and y-intercept represents in the context of a situation (students will keep practicing this; in this lesson they are just beginners)</li> </ul>
	<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>linear functions</li> <li>slope</li> <li>y-intercept</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief of 3-4</p> </div>

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ <b>A.3(B)</b> calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 Student Workbook</li> <li>Class set of red pens</li> </ul> <div data-bbox="443 272 1192 548" style="border: 1px solid black; padding: 5px;"> <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: limegreen; border: 1px solid black;"></td> <td>Debrief (6 min)</td> </tr> <tr> <td style="width: 20px; background-color: purple; border: 1px solid black;"></td> <td>Student Practice (14 min)</td> </tr> <tr> <td style="width: 20px; background-color: pink; 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 identify or calculate slope given a graph and interpret the meaning of this slope in the context of the situation.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>INM: 1e, 1f, 2a, 2b</li> <li>Student Practice: 1, 2</li> </ul>		Do Now (7 min)		INM (18 min)		Debrief (6 min)		Student Practice (14 min)		Exit Ticket (10 min)	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li>release students to complete #1 with their team, bring students back to debrief #1, and then re-release students to complete #2 with their team.</li> <li>use questions provided in green box on TE p89 to spark discussion.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li>use the graphs provided to justify their responses.</li> <li>Be able to explain what it means in context when one slope is steeper than another (as in INM #2)</li> </ul>
	Do Now (7 min)											
	INM (18 min)											
	Debrief (6 min)											
	Student Practice (14 min)											
	Exit Ticket (10 min)											
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>rate of change</li> <li>slope</li> <li>steepness</li> </ul>	<p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: The Do Now is not part of the INM, but it serves to activate prior knowledge and will prime students for the INM to come.</p> <p>For <b>INM</b>: Students should be able to work through #1 using the graph provided with minimal, if any, teacher support. Bring the class together to debrief INM #1 before releasing students to complete INM #2.</p> <div data-bbox="957 1133 1373 1334" style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief of #1</p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Students can find the slope of a line given a graph.</li> <li> Students can interpret slope in the context of a situation.</li> <li> Slope is a rate of change determined by <math>\frac{\Delta f(x)}{\Delta x}</math>.</li> <li> When interpreting slope in the context of a situation, think about the axis labels (e.g. “Debt,” and “Years Since Graduating.”)</li> </ul>										

Lesson 7: Slope of Vertical and Horizontal Lines		Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors
<p>◆ <b>A.2(G)</b> write an equation of a line that is parallel or perpendicular to the x- or y-axis and determine whether the slope of the line is zero or undefined</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>Unit 3 Student Workbook</li> <li>Class set of red pens</li> </ul> <p><b>Lesson Structure:</b></p>  <p><b>Mathematical Goal of this Lesson</b></p> <p>By the end of this lesson, students should be able to find the slope of vertical and horizontal lines. They should develop the understanding that horizontal lines have no change in <math>y</math>, so their slope is zero; zero divided by anything is zero. They should also see, during the QuickNotes, that vertical lines have no change in <math>x</math> and you cannot divide by zero; consequently, their slope is undefined.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: 2a, 4, 5</li> <li>✓ Student Practice: 1, 2, 3</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>Do Now</b>: When going over the Do Now, ask students why it makes sense for the slope to be negative in that situation (because we're measuring distance away from finish line).</p>	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> release students to complete #s 1 with their team, bring students back to debrief #1, and then re-release students to complete #2 – 5 with their team.</li> <li><input type="checkbox"/> use questions provided in green box on TE p 102 to spark discussion.</li> <li><input type="checkbox"/> emphasize that vertical lines are <b>undefined</b> because there is no change in <math>x</math>; you can't divide by zero.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> interpret slope in the context (e.g. be able to explain that the line for "Horizon" is flat because they offer unlimited data at a fixed price.</li> <li><input type="checkbox"/> Explain the difference between "zero slope" and "undefined."</li> </ul>
	<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>slope</li> <li><b>undefined</b></li> </ul>	<p>In <b>General</b>: The lesson is almost entirely on horizontal lines. Vertical lines are not discussed until the QuickNotes part as they did not fit the r phone plan scenario, but students can apply their understanding of horizontal lines to vertical lines as well. As the TE shows on p 103, ensure you explain how to generate equations of horizontal and vertical lines.</p> <div style="text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>Debrief #s 4-5</p> </div>

## Recommended Success Day Materials and Resources

### A.2(A): Domain and Range

- Bluebonnet Skills Practice: Domain and Range
- Sirius A.2(A) Practice Sheets
- General Review Bank\*\*\*

\*Note that the General Review Bank contains problems aligned to TEKS students have not worked with. Only the sections marked “Topic A” and “Topic C” apply for this unit. For future units, the other problem sets within that general review bank will be useful.

### A.3(B): Calculate Rate of Change

- Bluebonnet Skills Practice: Rate of Change from a Graph
- Sirius A.3(B) pages
- Kahoot: Rate of change of linear functions
- Imagine Math: *Find slope* printable ( **TE / SW** )

### A.2(G): Horizontal and Vertical Lines

- Imagine Math: *Different Slopes* Printable (TE / SW)
- Sirius A.2(G) page
- Khan Academy: Horizontal and Vertical Lines

### Unit 3 Tech Enhanced Question Practice

This problem set on EdCite is another opportunity for students to familiarize themselves with the EdCite platform. 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.

### A.12(A): Function Or Not?

- Bluebonnet Skills Practice: Function or Not?
- Sirius A.12(A) Practice Sheet
- Imagine Math *Identifying Functions* Printable (TE / SW)
- KA: Evaluate Functions from their Graph

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.

Standard(s)	Notes for Intellectual Preparation & Lesson Planning
<ul style="list-style-type: none"> <li>◆ <b>A.2(A)</b> determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</li> <li>◆ <b>A.3(B)</b> calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems</li> <li>◆ <b>A.12(A)</b> decide whether relations represented verbally, tabularly, graphically, and symbolically define a function</li> <li>◆ <b>A.2(G)</b> write an equation of a line that is parallel or perpendicular to the x- or y-axis and determine whether the slope of the line is zero or undefined</li> </ul>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Ensure you can access UE3 on EdCite.</li> </ul> <p><b>Notes to Inform Your Planning</b></p> <p>Review the Unit 3 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>The scanning deadline for the Unit 3 Exam is October 9, 2025.</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.2A</b> Determine the domain and range of a linear function in mathematical problems, determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities.</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>- Domain and Range</li> <li>- Real-World Situations</li> <li>- Continuous and Discrete</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>- Determine</li> <li>- Represent</li> </ul> <p><b>Clarifications Including, but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Identifying domain and range of linear functions and non-linear functions in mathematical situations and real-world situations</li> <li>• Domain is defined as a set of input values for the independent variable</li> <li>• Range is defined as a set of output values for the dependent variable</li> <li>• Continuous function defined as a function whose values are continuous or unbroken over the specified domain</li> <li>• Discrete function defined as a function whose values are distinct and separate and not connected; values are not continuous. Discrete functions are defined by their domain.</li> <li>• Inequality notation – notation in which the solution is represented by an inequality statement;</li> <li>• Identify reasonable domain and range for real-world problem situations;</li> <li>• Comparison of domain and range of function model to appropriate domain and range for a real-world problem situation.</li> </ul>	<p><b>Spring 2025</b></p> <div data-bbox="1018 341 1522 706"> <p>16</p> <p>An amusement park charges \$44.95 per person for admission and \$20.00 per car for parking. For purchases of at least 1 ticket, the table shows the relationship between <math>p</math>, the number of people in a car, and <math>c</math>, the total cost in dollars.</p> <table border="1"> <caption>Amusement Park Costs</caption> <thead> <tr> <th>Number of People, <math>p</math></th> <th>Total Cost, <math>c</math> (dollars)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>64.95</td> </tr> <tr> <td>2</td> <td>109.90</td> </tr> <tr> <td>3</td> <td>154.85</td> </tr> <tr> <td>4</td> <td>199.80</td> </tr> </tbody> </table> <p>The amusement park states that at most 4 tickets can be purchased. What is the range of the function in this situation?</p> <p>Ⓐ <math>1 \leq p \leq 4</math></p> <p>Ⓑ <math>64.95 \leq c \leq 199.80</math></p> <p>Ⓒ <math>\{1, 2, 3, 4\}</math></p> <p>Ⓓ <math>\{64.95, 109.90, 154.85, 199.80\}</math></p> </div> <div data-bbox="1018 722 1522 1088"> <p>17</p> <p>The owner of a business purchased a delivery van for \$62,500. For accounting purposes the owner identified a constant depreciation on the value of the van. The graph shows the linear relationship between <math>y</math>, the value in dollars of the delivery van, and <math>x</math>, the time in years.</p> <p>Which inequality best represents the domain of the function for this situation?</p> <p>Ⓐ <math>0 \leq y \leq 10</math></p> <p>Ⓑ <math>0 \leq x \leq 10</math></p> <p>Ⓒ <math>0 \leq y \leq 62,500</math></p> <p>Ⓓ <math>0 \leq x \leq 62,500</math></p> </div> <p><b>Spring 2023 – Q7</b></p> <p>A part of a linear function is shown on the grid.</p> <p>What is the range of the part of the linear function shown?</p> <p>Choose the correct answer from each drop-down menu to complete the sentence.</p> <p>The range is the set of all real numbers [ ] and [ ].</p>	Number of People, $p$	Total Cost, $c$ (dollars)	1	64.95	2	109.90	3	154.85	4	199.80
Number of People, $p$	Total Cost, $c$ (dollars)											
1	64.95											
2	109.90											
3	154.85											
4	199.80											

**A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description

**Concepts:**

- Linear Equations
- Two Variables
- Table
- Graph
- Verbal Description

**Skills:**

- Write

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

- Write linear equation from a graph, table, or verbal description
- Use the parts of the equation to describe the real-world situation
- Equations may be represented in slope-intercept form, standard form, or point-slope form

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The table represents some points on the graph of linear function  $f$ .

Linear Function	
$x$	$f(x)$
-6	-10
-2	-4
4	5
10	14

What is the equation of function  $f$  in slope-intercept form? Move the correct answer to each box. Not all answers will be used.

- $-\frac{3}{2}$   
   $-1$   
   $\frac{1}{2}$   
   $1$   
   $\frac{3}{2}$   
   $\frac{7}{4}$

$f(x) =$    $x +$

**Spring 2024 – Q36**

The total cost,  $y$ , for  $x$  tickets to a concert includes a flat fee for processing and a cost per ticket. One customer purchased 4 tickets for a total cost of \$160. Another customer purchased 8 tickets for a total cost of \$300.

Which linear equation represents the total cost in dollars,  $y$ , for  $x$  tickets?

Ⓐ  $y = 40x$

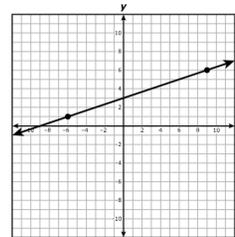
Ⓑ  $y = 37.5x$

Ⓒ  $y = 35x + 20$

Ⓓ  $y = 20x + 35$

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The graph of a linear function is shown on the grid.



Which equation is best represented by this graph?

Ⓐ  $y = 3(x + 1)$

Ⓑ  $y = 3(x + 3)$

Ⓒ  $y = \frac{1}{3}(x + 9)$

Ⓓ  $y = \frac{1}{3}(x + 3)$

**A.3(B)** calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems

**Concepts:**

- rate of change
- linear function

**Skills:**

- calculate

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

- Identifying rate of change from a graph
- Identifying rate of change from a table
- Identifying rate of change from an equation

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Which value represents the rate of change of  $y$  with respect to  $x$  for this function?

$$x + 7y = -14$$

(A)  $-7$

(B)  $7$

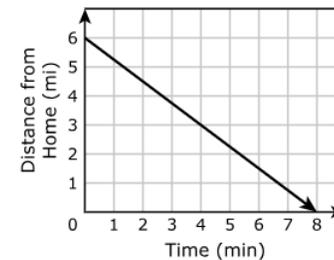
(C)  $-\frac{1}{7}$

(D)  $\frac{1}{7}$

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The graph shows a student's distance from home as a function of time.

Going Home



Based on the graph, what is the rate of change of the student's distance from home in miles with respect to the time in minutes?

(A) Decrease of  $\frac{3}{4}$  mi per minute

(B) Decrease of  $\frac{4}{3}$  mi per minute

(C) Increase of  $\frac{3}{4}$  mi per minute

(D) Increase of  $\frac{4}{3}$  mi per minute

## 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>6.5A</b> represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions</p> <p><b>6.6A</b> identify independent and dependent quantities from tables and graphs</p> <p><b>6.6B</b> write an equation that represents the relationship between independent and dependent quantities from a table</p> <p><b>6.6C</b> represent a given situation using verbal descriptions, tables, graphs, and equations in the form <math>y = kx</math> or <math>y = x + b</math></p> <p><b>7.4A</b> represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including <math>d = rt</math></p> <p><b>7.7A</b> represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form <math>y = mx + b</math></p>	<p><b>A.2A</b> determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</p> <p><b>A.2C</b> write linear equations in two variables given a table of values, a graph, and a verbal description</p> <p><b>A.3B</b> calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems</p> <p><b>A.2G</b> write an equation of a line that is parallel or perpendicular to the x- or y-axis and determine whether the slope of the line is zero or undefined</p> <p><b>A.12A</b> decide whether relations represented verbally, tabularly, graphically, and symbolically define a function</p> <p><b>A.12B</b> evaluate functions, expressed in function notation, given one or more elements in their domains</p>	<p><b>A2.2A</b> graph the functions <math>f(x) = \sqrt{x}</math>, <math>f(x) = \frac{1}{x}</math>, <math>f(x) = x^3</math>, <math>f(x) = \sqrt[3]{x}</math>, <math>f(x) = b^x</math>, <math>f(x) =  x </math>, and <math>f(x) = \log_b(x)</math> where <math>b</math> is 2, 10, and <math>e</math>, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval.</p> <p><b>A2.2C</b> describe and analyze the relationship between a function and its inverse (quadratic and square root, logarithmic and exponential), including the restriction(s) on domain, which will restrict its range</p> <p><b>A2.6L</b> formulate and solve equations involving inverse variation</p> <p><b>A2.7I</b> write the domain and range of a function in interval notation, inequalities, and set notation</p>