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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**

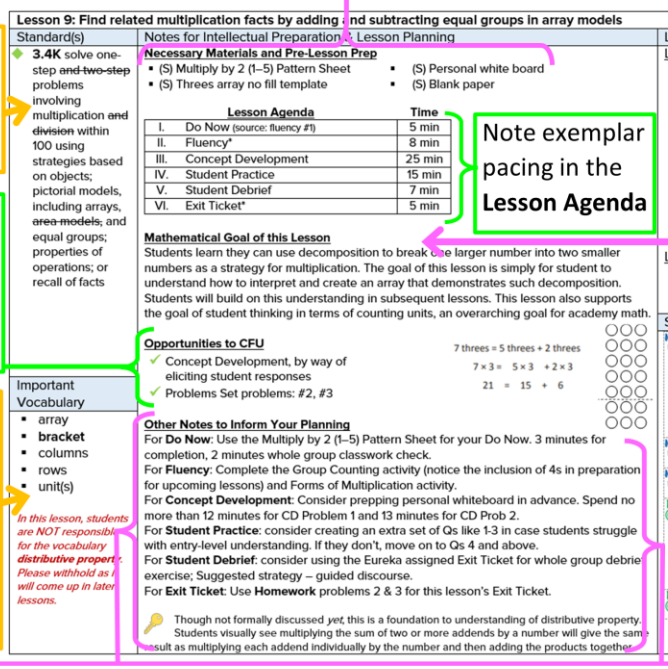
Note exemplar pacing in the **Lesson Agenda**

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

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

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

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



Lesson 9: Find related multiplication facts by adding and subtracting equal groups in array models Date: _____

Standard(s)

3.4K 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

Important Vocabulary

- array
- **bracket**
- columns
- rows
- unit(s)

*In this lesson, students are NOT responsible for the vocabulary **distributive property**. Please withhold as it will come up in later lessons.*

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- (S) Multiply by 2 (1–5) Pattern Sheet
- (S) Threes array no fill template
- (S) Personal white board
- (S) Blank paper

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

Mathematical Goal of this Lesson

Students learn they can use decomposition to break the 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.

Opportunities to CFU

- ✓ Concept Development, by way of eliciting student responses
- ✓ Problems Set problems: #2, #3

7 threes = 5 threes + 2 threes
7 × 3 = 5 × 3 + 2 × 3
21 = 15 + 6

Other Notes to Inform Your Planning

For **Do Now**: Use the Multiply by 2 (1–5) Pattern Sheet for your Do Now. 3 minutes for completion, 2 minutes whole group classwork check.
For **Fluency**: Complete the Group Counting activity (notice the inclusion of 4s in preparation for upcoming lessons) and Forms of Multiplication activity.
For **Concept Development**: Consider prepping personal whiteboard in advance. Spend no more than 12 minutes for CD Problem 1 and 13 minutes for CD Prob 2.
For **Student Practice**: 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.
For **Student Debrief**: consider using the Eureka assigned Exit Ticket for whole group debrief exercise; Suggested strategy – guided discourse.
For **Exit Ticket**: Use **Homework** problems 2 & 3 for this lesson's Exit Ticket.

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.

Lesson Look Fors

Look for teachers to...

- ❑ Have established a signaling routine for choral response or work show during the respective fluency activities
- ❑ Use a think aloud to describe why they shade what portions of the array, or use a different symbol in the array
- ❑ Make the focus of the lesson understanding the visual representations

Look for students to...

- ❑ Explain what they see in the array and how it relates to a given number sentence.

Student Criteria for Success

Know: Shading, brackets, and/or dotted lines on an array will have mathematical significance
-brackets can identify parts or wholes
-dotted lines and shading represent decompositions

Know: We count units; In an array, counting rows is the same as counting units.

Know: Addition/subtraction and multiplication math facts (up to 4)

Do: Interpret an array
-identify decompositions within an array
-Relate an annotated or labeled array to one or more number sentences

Do: Addition/subtraction (+/- up to 4)
Multiplication (2, 3, and 4)

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**

UNIT SYNOPSIS

This unit begins with an introduction to the three forms of linear functions: slope-intercept, point-slope, and standard form. Throughout the first five lessons, students learn how to graph equations in all three forms form, when each of the three forms makes the most sense to use, and how to manipulate an equation to get it into its desired form.

In the second half of the unit, students look at special cases of linear equations. First, they learn how to determine if two linear equations represent lines that are parallel, perpendicular, or neither. Next, they learn how to generate equations of lines that run through a specified point AND are parallel or perpendicular to a different given line.

The penultimate lesson revisits function notation. In Unit 3, students evaluated functions using only graphical representations. In this unit, students evaluate functions in function notation. Just as in Unit 3, students are expected not just to evaluate, but also to interpret the meaning of their function inputs and outputs. The final lesson allows students to explore the graphing feature of the TI Nspire. Students will practice graphing a linear equation, generating a table of values, and learn how to adjust the window to ensure key features of the equation are visible.

CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems	**A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$, given one point and the slope and given two points **A.2(D)** write and solve equations involving direct variation **A.2(E)** write the equation of a line that contains a given point and is parallel to a given line **A.2(F)** write the equation of a line that contains a given point and is perpendicular to a given line **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$ **A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains

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

LEARNING SUPPORTS BY LESSON

There is a checkmark for the math support if the lesson	Lessons → Math Supports	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
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

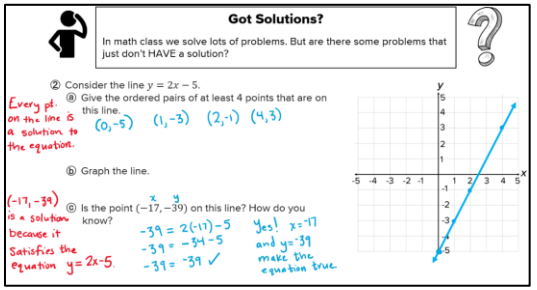
For every new lesson, the teacher begins by making the goals of the lesson crystal clear. The teacher does more than simply read the objective to the class. They make connections to previous learning, share how this learning fits into a bigger picture, or explain why this learning is important for future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

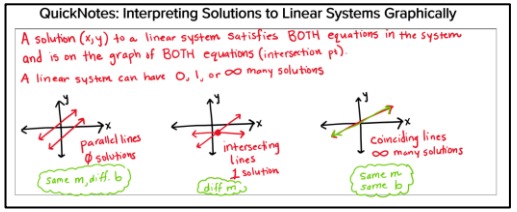
Debrief Activity

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.**



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.



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 4 – Forms of Linear Equations			
Day	Date	Lesson	Lesson Title
There are 4 flexible Success Days that you can use anywhere in the unit. • Consider using 1 day between Lessons 4 and 5 to administer optional Topic Quiz 4. • Consider using 1 day to review before the Unit 4 Exam. • If you don't need to use all 3 success days, you can/should save unused days for later.			
1		1	Slope-Intercept Form (Day 1)
2		2	Slope-Intercept Form (Day 2)
3		3	Point-Slope Form (Day 1)
4		4	Point-Slope Form (Day 2)
5		5	Standard Form
6			Success Day (Ideal time to administer **optional** Unit 4 Topic Quiz)
7		6	Parallel and Perpendicular Lines (Day 1)
8		7	Parallel and Perpendicular Lines (Day 2)
9		8	Direct Variation
10		9	Evaluate Functions
11		10	Linear Equations on the Calculator
12			Success Day
13			Unit 4 Exam
14			Success Day
15			Success Day

Lesson 1: Slope-Intercept Form (Day 1) Date: _____

Standard(s)

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

Important Vocabulary

- slope
- **slope-intercept form**
- ***y*-intercept**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to write an equation in slope-intercept form given a starting value and a constant rate of change. **Note that the focus of this lesson is the contextual interpretation of a linear equation, not the graphical interpretation.** Instead of focusing on the terms "slope" and "y-intercept," this lesson uses the words "starting value" and "rate" or "cost per side." In the next lesson, students will connect these contextual features to the graphical features of slope and *y*-intercept.

Opportunities to CFU

- ✓ INM: 1, 2, 5
- ✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now can be skipped or replaced if necessary; it is not part of the INM.

For **Debrief:** During the Debrief, you are coaching students to go from the KFC scenario to slope-intercept form. In #5 especially, make sure students understand the difference between $16.99 (starting value) and $2.89 (cost per side).

Focus on Disciplinary Literacy

Debrief

Lesson Look Fors

Look for teachers to…

- ❑ use monitoring questions in the green box on TE p 7 to help students when they're stuck during the INM.
- ❑ prioritize building conceptual understanding by focusing on *b* as a "starting value" and *m* as a "rate."
- ❑ avoid jumping straight into phrases like "b represents the *y*-intercept and m represents the slope."

Look for students to…

- ❑ be able to justify every response they provide in the INM.
- ❑ be able to distinguish between a "rate" and a "starting value" when given a situation – "Student Practice" gives more at bats for this.

Student Know/Do Chart

Do: Students can generate an equation in slope-intercept form given a starting value and a constant rate of change.

Know: The slope-intercept formula is $y = mx + b$.

Know: In slope-intercept form, *b* represents the starting value.

Know: In slope-intercept form, *m* represents the rate.

Lesson 2: Slope-Intercept Form (Day 2) Date: _____

Standard(s)

- **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description
- **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems

Important Vocabulary

- slope
- slope-intercept form
- *y*-intercept

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to identify the slope and *y*-intercept from a linear equation, graph lines given a point and a slope, and write the equation of a line shown on a graph. The main purpose of this lesson is to connect students' understanding of a starting value and rate with the y-intercept and slope of a linear graph,
respectively.

Opportunities to CFU

✓ INM: 2, 4, 8 ✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now is a spiraled review for **A.2(A)**. It is not part of the INM and can be skipped or replaced if necessary.

For **Debrief:** When you go over question 5 about slope, try to connect as many representations as possible. Talk about how the slope can be seen from the equation, from the graph, from the context, and from using any two points.
This is a great time to get students to notice that they could graph the line
using just the y-intercept and the slope. You can add this method to the
graph.

Focus on Disciplinary Literacy

Debrief Q5

Lesson Look Fors

Look for teachers to…

- ❑ set up the context for the INM (by reading the "How Much Snow" box at the top of the SE) and then release students in teams to reason through the INM.
- ❑ use monitoring questions in the green box on TE p 15 to help students when they're stuck.

Look for students to…

- ❑ connect "y-intercept" to "starting value" from previous lesson
- ❑ connect "slope" to "rate" from previous lesson

Student Know/Do Chart

Students can graph a line given an equation in slope-intercept form.

Students can identify the slope and y-intercept given an equation in slope-intercept form.

In $y = mx + b$, m represents the slope, or rate of change.

In $y = mx + b$, b represents the y-intercept, or starting value.

Lesson 3: Point-Slope Form (Day 1) Date: _____

Standard(s)

- **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description
- **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems
- **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, ~~$Ax + Bx = C$~~, and $y - y_1 = m(x - x_1)$
- **A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, ~~$Ax + Bx = C$~~, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points

Important Vocabulary

- point-slope form
- (x_1, y_1)

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens and **highlight**

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to write and graph equations in point-slope form. They should also be able to identify the slope and (x_1, y_1) given an equation in point-slope form. Students should also begin to see that sometimes it's easier to use point-slope form, and other times it's easier to use slope-intercept form.

Opportunities to CFU

✓ INM: 5, 6

✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals how to find the slope given two points. It fits well with the INM because in the INM, students will see that point-slope form is a rearrangement of the slope formula.

Focus on Disciplinary Literacy

Debrief

In **General:** Coach students to be careful with negative coordinates. There are subtraction signs in point-slope form, and this causes students to make careless errors. For example, they might think that the line $y - 5 = \frac{1}{2}(x - 2)$ contains the point $(-2, -5)$ instead of $(2, 5)$.

Lesson Look Fors

Look for teachers to…

- ❑ during QuickNotes, stamp that point-slope form is the slope formula rearranged.
- ❑ emphasize when each form is useful (i.e. when you have the slope and a point, use point-slope form; when you have a slope and y-intercept, use slope-intercept form).
- ❑ emphasize that an equation in point-slope form can be manipulated to get it in slope-intercept form and vice versa.

Look for students to…

- ❑ be careful with the subtraction signs in point-slope form, especially when working with negative coordinates for (x_1, y_1).
- ❑ explain why point-slope form works (it's the manipulation of the slope formula!)

Student Know/Do Chart

Do	Students can graph a line given its equation in point-slope form.
Do	Students can identify the slope and *y*-intercept given an equation in point-slope form.
Know	In, $y - y_1 = m(x - x_1)$ (point slope form), m represents the slope, and one point on the line is (x_1, y_1). b is NOT given.
Know	To identify the *y*-intercept from a line given in point-slope form, you can manipulate the equation or set $x = 0$ and solve.

Lesson 4: Point-Slope Form (Day 2) Date: _____

Standard(s)

- **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description
- **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems
- **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, ~~$Ax + Bx = C$~~, and $y - y_1 = m(x - x_1)$
- **A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, ~~$Ax + Bx = C$~~, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points

Important Vocabulary

- point-slope form

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens, **scissors,** and **glue** or **tape**.

Lesson Structure:

- Do Now (7 min)
- INM (33 min)
- Debrief (5 min)
- Student Practice (0 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to write an equation in point-slope form and slope-intercept form given a graph, a table, or a verbal description.

Opportunities to CFU

✓ INM:

✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in slope-intercept form. It can be skipped or replaced if necessary. While students are working on the Do Now, distribute class set of scissors and glue/tape.

For **INM:** This INM is actually more like Student Practice! Students will work on matching equations in slope-intercept and point-slope form with a graph, table, or scenario. Make sure you save time at the end of class for students to check their work.

Focus on Disciplinary Literacy

Matching Activity

For **Student Practice:** It is unlikely that you will have time to facilitate the "Student Practice" portion. Consider saving the provided problem set for a success day.

Lesson Look Fors

Look for teachers to…

- ❑ set clear expectations for this Matching Activity (consider scissor safety, "just-a-dot-not-a-lot" for glue, and picking up tiny paper scraps before class ends)
- ❑ actively circulate and monitor, using questions in green box on TE p33 to check in on students.

Look for students to…

- ❑ justify their matched sets, explaining how they know the equations are the same even if they look different.

Student Know/Do Chart

Do	Students can generate an equation in point-slope form given two points.
Know	To find the slope given two points, use $m = \frac{y_2 - y_1}{x_2 - x_1}$
Know	To write an equation in point-slope form, all you need is the slope and ANY point on the line.
Know	In, $y - y_1 = m(x - x_1)$ (point slope form), m represents the slope, and one point on the line is (x_1, y_1). ANY point on the line can be used.

Lesson 5: Standard Form | Date: _____

Standard(s)

- **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description
- **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems
- **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y - y_1 = m(x - x_1)$
- **A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points

Important Vocabulary

- **Standard Form**
- ***x*-intercept**
- ***y*-intercept**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to find and interpret *x*- and *y*-intercepts of lines given in Standard Form. They should also be able to identify the slope and *y*-intercept of lines in Standard Form by manipulating the equation if necessary. Last, students should be able to explain that generally, the Standard Form of a line is used to represent possible combinations of *x* and *y* to reach a fixed sum.

Opportunities to CFU

- ✓ INM: 2, 5, 7
- ✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in manipulating literal equations.

For **Debrief:** As you Debrief, help students connect INM#s 2 and 3 to finding intercepts. Use the Cookies/Cakes scenario to highlight that Standard Form is useful here because we have a fixed number of eggs and want to know what possible combinations we can make of cookies/cakes.

Focus on Disciplinary Literacy

Debrief

Lesson Look Fors

Look for teachers to…

- ❑ set up the context for the INM (by reading the "How Much Cookies" box at the top of the SE) and then release students in teams to reason through the INM.
- ❑ use monitoring questions in the green box on TE p41 to help students when they're stuck.

Look for students to…

- ❑ explain what the *x*- and *y*-intercept represent in context .
- ❑ be able to explain when Standard Form is more useful than Point-Slope or Slope-Intercept forms.

Student Know/Do Chart

Do	Students can find the slope, *x*-, and *y*-intercept of a line given its equation in Standard Form.
Do	Students can manipulate an equation given in Standard Form so that it is in slope-intercept form.
Know	The *y*-intercept is where a line intercepts the *y*-axis. When given a linear equation, you can find the *y*-intercept by setting *x* equal to zero.
Know	The *x*-intercept is where a line intercepts the *x*-axis. When given a linear equation, you can find the *x*-intercept by setting *y* equal to zero.

Lesson 6: Parallel and Perpendicular Lines (Day 1) Date: _____

Standard(s)

- **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$
- **A.2(E)** write the equation of a line that contains a given point and is parallel to a given line
- **A.2(F)** write the equation of a line that contains a given point and is perpendicular to a given line

Important Vocabulary

- **coincident lines**
- **opposite**
- **parallel lines**
- **perpendicular lines**
- **reciprocal**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (12 min)
- Debrief (7 min)
- Student Practice (19 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to determine whether two lines are parallel, perpendicular, or neither, given their equations in various forms. This sets students up for the next lesson, in which they'll be asked to generate an equation that runs through a specific point and is parallel or perpendicular to another given line. This lesson connects to what students have learned about equations with special solutions (parallel lines → no solution; coincident lines → all real numbers).

Opportunities to CFU

- ✓ INM: 2d, 3d
- ✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in the forms of linear equations. It can be replaced or skipped if necessary as it is not part of the INM.

For **QuickNotes:** The Quick Notes also presents the term "coincident lines," which students do not work with much in this course. For that reason, it's only included as an aside during the QuickNotes. During this time, you can connect this lesson to what students learned about equations with special solutions in Unit 1.

Focus on Disciplinary Literacy

2d, 3d

Lesson Look Fors

Look for teachers to…

- ❑ allow students to reason through the entirety of INM #2 before debriefing it (repeat this process for #3)
- ❑ revisit the terms "opposite" and "reciprocal" if they notice (while circulating during INM #3) that students do not understand these terms.

Look for students to…

- ❑ build on prior knowledge of "parallel" and "perpendicular," terms they've applied since 4th grade.
- ❑ easily generate equations given graphed lines in INM #s 2-3

Student Know/Do Chart

Do	Students can determine if two lines are parallel, perpendicular, or neither given their equations.
Do	Students can manipulate equations when necessary to identify slope.
Know	Two lines are parallel if they have the same slope.
Know	Two lines are perpendicular if their slopes are opposite reciprocals.

Lesson 7: Parallel and Perpendicular Lines (Day 2) Date: _____

Standard(s)

- **A.2(E)** write the equation of a line that contains a given point and is parallel to a given line
- **A.2(F)** write the equation of a line that contains a given point and is perpendicular to a given line

Important Vocabulary

- coincident lines
- opposite
- parallel lines
- perpendicular lines
- reciprocal

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Decide how to transition to and set up "Speed Dating" activity
- Class set of red pens and **highlighters**

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to generate an equation that runs through a specific point and is parallel or perpendicular to another given line.

Opportunities to CFU

✓ INM: 2a, 3a

✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in the previous lesson. It is not part of the INM and can be cut or replaced if necessary.

For **Student Practice:** Carefully read directions for Speed Dating while internalizing. It is a great way to get students to stay engaged solving problems with different partners!

Focus on Disciplinary Literacy

Debriefing 3a

TE Print Error: Please disregard the incorrect objective on TE p53. The objective should instead be, "SWBAT write the equation of a line that runs through a given point and is parallel or perpendicular to a given line."

Lesson Look Fors

Look for teachers to…

- ❑ set up the context for the INM (by reading the "Create It" box at the top of the SE) and then release students in teams to reason through the INM.
- ❑ set clear expectations for Speed Dating; circulate to inspect what you expect.

Look for students to…

- ❑ be comfortable manipulating equations to find the slope.
- ❑ explain why they're using the same slope or the opposite reciprocal when generating a new line.
- ❑ Exhibit kindness and patience with every partner they interact with during Speed Dating.

Student Know/Do Chart

Do: Students can write the equation of a line that contains a given point and is perpendicular to a given line.

Know: Two lines are parallel if they have the same slope.

Know: Two lines are perpendicular if their slopes are opposite reciprocals.

Know: If you know the slope of a line and a point on the line, you can substitute known values into $y = mx + b$ to identify the y-intercept, b.

Lesson 8: Direct Variation | Date: _____

Standard(s)

- **A.2(D)** write and solve equations involving direct variation

Important Vocabulary

- **direct variation**
- ***k***
- ***"varies directly"***

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens and **highlight**

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to recognize when two quantities have a proportional relationship, write direct variation equations in the form of $y = kx$, and apply the concept of direct variation to find unknown values. This lesson is closely related to what students have learned in 6th and 7th about setting up proportions and solving for a missing value.

Opportunities to CFU

- ✓ INM: 2, 5, 7
- ✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now CANNOT be skipped; it informs the INM.

For **Debrief:** While debriefing INM #7, explain that the generic phrase "*y* varies directly with *x*" (kind of like a sentence starter) can always be specified to reflect the context. For example, in #7, we could say "the cost varies directly with the number of gallons."

Focus on Disciplinary Literacy

Debrief #7

Lesson Look Fors

Look for teachers to…

- ❑ set up the context for the INM by debriefing the Do Now (see red/orange annotations) and then release students in teams to reason through the INM.
- ❑ use monitoring questions in the green box on TE p65 to help students when they're stuck.
- ❑ state that direct variation equations are a "special case" because they always go through the origin.

Look for students to…

- ❑ build on the proportional reasoning they developed in 6th/7th grades
- ❑ use double number lines to help set up proportions, find missing values, and/or identify the constant multiple, *k*.

Student Know/Do Chart

Do: Students can set up a proportional relationship that reflects a situation and solve to find the missing value.

Know: Direct variation describes a situation that can be expressed as $y = kx$, where k represents a constant rate of change.

Know: When a situation fits $y = kx$, you can set up a proportion to find a missing value.

Lesson 9: Evaluate Functions Date: _____

Standard(s)

◆ **A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains

Important Vocabulary

- **evaluate a function**
- function
- interpret a function
- $f(a) = b$
- $f(x) = x$

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens and **highlighters**

Lesson Structure:

- Do Now (7 min)
- INM (17 min)
- Debrief (5 min)
- Student Practice (16 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to evaluate and interpret functions given input and/or output data. This lesson connects to what students learned in Unit 3: Introduction to Functions. In Unit 3, students worked only with graphs to "evaluate" functions. In this lesson, students evaluate functions expressed in function notation. This is also a spiraled opportunity to practice evaluating expressions.

Opportunities to CFU

✓ INM: 2, 5 ✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in Unit 2 and serves to activate prior knowledge about function notation. Before moving onto the INM, you may want to take the opportunity to revisit that $f(a) = b$ means that when a is put into the function f, the output is b.

General Progression: The INM begins with what students know to help them acquire a new understanding. Q2 starts with evaluating a simple expression, one they would have seen in 6th grade. Q3 builds on Q2 by having students evaluate an equation twice to get two points. Q4 transitions from x/y to $x/f(x)$, and Q5 has students evaluate and interpret function inputs in context.

Focus on Disciplinary Literacy

Debrief #4

Lesson Look Fors

Look for teachers to…

- ❑ release students to work together for #s 2-3, debrief, re-release for #4, debrief, and re-release for #5 before completing final debrief.
- ❑ expect students to interpret, not just evaluate, during INM #5.

Look for students to…

- ❑ accurately substitute given values for x
- ❑ simplify multi-step expressions using the order of operations
- ❑ interpret input and output values in context.

Student Know/Do Chart

Do Students can evaluate a function given a value for x.

Know To evaluate a function, substitute the value you are given for x. Then, follow the order of operations to simplify the right side of the expression.

Lesson 10: Linear Equations on the Calculator Date: _____

Standard(s)

- **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description
- **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems
- **A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points

Important Vocabulary

- *x*-intercept
- *y*-intercept
- slope-intercept form
- **Window/Zoom**
- **Zoom to Fit**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 4 Student Workbook
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (15 min)
- Debrief (5 min)
- Student Practice (18 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to use the TI Nspire to check their work on any type of question that they've encountered in Unit 4. They should be able to graph a linear equation, access and scroll through a table of values, and adjust the window when the line isn't originally graphed in the default window.

Opportunities to CFU

- ✓ INM: 2b, 2d
- ✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in what students already know about slope-intercept form. It shouldn't be skipped or replaced, since the first part of the INM has students use the calculator to graph what they had just graphed by hand in the Do Now.

In **General**: Depending on how familiar students are with the Nspire, you might choose to walk students through each step, projecting your Nspire for all to see and expecting students to follow along with you and their workbook. Alternatively, you might choose to challenge students to follow along with just the book.

Focus on Disciplinary Literacy

Debrief

For **Student Practice**: Unlike the majority of lessons in the core MCR curriculum, this problem set is composed entirely of STAAR-mirrored problems so that students can build familiarity with when they might use the graphing feature of the Nspire on the STAAR.

Lesson Look Fors

Look for teachers to…

- ❑ model how to use the calculator to graph a line, generate a table, and adjust the window; OR facilitate an ideal space for students to do so using their workbook.
- ❑ maintain the expectation that students coach their partners when they're stuck (as opposed to pressing the buttons for them).

Look for students to…

- ❑ demonstrate how to graph an equation, how to pull up a table of values for that equation, and how to resize the window
- ❑ take advantage of the STAAR-mirrored problems provided in the Student Practice section to test what they already know and double-check their work with the calculator

Student Know/Do Chart

Students can generate a linear equation given a table of values.

To generate an equation given a table of values, identify the slope between two points and use the slope and a given point to identify the y-intercept.

You can use the calculator to confirm your answer is correct.

Recommended Success Day Materials and Resources

A.2(B) & A.2(C): write linear equations

- ☐ Bluebonnet SE: Point-Slope Form
- ☐ Sirius A.2(C) pages
- ☐ Sirius A.2(B) page
- ☐ KA: Point-Slope Form
- ☐ KA: Slope-Intercept from Two Points
- ☐ KA: Linear Equations in Any Form
- ☐ KA: Writing Linear Equations (Word Problems)
- ☐ Imagine Math: Point Slope Form (TE / SW)
- ☐ Imagine Math: Slope Intercept Form (TE / SW)

A.3(C): graph linear functions and ID key features

- ☐ Bluebonnet SE: Graphing ALL Forms of Linear Equations
- ☐ Bluebonnet Skills Practice: Graphing Linear Equations
- ☐ Bluebonnet Skills: Key Characteristics of Linear Functions Part 1
- ☐ Bluebonnet Skills: Key Characteristics Part 2
- ☐ Bluebonnet Skills: Comparing Linear Functions
- ☐ Sirius A.3(C) page
- ☐ KA: using slope and intercepts in context
- ☐ Imagine Math: Understand Linear Functions (TE / SW)

A.2(D): Direct variation

- ☐ Bluebonnet Skills Practice: Direct Variation
- ☐ Sirius A.2(D) Practice Sheet
- ☐ KA: Proportion Word Problems

A.2(E) & A.2(F): parallel and perpendicular lines

- ☐ Bluebonnet Skills Practice: Parallel Lines
- ☐ Bluebonnet Skills Practice: Perpendicular Lines
- ☐ KA: Write equations of parallel and perpendicular lines
- ☐ Imagine Math: Slopes of Parallel and Perp. Lines (TE / SW)
- ☐ Imagine Math: Equations of Parallel and Perp. Lines (TE / SW)

A.3(A): determine slope

- ☐ KA: Slope from a graph
- ☐ KA: Slope from equation
- ☐ KA: Slope from two points
- ☐ KA: Slope from a table
- ☐ Imagine Math: Find and Interpret Slope (TE / SW)

A.12(B): evaluate functions

- ☐ Bluebonnet Skills Practice: Evaluate Functions
- ☐ Sirius A.12(B) Practice Sheet
- ☐ Imagine Math *Identifying Functions* Printable (TE / SW)
- ☐ Imagine Math *Function Notation* Printable (TE / SW)
- ☐ KA: Evaluate Functions from their Graph
- ☐ KA: Evaluate Function Expressions

Unit 4 Tech Enhanced Question Practice

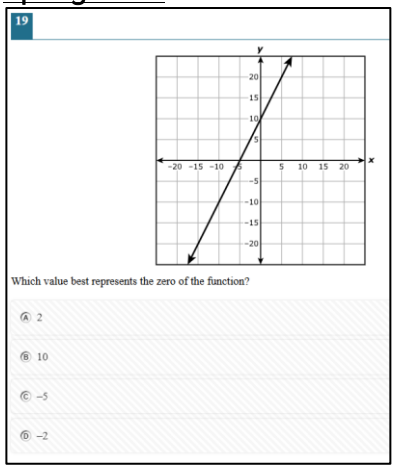
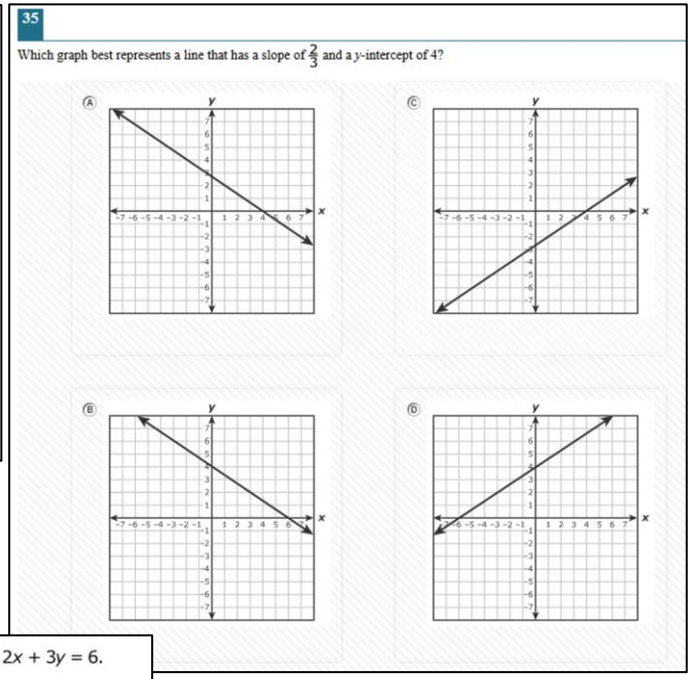
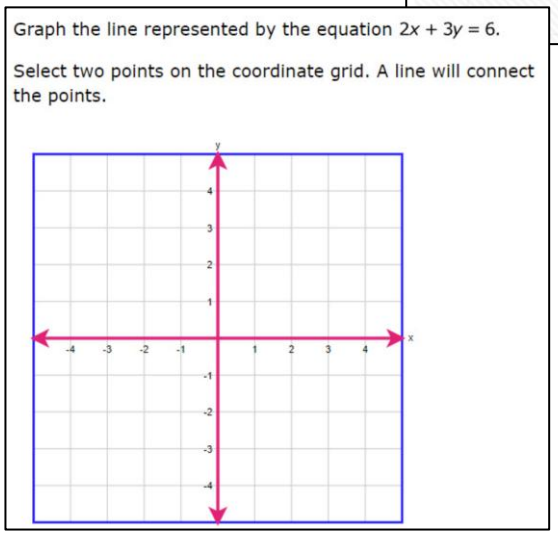
This problem set focuses on graphing all forms of linear equations on EdCite. It is not mandatory, and it can be retaken as many times as the student wishes to take it. You'll need to click "copy assignment" to be able to assign it to your students.

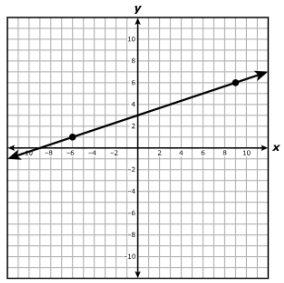
If student data indicates a pause point is not necessary, you can opt to move forward and reserve a Success Day to use at a later date.

Unit 4 Exam	Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning
◆ **A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description ◆ **A.3(C)** graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems ◆ **A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$, given one point and the slope and given two points ◆ **A.2(D)** write and solve equations involving direct variation ◆ **A.2(E)** write the equation of a line that contains a given point and is parallel to a given line ◆ **A.2(F)** write the equation of a line that contains a given point and is perpendicular to a given line ◆ **A.3(A)** determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$ ◆ **A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains	**Necessary Materials and Pre-Lesson Prep** ▪ Ensure you can access UE4 on EdCite. **Notes to Inform Your Planning** Review the Unit 4 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. The scanning deadline for the Unit 4 Exam is **October 30, 2025**. 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.)

UNPACKED STANDARDS

Focus standards for this unit.

Standard Breakdown		
Standard	**Specificity**	**STAAR Alignment**
A.3(C) graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems	**Concepts:** - linear equations - coordinate plane - *y*-intercept - *x*-intercept - slope - zeros **Skills:** - graph - identify **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	**Spring 2025**   **Spring 2024 –Q2** 

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	**Spring 2025** **6** 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 | $\frac{3}{2}$ | $\frac{7}{4}$ $f(x) =$ ☐ $x +$ ☐ **42** The graph of a linear function is shown on the grid.  Which equation is best represented by this graph? Ⓐ $y = 3(x + 1)$ Ⓑ $y = 3(x + 3)$ Ⓒ $y = \frac{1}{3}(x + 9)$ Ⓓ $y = \frac{1}{3}(x + 3)$ **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? Ⓐ $y = 40x$ Ⓑ $y = 37.5x$ Ⓒ $y = 35x + 20$ Ⓓ $y = 20x + 35$

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.

6th / 7th Grade	Algebra I	Algebra II
6.5A represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions 6.6A identify independent and dependent quantities from tables and graphs 6.6B write an equation that represents the relationship between independent and dependent quantities from a table 6.6C represent a given situation using verbal descriptions, tables, graphs, and equations in the form $y = kx$ or $y = x + b$ 7.4A represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$ 7.7A represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form $y = mx + b$	A.2C write linear equations in two variables given a table of values, a graph, and a verbal description A.3C graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems A.2B write linear equations in two variables in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$, given one point and the slope and given two points A.2D write and solve equations involving direct variation A.2E write the equation of a line that contains a given point and is parallel to a given line A.2F write the equation of a line that contains a given point and is perpendicular to a given line A.3A determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + Bx = C$, and $y – y_1 = m(x – x_1)$ A.12B evaluate functions, expressed in function notation, given one or more elements in their domains	A2.2A graph the functions $f(x) = \sqrt{x}$, $f(x) = \frac{1}{x}$, $f(x) = x^3$, $f(x) = \sqrt[3]{x}$, $f(x) = b^x$, $f(x) = \lvert x \rvert$, and $f(x) = log_b(x)$ where b is 2, 10, and e, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval. A2.2C 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 A2.6L formulate and solve equations involving inverse variation A2.7I write the domain and range of a function in interval notation, inequalities, and set notation