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How to Use This Addenda

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**

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

Date: _____

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

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

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

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

$7 \text{ threes} = 5 \text{ threes} + 2 \text{ threes}$
 $7 \times 3 = 5 \times 3 + 2 \times 3$
 $21 = 15 + 6$



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

- 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
- We count units; In an array, counting rows is the same as counting units.
- Addition/subtraction and multiplication math facts (up to 4)
- Interpret an array
- identify decompositions within an array
- Relate an annotated or labeled array to one or more number sentences
- Addition/subtraction (+/- up to 4)
- Multiplication (2, 3, and 4)

Note exemplar pacing in the **Lesson Agenda**

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

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**

UNIT SYNOPSIS

This last unit in the Geometry focuses on the statistics content that we think every high school student should learn. You might be thinking, “This is a Geometry course! Why are we including statistics and probability?” We did this for two reasons. First, we want students to learn all this content before taking any college-entrance standardized tests, like the ACT or SAT. Second, we feel like we could create the space in Geometry to dedicate one month to statistics. This statistics unit is split into four modules that can be mixed and matched and taught in any order.

Lessons 10.1 to 10.4: One-Variable Data Analysis

Lessons 10.5 to 10.8: Two-Variable Data Analysis

Lessons 10.9 to 10.12: Probability

Lessons 10.13 to 10.17: Statistical Inference

CONTENT STANDARDS

Below are the standards addressed in this unit.

AP Statistics Learning Objectives

UNC-1.A represent categorical data using frequency or relative frequency tables

UNC-1.B describe categorical data represented in frequency or relative frequency tables

UNC-1.I calculate measures of center and position for quantitative data

UNC-1.J calculate measures of variability for quantitative data

UNC-1.S represent bivariate quantitative data using scatterplots.

DAT-1.D calculate a predicted response value using a linear regression model

DAT-1.E represent differences between measured and predicted responses using residual plots.

DAT-2.A identify the type of study.

DAT-2.B identify appropriate generalizations and determinations based on observational studies.

UNC-4.D calculate an appropriate confidence interval for a population proportion

UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion

VAR-4.A calculate probabilities for events and their complements

VAR-4.C explain why two events are (or are not) mutually exclusive

VAR-4.D calculate conditional probabilities

VAR-4.E calculate the probabilities for independent events and for the union of two events

**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 →	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	
	Math Supports																		
makes a connection to prior content or from a previous unit or academic year	Access Prior Knowledge	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
uses familiar contexts or experiences to make the learning relevant to students	Real-World Connections	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
makes use of graphic organizers	Graphic Organizers	✓									✓	✓					✓		
includes tools like rulers, protractors, patty paper, algebra tiles, etc.	Tools or Manipulatives											✓					✓		
incorporates tables, reference charts, displays, pictures, models, or color-coding	Visual Aids	✓	✓	✓				✓	✓	✓		✓		✓					
includes definitions, examples vs. nonexamples, cognates, etc.	Vocabulary Supports	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		
includes strategies that support language development																			
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																			
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

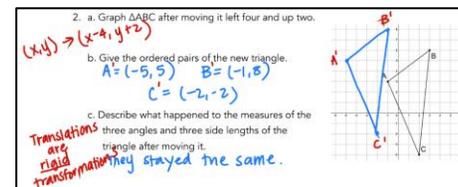
For every new lesson, the teacher begins by making the goals of the lesson crystal clear. The teacher does more than simply read the objective to the class. They make connections to previous learning, share how this learning fits into a bigger picture, or explain why this learning is important for future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

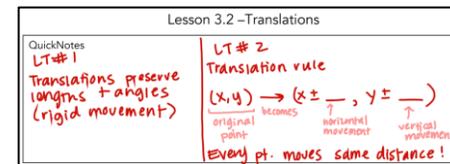
Debrief Activity

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

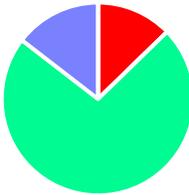
- During the **Experience First** phase, if most of your students seem stuck or disengaged, take a moment to pause, reset, and provide clear instructions. Some problems of the Activity are more suitable to do a whole-class discussion as a means to save some instructional time for Student Practice or 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

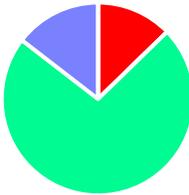
AT A GLANCE: Unit 10 – Statistics and Probability			
Day	Date	Lesson	Lesson Title
<p>There are 8 flexible Success Days that you can use anywhere in the unit.</p> <ul style="list-style-type: none"> • Consider using 1 day to facilitate Lesson 4, a Mid-Unit review that addresses content from Lessons 1 - 3. • Consider using 1 flex day to administer Topic Quiz A between lessons 4 and 5. • Consider using 1 day to facilitate Lesson 8, a Mid-Unit review that addresses content from Lessons 5 - 7. • Consider using 1 flex day to administer Topic Quiz B between lessons 7 and 8. • Consider using 1 day to facilitate Lesson 12, a Mid-Unit review that addresses content from Lessons 9 - 11. • Consider using 1 flex day to administer Topic Quiz C between lessons 12 and 13. • Consider using 1 day to facilitate Lesson 17, a Mid-Unit review that addresses content from Lessons 13 - 16. • Consider using 1 day to review the day before UE10. Use topic quiz data to prioritize which concepts or skills to review. 			
1		1	Categorical Data and Displays
2		2	Measures of Center for Quantitative Data
3		3	Measures of Spread for Quantitative Data
4		4	Mid-Unit Review A (Lessons 1 – 3) Success Day
5			Unit 10 Topic Quiz A Success Day
6		5	Scatterplots and Line of Best Fit
7		6	Predictions and Residuals
8		7	Models for Nonlinear Data
9		8	Mid-Unit Review B (Lessons 5 - 7) Success Day
10			Unit 10 Topic Quiz B Success Day
11		9	Probability Models and Rules
12		10	Probability Using Two-Way Tables
13		11	Probability Using Tree Diagrams
14		12	Mid-Unit Review C (Lessons 9 - 11) Success Day
15			Unit 10 Topic Quiz C Success Day
16		13	Random Sampling
17		14	Margin of Error
18		15	Observational Studies and Experiments
19		16	Random Sample and Random Assignments
20		17	Mid-Unit Review D (Lessons 13 - 16) Success Day
21			Unit 10 Topic Quiz D or Cumulative Review (use your TQ data to plan Cumulative Review) Success Day
22			Unit 10 Exam

Lesson 4: Mid-Unit Review A (Lessons 1-3) – The Star Wars and Ice Cream Problems		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ UNC-1.A represent categorical data using frequency or relative frequency tables</p> <p>◆ UNC-1.B describe categorical data represented in frequency or relative frequency tables</p> <p>◆ UNC-1.I calculate measures of center and position for quantitative data</p> <p>◆ UNC-1.J calculate measures of variability for quantitative data</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Unit 10.4 Student Workbook pages Random grouping cards (like these) <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</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: blue; border: 1px solid black;"></td> <td>INM (0 min)</td> </tr> <tr> <td style="width: 20px; background-color: green; border: 1px solid black;"></td> <td>Problem (40 min)</td> </tr> <tr> <td style="width: 20px; background-color: purple; border: 1px solid black;"></td> <td>Debrief (8 min)</td> </tr> <tr> <td style="width: 20px; background-color: pink; border: 1px solid black;"></td> <td>Exit Ticket (0 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson This lesson provides a review of Lesson 1-3 and gives students the opportunity to work together. Two different problems are provided, but the class should choose ONE to work on. You can discuss the other one if you have a longer class period or save it for a flex day.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ when giving directions (before you release students to participate in the activity) ✓ during the Debrief when you go over most-missed questions <p>Other Notes to Inform Your Planning For the Do Now: The provided Do Now is helpful for activating prior knowledge, but it is not married to the INM and can be replaced with a spiraled review question of your choice.</p>		Do Now (7 min)		INM (0 min)		Problem (40 min)		Debrief (8 min)		Exit Ticket (0 min)	<p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> give clear directions so the activity can flow smoothly. <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> work with their partners as they apply what they've learned so far.
	Do Now (7 min)											
	INM (0 min)											
	Problem (40 min)											
	Debrief (8 min)											
	Exit Ticket (0 min)											
<p>Important Vocabulary</p>	<p>On Random Grouping: Go We like to use playing cards or random group generator cards (like these) to break students into groups. Working with new people can increase discussion and disrupt some of the participation patterns that are formed when students work in the same group for longer periods of time. We have students work in one group for Part 1, and then change groups for Part 2. You can sort students by number first, then by color or suit. Give students about 15 minutes for each part of the activity. You can use the final 8 minutes of class to go over answers so students can use this page to study for their quiz tomorrow. (Source: MathMedic)</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>Star Wars or Ice Cream Problem</p> </div> <p>For the Exit Ticket: No SP is provided because this review lesson is essentially a LOT of student practice. No ET is provided because the next day should be a Topic Quiz day that will give you a helpful data point.</p>	<p>Student Know/Do Chart</p> <p> Students can apply all “Dos” from Lessons 1-3.</p> <p> Students know all “Knows” from Lessons 1-3.</p>										
<p>All vocabulary from Lessons 1 – 3.</p>												

Lesson 5: Scatterplots and Line of Best Fit		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ UNC-1.S represent bivariate quantitative data using scatterplots.</p> <p>◆ DAT-1.D calculate a predicted response value using a linear regression model</p> <p>◆ DAT-1.D.2 the predicted response value, denoted by \hat{y}, is calculated as $\hat{y} = a + bx$, where a is the y-intercept and b is the slope of the regression line, and x is the value of the explanatory variable</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Lesson 10.5 Student Workbook pages Access to StatsMedic applet (2 Quantitative Variables) Class set of red pens & rulers Large bowl of Starburst <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">■</td> <td>Do Now (7 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>INM (18 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Debrief (5 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Student Practice (15 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson By the end of this lesson, students should be able to describe the relationship for bivariate data by creating a scatter plot and interpreting the slope and y-intercept of its line of best fit.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ INM: 4d, 4e ✓ Student Practice: 1, 2, 3 <p>Other Notes to Inform Your Planning</p> <p>For Do Now: This Do Now spirals in previous content, but it can be skipped or replaced. If you worry about running out of time, consider using Do Now time to let students get ahead on #s 2 and 3.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>Debrief #4</p> </div> <p>For INM: Decide ahead of time if you want students to do this activity on their individual laptops or if you want to do it on one laptop and project your screen. Since everyone is using the same data for the INM, either option will work.</p> <p>On Disciplinary Literacy: Know that \hat{y} (y-hat) is entirely new to students! Students should use y-hat to communicate that they are making predictions (as opposed to calculating an exact output).</p>	■	Do Now (7 min)	■	INM (18 min)	■	Debrief (5 min)	■	Student Practice (15 min)	■	Exit Ticket (10 min)	<p>Lesson Look Fors</p> <p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> discuss the use of \hat{y} to remind students that the primary reason for modeling a set of data with a line is to be able to make predictions. <input type="checkbox"/> Get students to notice that the line of best fit is in the form $\hat{y} = a + bx$ (instead of the $y = mx + b$ order that students are used to). This promotes students' mathematical flexibility in understanding the parts of a linear equation. <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> use tables and graphs to make predictions <input type="checkbox"/> be able to explain the difference between y and \hat{y}. <p>Student Criteria for Success</p> <ul style="list-style-type: none">  Students can interpret the slope and y-intercept of a line of best fit.  Sometimes, the y-intercept in a line of best fit does not make sense because the line of best fit is just a model.  The line of best fit cannot give exact outputs, but it CAN offer predictions.
■	Do Now (7 min)											
■	INM (18 min)											
■	Debrief (5 min)											
■	Student Practice (15 min)											
■	Exit Ticket (10 min)											
<p>Important Vocabulary</p> <ul style="list-style-type: none"> explanatory variable line of best fit response variable scatter plot \hat{y} 												

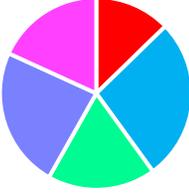
Lesson 8: Mid-Unit Review B (Lessons 5-7) – Carbon Emissions Problem		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ UNC-1.S represent bivariate quantitative data using scatterplots.</p> <p>◆ DAT-1.D calculate a predicted response value using a linear regression model</p> <p>◆ DAT-1.E represent differences between measured and predicted responses using residual plots.</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Unit 10.8 Student Workbook pages Class set of different colored pens (see pink TE box on p87 for details) <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</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: blue; border: 1px solid black;"></td> <td>INM (0 min)</td> </tr> <tr> <td style="width: 20px; background-color: green; border: 1px solid black;"></td> <td>Problem (40 min)</td> </tr> <tr> <td style="width: 20px; background-color: purple; border: 1px solid black;"></td> <td>Debrief (8 min)</td> </tr> <tr> <td style="width: 20px; background-color: pink; border: 1px solid black;"></td> <td>Exit Ticket (0 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson This lesson provides a review of Lesson 5-7 and gives students the opportunity to work together. Two different problems are provided, and groups should make it through both.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ when giving directions (before you release students to participate in the activity) ✓ during the Debrief when you go over the questions <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The provided Do Now is helpful for activating prior knowledge, but it is not married to the INM and can be replaced with a spiraled review question of your choice.</p> <p>For Debrief: Go over questions students struggled with the most.</p> <p>For the Exit Ticket: No SP is provided because this review lesson is essentially a LOT of student practice. No ET is provided because the next day should be a Topic Quiz day that will give you a helpful data point.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p style="background-color: yellow; display: inline-block; padding: 2px 5px;">Focus on Disciplinary Literacy</p>  <p>Carbon Emissions Problem</p> </div>		Do Now (7 min)		INM (0 min)		Problem (40 min)		Debrief (8 min)		Exit Ticket (0 min)	<p>Lesson Look Fors</p> <p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> have internalized directions on TE p57 <input type="checkbox"/> give students clear directions so the activity can flow smoothly. <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> work with their partners to solve the problem <input type="checkbox"/> provide feedback to each other (see description of how this works in pink box on TE p57 for more details)
		Do Now (7 min)										
	INM (0 min)											
	Problem (40 min)											
	Debrief (8 min)											
	Exit Ticket (0 min)											
<p>Important Vocabulary</p> <p>All vocabulary from Lessons 5 - 7.</p>		<p>Student Know/Do Chart</p> <div style="display: flex; align-items: flex-start; margin-bottom: 10px;"> <div style="text-align: center; margin-right: 10px;">  </div> <p>Students can apply all “Dos” from Lessons 5-7.</p> </div> <div style="display: flex; align-items: flex-start;"> <div style="text-align: center; margin-right: 10px;">  </div> <p>Students know all “Knows” from Lessons 5-7.</p> </div>										

Lesson 9: Probability Models and Rules		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ VAR-4.A calculate probabilities for events and their complements</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> ▪ Lesson 10.9 Student Workbook pages ▪ Class set of red pens ▪ Pair of dice per student pair <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Lesson Structure:</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 (16 min)</td> </tr> <tr> <td style="width: 20px; background-color: limegreen; border: 1px solid black;"></td> <td>Debrief (7 min)</td> </tr> <tr> <td style="width: 20px; background-color: blue; border: 1px solid black;"></td> <td>Student Practice (15 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>Mathematical Goal of this Lesson By the end of this lesson, students should be able to use proper notation to describe the probability of an event, determine the theoretical probability of an event and its complement, and determine the experimental probability of an event. Students learned these ideas in 7th grade, but did not apply them much during Algebra 1, so many students will need this refresher.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ INM: 3, 6, 7 ✓ Student Practice: 1, 2, 3, 4 <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The Do Now can be skipped or replaced, but it serves to activate students' prior knowledge of probability from 7th grade.</p> <p>For the INM: In today's lesson, student data is collected and added together. Know that this works only for mutually exclusive events, and that students will investigate what happens when events are not mutually exclusive in the next lesson.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>Debrief</p> </div>		Do Now (7 min)		INM (16 min)		Debrief (7 min)		Student Practice (15 min)		Exit Ticket (10 min)	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> model the game "Odds or Evens" and set clear expectations for student game play. <input type="checkbox"/> visibly collect and display student generated data from "Odds or Evens" <input type="checkbox"/> emphasize the difference between theoretical and experimental probability and relate this to the Law of Large Numbers (see pink box on TE p63 for details) <p>Look for students to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> play "Odds or Evens" and record their results. <input type="checkbox"/> explain the difference between experimental and theoretical probability <input type="checkbox"/> explain the relationship between the probability of an event occurring and its complement.
		Do Now (7 min)										
	INM (16 min)											
	Debrief (7 min)											
	Student Practice (15 min)											
	Exit Ticket (10 min)											
<p>Important Vocabulary</p> <ul style="list-style-type: none"> ▪ complement ▪ experiment ▪ probability ▪ Law of Large Numbers ▪ outcome ▪ probability ▪ probability experiment ▪ sample space ▪ trial ▪ theoretical probability 	<p>Student Know/Do Chart</p> <p> Students can compute the probability of an event or its complement.</p> <p> To find the probability of an event occurring, divide the number of ways the event could occur by the total number of possible outcomes.</p>											

Lesson 12: Mid-Unit Review C (Lessons 9-11) – Fan-N-Pick		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ VAR-4.A calculate probabilities for events and their complements</p> <p>◆ VAR-4.C explain why two events are (or are not) mutually exclusive</p> <p>◆ VAR-4.D calculate conditional probabilities</p> <p>◆ VAR-4.E calculate the probabilities for independent events and for the union of two events</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Unit 10.12 Student Workbook pages Print and cut out each problem set (print two for large classes) <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</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: blue;"></td> <td>INM (0 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: green;"></td> <td>Problem (40 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: purple;"></td> <td>Debrief (8 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: pink;"></td> <td>Exit Ticket (0 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson This lesson provides a review of Lesson 9-11 and gives students the opportunity to work together.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ when giving directions (before you release students to participate in the activity) ✓ during the Debrief when you go over the questions <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The provided Do Now is helpful for activating prior knowledge, but it is not married to the INM and can be replaced with a spiraled review question of your choice.</p> <p>For Debrief: Go over questions students struggled with the most.</p> <p>For the Exit Ticket: No SP is provided because this review lesson is essentially a LOT of student practice. No ET is provided because the next day should be a Topic Quiz day that will give you a helpful data point.</p>		Do Now (7 min)		INM (0 min)		Problem (40 min)		Debrief (8 min)		Exit Ticket (0 min)	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> have internalized directions on TE p89 and prepared printed cards on TE pp 95-98 <input type="checkbox"/> give students clear expectations and directions so the activity can flow smoothly. <p>Look for students to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> work with their groups to solve the problem using the structure described by their teacher <input type="checkbox"/> work in groups of four as described on TE p89 (Player 1 = Fan & Calculator; Player 2 = Reader; Player 3 = Question answerer; Player 4 = Responder)
	Do Now (7 min)											
	INM (0 min)											
	Problem (40 min)											
	Debrief (8 min)											
	Exit Ticket (0 min)											
Important Vocabulary		Student Know/Do Chart										
All vocabulary from Lessons 9 - 11.		<p> Students can apply all “Dos” from Lessons 9-11.</p> <p> Students know all “Knows” from Lessons 9-11</p>										
	<p>Focus on Disciplinary Literacy</p>  Fan-N-Pick											

Lesson 13: Random Sampling		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ DAT-2.B identify appropriate generalizations and determinations based on observational studies.</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Lesson 10.13 Student Workbook pages Enough whiteboard space for TWO different number lines for dot plot generation Class set of red pens 2 dot stickers per student A way for students to choose a random number (see TE p149 for details) Optional: play the song while students are working on the Do Now <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Lesson Structure:</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 (16 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: limegreen;"></td> <td>Debrief (7 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: purple;"></td> <td>Student Practice (15 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: magenta;"></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson By the end of this lesson, students should be able to distinguish between a population and a sample, and describe the population to which results can be generalized based on the sampling method used. In this lesson, we compare two different methods of sampling (human “randomness” vs computer randomness) and draw conclusions from the differences. This lesson is connected to the lesson that follows.</p>		Do Now (7 min)		INM (16 min)		Debrief (7 min)		Student Practice (15 min)		Exit Ticket (10 min)	<p>Look for teachers to...</p> <ul style="list-style-type: none"> set the context for the lesson by reading the introductory box at the top of the INM. Then, urge students to quickly circle 5 words for the Do Now and answer #s 1 and 2. before class, set up two number lines for “average word length” Vdot plots (see TE p101 for examples) <p>Look for students to...</p> <ul style="list-style-type: none"> generate a reason that could potentially explain the difference between avg word length of the words they chose during the Do Now (the sample) and the average of all the words (the population)
	Do Now (7 min)											
	INM (16 min)											
	Debrief (7 min)											
	Student Practice (15 min)											
	Exit Ticket (10 min)											
<p>Important Vocabulary</p> <ul style="list-style-type: none"> population random sample population mean sample sample mean sampling variability 	<p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ INM: 3, 6, 7 ✓ Student Practice: 1, 2, 3 <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The Do Now cannot be skipped or replaced; it sets up the INM. Students can do this on their own. Usually we don’t encourage teachers to RUSH their students, but we do want you to rush them through choosing 5 words. (They can take their time finding the average.)</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>INM 6</p> </div>	<p>Student Know/Do Chart</p> <ul style="list-style-type: none"> Do Students can distinguish between a population and a sample. Know A population is a complete group with at least one shared characteristic (e.g. the population of an entire city includes everyone in that city). Know A sample is a smaller and more manageable part of a population (e.g. a random selection of 100 people from the same city). 										

Lesson 14: Margin of Error		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ UNC-4.D calculate an appropriate confidence interval for a population proportion</p> <p>◆ UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Lesson 10.14 Student Workbook pages Class set of red pens <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">■</td> <td>Do Now (7 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>INM (13 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Debrief (10 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Student Practice (15 min)</td> </tr> <tr> <td style="text-align: center;">■</td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson By the end of this lesson, students should be able to interpret margin of error, construct a confidence interval when given an estimate and a margin of error, and explain the relationship between sample size and margin of error.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ INM: 3, 4, 6, 7 ✓ Student Practice: 1, 2, 3, 4 <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The Do Now was originally part of the INM; it cannot be skipped or replaced. It involves the 2020 Iowa Caucus, which already happened. Encourage students to pretend that we do not know who actually won.</p> <p>For the INM: Note that we are not asking students to calculate the margin of error – this is something they’ll do in AP statistics. The goal of this lesson is to understand WHY we report a margin of error (to account for sampling variability) and use it to create a confidence interval.</p> <p>About the QuickNotes: When you stamp that increasing sample size decreases margin of error, refer back to the dot plot the class made in the previous lesson and ask students how the class estimates would have changed if we had used a sample size of 50 instead of 5 words. Students should realize that the larger sample size should produce estimates that are closer to the truth.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>Debrief</p> </div>	■	Do Now (7 min)	■	INM (13 min)	■	Debrief (10 min)	■	Student Practice (15 min)	■	Exit Ticket (10 min)	<p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> use the guiding questions in the pink box on TE p109 to support students as they work through #s 4-6. <input type="checkbox"/> after the debrief, reveal who won the Iowa caucus (Buttigieg by just 0.1%!) – see TE p110 <input type="checkbox"/> stamp that margin of error is used to account for sampling variability due to the fact that every random sample produces a slightly different estimate <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> be able to explain how sample size affects margin of error. <input type="checkbox"/> calculate confidence intervals
■	Do Now (7 min)											
■	INM (13 min)											
■	Debrief (10 min)											
■	Student Practice (15 min)											
■	Exit Ticket (10 min)											
<p>Important Vocabulary</p> <ul style="list-style-type: none"> confidence interval margin of error 		<p>Student Know/Do Chart</p> <p>Do Students can construct a confidence interval when given an estimate and a margin of error.</p> <p>Know To calculate a confidence interval, add the margin of error to the estimate, and also subtract the margin of error from the estimate.</p> <p>Know The greater the sample size, the lower the margin of error.</p>										

Lesson 16: Random Sample and Random Assignment		Date: _____										
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors										
<p>◆ DAT-2.A identify the type of study.</p> <p>◆ DAT-2.B identify appropriate generalizations and determinations based on observational studies.</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Lesson 10.16 Student Workbook Class set of red pens Prepare for card sort (see TE p189 for directions and print copies of TE p194) <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</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 (15 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: limegreen;"></td> <td>Debrief (10 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: blue;"></td> <td>Student Practice (13 min)</td> </tr> <tr> <td style="width: 20px; height: 15px; background-color: magenta;"></td> <td>Exit Ticket (10 min)</td> </tr> </table>  </div> <p>Mathematical Goal of this Lesson By the end of this lesson, students should be able to determine if the results of a study can be generalized to a larger population and why, and determine if causation can be established.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ INM: Card Sort ✓ Student Practice: 1 <p>Other Notes to Inform Your Planning</p>		Do Now (7 min)		INM (15 min)		Debrief (10 min)		Student Practice (13 min)		Exit Ticket (10 min)	<p>Look for teachers to...</p> <ul style="list-style-type: none"> ☐ Remind students of the purpose of taking a random sample and using random assignment BEFORE starting the INM activity (see pink box on TE p125) ☐ Set clear expectations when facilitating card sort ☐ share the table (provided on TE p127) with students at the END of the Debrief and QuickNotes <p>Look for students to...</p> <ul style="list-style-type: none"> ☐ engage in a card sort by matching six different conclusions to six different study designs. ☐ explain what must be true for an experiment to show causation (random assignment) AND what must be true for the results of a study to be generalized to a larger population (random sampling)
	Do Now (7 min)											
	INM (15 min)											
	Debrief (10 min)											
	Student Practice (13 min)											
	Exit Ticket (10 min)											
<p>Important Vocabulary</p> <ul style="list-style-type: none"> random assignment random sample 	<p>For the Do Now: The Do Now is spiraled review and can be skipped or replaced if necessary.</p> <p>For the Debrief: Notice that the key on TE p190 takes students through thinking about whether each of the 6 scenarios make use of random sampling and random assignment.</p> <div style="text-align: center; margin-top: 20px;"> <div style="background-color: yellow; padding: 5px; border: 1px solid black; display: inline-block;">Focus on Disciplinary Literacy</div> <div style="margin-top: 10px;">  Card Sort </div> </div>	<p>Student Know/Do Chart</p> <ul style="list-style-type: none">  Students can distinguish between an observation and an experiment.  Students can identify explanatory and response variables.  Students can evaluate whether a scenario implies causation or not.  An experiment requires that treatments are imposed using random assignment. An observational study requires no treatments and is just an observation.  Random assignment is required to show causation. 										

Lesson 17: Mid-Unit Review D (Lessons 13-16) – Trashketball		Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors
<p>◆ DAT-2.A identify the type of study.</p> <p>◆ DAT-2.B identify appropriate generalizations and determinations based on observational studies.</p> <p>◆ UNC-4.D calculate an appropriate confidence interval for a population proportion</p> <p>◆ UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion</p>	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> Unit 10.17 Student Workbook pages Two wastebaskets Yardstick or tape to mark a line Print enough copies of problems for the activity (TE pp 203-206) so that each group can have one. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Lesson Structure:</p> <ul style="list-style-type: none"> ■ Do Now (7 min) ■ INM (0 min) ■ Problem (40 min) ■ Debrief (8 min) ■ Exit Ticket (0 min)  </div> <p>Mathematical Goal of this Lesson This lesson provides a review of Lesson 13-16 and gives students the opportunity to work together.</p> <p>Opportunities to CFU</p> <ul style="list-style-type: none"> ✓ when giving directions (before you release students to participate in the activity) ✓ during the Debrief when you go over the questions <p>Other Notes to Inform Your Planning</p> <p>For the Do Now: The provided Do Now is helpful for activating prior knowledge, but it is not married to the INM and can be replaced with a spiraled review question of your choice.</p> <p>For Debrief: Go over questions students struggled with the most.</p> <p>For the Exit Ticket: No SP is provided because this review lesson is essentially a LOT of student practice. No ET is provided because the next day should be a Topic Quiz day that will give you a helpful data point.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; text-align: center;"> <p>Focus on Disciplinary Literacy</p>  <p>Trashketball</p> </div>	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> have internalized directions provided in the “Trashketball” section of the TE and prepared copies of problems <input type="checkbox"/> set clear expectations and clearly communicate directions for Trashketball to students <input type="checkbox"/> bring the joy! <p>Look for students to...</p> <ul style="list-style-type: none"> <input type="checkbox"/> be seated in groups of 3-4, working together <input type="checkbox"/> complete questions in order <input type="checkbox"/> model sportsmanship
	<p>Important Vocabulary</p> <p>All vocabulary from Lessons 13 – 16.</p>	<p>Student Know/Do Chart</p> <div style="display: flex; align-items: flex-start; margin-bottom: 10px;"> <div style="text-align: center; margin-right: 10px;">  </div> <p>Students can apply all “Dos” from Lessons 13-16.</p> </div> <div style="display: flex; align-items: flex-start;"> <div style="text-align: center; margin-right: 10px;">  </div> <p>Students know all “Knows” from Lessons 13-16.</p> </div>

Recommended Unit 10 Success Day Material and Resources

Date: _____

For more practice with One-Variable Data Analysis (Lesson 1 – 4), try...

- New Jersey Center for Teaching and Learning: one-variable data analysis practice
- Albert.io AP Stats: 1.7 Summary Statistics for a Quantitative Variable
- 22-23 6G Mah Lesson 10.8: Percent Bar: TE | SW
- 22-23 6G Math Lesson 10.2: Measures of Center: TE | SW

For more practice with Two-Variable Data Analysis (Lesson 5 - 8), try...

- Albert.io: AP Stats 2.5: Correlation
- Albert.io: AP Stats 2.6: Linear Regression Models
- Albert.io: AP Stats 2.7: Residuals
- Imagine Math: Use a Line of Best Fit (TE / SW)
- Sirius: A.4(C) Practice Sheet
- Illustrative Mathematics: US Households
- Illustrative Mathematics: US Population
- Kahoot: Scatter Plots and Function Models

For more practice with Probability (Lessons 9-12), try...

- 21-22 MCR Lesson 11.1: Probability and Sample Space: TE | SW
- 21-22 MCR Lesson 11.2: Theoretical vs Experimental Probability: TE | SW
- 21-22 MCR Lesson 11.4: Independent and Dependent Events: TE | SW
- 21-22 MCR Lesson 11.7: Mutually Exclusive Event: TE | SW
- 21-22 MCR Unit 11 Cumulative Review: TE | SW
- OER: Independence and Conditional Probability Skills Practice
- OER: Computing Probability Skills Practice
- New Jersey Center for Teaching and Learning: Probability Review (pp 1 – 6)
- NJCTL: More Probability Practice
- Albert.io: AP Stats 4.3: Intro to Probability
- Albert.io: AP Stats 4.4 Mutually Exclusive Events

For more practice with Statistical Inference (Lessons 13-17), try...

- Albert.io: AP Stats 3.3: Random Sampling and Data Collection
- Albert.io: AP Stats 3.5: Intro to Experimental Design

Standard(s)	Notes for Intellectual Preparation & Lesson Planning
<ul style="list-style-type: none"> ◆ UNC-1.I calculate measures of center and position for quantitative data ◆ UNC-1.J calculate measures of variability for quantitative data ◆ DAT-1.D calculate a predicted response value using a linear regression model ◆ DAT-1.D.2 the predicted response value, denoted by \hat{y}, is calculated as $\hat{y} = a + bx$, where a is the y-intercept and b is the slope of the regression line, and x is the value of the explanatory variable ◆ DAT-2.A identify the type of study. ◆ DAT-2.B identify appropriate generalizations and determinations based on observational studies. ◆ UNC-4.D calculate an appropriate confidence interval for a population proportion ◆ UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion ◆ VAR-4.A calculate probabilities for events and their complements ◆ VAR-4.D calculate conditional probabilities 	<p>Necessary Materials and Pre-Lesson Prep</p> <ul style="list-style-type: none"> ▪ Print enough copies of UE10 Bluebook on Curriculum Corner (for the FRQ) and ensure you have access to the exam on Edcite. (If you do not have access to the exam, notify your TC and submit a Zendesk ticket ASAP.) <p>Notes to Inform Your Planning</p> <p>Review the Unit 10 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>The scanning deadline for the Unit 9 Exam is May 7th, 2026. Consider administering the exam 1-3 school days BEFORE May 7th to allow sufficient time for grading the FRQ.</p> <p>Refer to the scoring guide to score the FRQ.</p>

UNPACKED STANDARDS

Focus standards for this unit.

Standards Clarification																	
Standards	Specificity	Notes/Explanations/Examples															
<p>G.13C Identify whether two events are independent and compute the probability of the two events occurring together with or without replacement</p>	<p><u>Content:</u></p> <ul style="list-style-type: none"> Independent vs dependent events Probability Replacement <p><u>Including but not limited to:</u></p> <ul style="list-style-type: none"> Finding the probability of an event and/or its complement as a percent Finding the probability of an event and/or its complement as a fraction Find the theoretical and/or experimental probability of an event and/or its complement 	<p>From Dec 2020 ACT</p> <p>5. A certain committee is composed of 9 juniors and 11 seniors. Two different members of the committee will be randomly selected for 2 different leadership roles. Given that the 1st member who will be selected is a senior, what is the probability that the 2nd member who will be selected is a junior?</p> <p>A. $\frac{9}{19}$ B. $\frac{9}{20}$ C. $\frac{10}{19}$ D. $\frac{10}{20}$ E. $\frac{11}{20}$</p>															
<p>DAT-1.D Calculate a predicted response value using a linear regression model.</p>	<p><u>Concepts:</u> Predicted response</p> <ul style="list-style-type: none"> The predicted response value, denoted by \hat{y}, is calculated as $\hat{y} = a + bx$, where a is the y-intercept and b is the slope of the regression line, and x is the value of the explanatory variable. <p>Linear regression model</p> <ul style="list-style-type: none"> A simple linear regression model is an equation that uses an explanatory variable, x, to predict the response variable, y. Extrapolation is predicting a response value using a value for the explanatory variable that is beyond the interval of x-values used to determine the regression line. The predicted value is less reliable as an estimate the further we extrapolate. <p><u>Content:</u> Including, but not limited to:</p> <ul style="list-style-type: none"> Explanatory (predictor or treatment) variable, x Response variable, y Observed response, y_i Predicted (expected) response, \hat{y} Simple linear regression <ul style="list-style-type: none"> $\hat{y} = a + bx$ Slope, b Intercept, a 	<p>2011 AP Statistics Released FRQ #5</p> <p>5. Windmills generate electricity by transferring energy from wind to a turbine. A study was conducted to examine the relationship between wind velocity in miles per hour (mph) and electricity production in amperes for one particular windmill. For the windmill, measurements were taken on twenty-five randomly selected days, and the computer output for the regression analysis for predicting electricity production based on wind velocity is given below. The regression model assumptions were checked and determined to be reasonable over the interval of wind speeds represented in the data, which were from 10 miles per hour to 40 miles per hour.</p> <table border="1" data-bbox="1339 1031 1690 1149"> <thead> <tr> <th>Predictor</th> <th>Coef</th> <th>SE Coef</th> <th>T</th> <th>P</th> </tr> </thead> <tbody> <tr> <td>Constant</td> <td>0.137</td> <td>0.126</td> <td>1.09</td> <td>0.289</td> </tr> <tr> <td>Wind velocity</td> <td>0.240</td> <td>0.019</td> <td>12.63</td> <td>0.000</td> </tr> </tbody> </table> <p>S = 0.237 R-Sq = 0.873 R-Sq (adj) = 0.868</p> <p>(a) Use the computer output above to determine the equation of the least squares regression line. Identify all variables used in the equation.</p> <p>(b) How much more electricity would the windmill be expected to produce on a day when the wind velocity is 25 mph than on a day when the wind velocity is 15 mph? Show how you arrived at your answer.</p>	Predictor	Coef	SE Coef	T	P	Constant	0.137	0.126	1.09	0.289	Wind velocity	0.240	0.019	12.63	0.000
Predictor	Coef	SE Coef	T	P													
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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.

7 th Grade	Geometry	AP Statistics
<p>7.6H solve problems using qualitative and quantitative predictions and comparisons from simple experiments</p> <p>7.6I determine experimental and theoretical probabilities related to simple and compound events using data and sample spaces</p> <p>7.6A represent sample spaces for simple and compound events using lists and tree diagrams</p> <p>7.6C make predictions and determine solutions using experimental data for simple and compound events</p> <p>7.6D make predictions and determine solutions using theoretical probability for simple and compound events</p> <p>7.6E find the probabilities of a simple event and its complement and describe the relationship between the two</p>	<p>UNC-1.A represent categorical data using frequency or relative frequency tables</p> <p>UNC-1.B describe categorical data represented in frequency or relative frequency tables</p> <p>UNC-1.I calculate measures of center and position for quantitative data</p> <p>UNC-1.J calculate measures of variability for quantitative data</p> <p>UNC-1.S represent bivariate quantitative data using scatterplots.</p> <p>DAT-1.D calculate a predicted response value using a linear regression model</p> <p>DAT-1.E represent differences between measured and predicted responses using residual plots.</p> <p>DAT-2.A identify the type of study.</p> <p>DAT-2.B identify appropriate generalizations and determinations based on observational studies.</p> <p>UNC-4.D calculate an appropriate confidence interval for a population proportion</p> <p>UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion</p>	<p>UNC-1.A represent categorical data using frequency or relative frequency tables</p> <p>UNC-1.B describe categorical data represented in frequency or relative frequency tables</p> <p>UNC-1.I calculate measures of center and position for quantitative data</p> <p>UNC-1.J calculate measures of variability for quantitative data</p> <p>UNC-1.S represent bivariate quantitative data using scatterplots.</p> <p>DAT-1.E represent differences between measured and predicted responses using residual plots.</p> <p>DAT-2.A identify the type of study.</p> <p>DAT-2.B identify appropriate generalizations and determinations based on observational studies.</p> <p>UNC-4.D calculate an appropriate confidence interval for a population proportion</p> <p>UNC-4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion</p>
<p style="text-align: center;">Algebra I</p> <p>A.4(A) calculate, using technology, the correlation coefficient between two quantitative variables and interpret this quantity as a measure of the strength of the linear association</p> <p>A.4(B) compare and contrast association and causation in real-world problems</p> <p>A.4(C) write, with and without technology, linear functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems</p>	<p>VAR-4.A calculate probabilities for events and their complements</p> <p>VAR-4.C explain why two events are (or are not) mutually exclusive</p> <p>VAR-4.D calculate conditional probabilities</p> <p>VAR-4.E calculate the probabilities for independent events and for the union of two events</p>	<p>VAR-4.A calculate probabilities for events and their complements</p> <p>VAR-4.C explain why two events are (or are not) mutually exclusive</p> <p>VAR-4.D calculate conditional probabilities</p> <p>VAR-4.E calculate the probabilities for independent events and for the union of two events</p>