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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

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

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

**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)

**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.*

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 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

Although students have worked with fractions (a form of ratios) in previous grades, it is unlikely that they are familiar with ratios. Because of this, students begin the unit by learning what a ratio IS, how to write a ratio, and how to distinguish between part to part and part to whole ratios. Then, students learn to use tape diagrams to find missing parts in ratios, developing their proportional reasoning. Next, they learn to use ratio tables and double number lines, which are alternatives to tape diagrams and also help students find missing quantities. Last, they are introduced to the concept of unit rate and use this understanding to convert between metric and customary units.

By the end of this unit, students should be able to use a variety of strategies to reason proportionally and compare rates. For example, they should be able to scale recipes up or down and identify which “deals” are better than others. This unit sets students up for success in each succeeding unit. They use proportional reasoning in unit 3 to simplify rational numbers; in Unit 5 (Percents), they encounter the concept of percent as “a ratio out of 100.” In Unit 8, they discover that multiplicative relationships have constant ratios, while additive relationships do not.

## Topic A Overview – Ratios

In Topic A, students build an understanding of the concept of “ratio” and write ratios when given various scenarios. They start by writing ratios based on images (like stars or arrows) and then write ratios based on given situations. As they learn about ratios, they learn that ratios have equivalents and can be simplified (for example, the ratio 2:3 is equivalent to the ratio 4:6). After learning how to write part-to-part and part-to-whole ratios, students learn how to find missing parts or wholes when given other information. Mastering Topic A lays the foundation for the rest of the unit, as students need to be able to find missing parts and totals in ratio relationships to be able to further develop their understanding of proportional relationships.

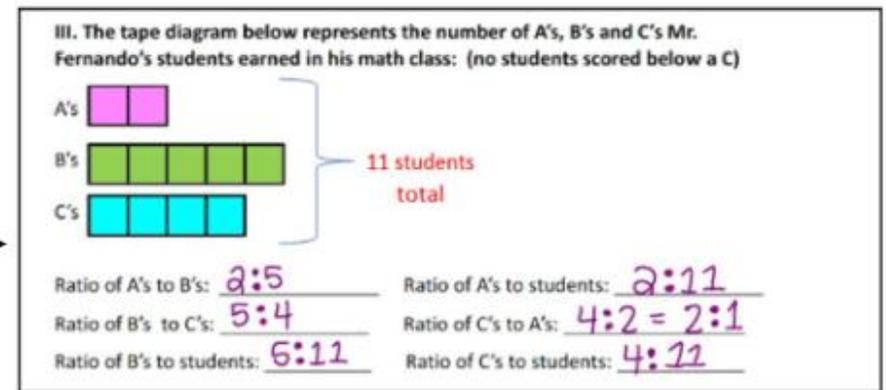


**How does the number of stars compare to the number of triangles?**

There are 8 stars for every 2 triangles *or* 4 stars for every 1 triangle.

The ratio of stars to triangles is 8 : 2, which simplifies to 4 : 1.

The ratio of triangles to stars is 2 : 8, which simplifies to 1 : 4.



## Topic B Overview – Ratio Tables, Double Number Lines, and Unit Rate

In the previous topic, students learn how to use tape diagrams to model ratio relationships. Lessons 6-7 give two other ways to model ratio relationships: 1) ratio tables and 2) double number lines. In Lesson 6, students build ratio tables based on a given ratio relationship. Students develop an understanding that all ratios in a ratio table will simplify to the same amount. In Lesson 7, students explore equivalent ratios using a double number line. By the end of Lesson 7, students should begin to understand that some situations may be easier to explore using a tape diagram, while others may be better explored using a ratio table or a double number line. Further, students should be able to identify both the additive and multiplicative structure of ratio tables and double number lines. In Lesson 8, students begin to build an understanding of unit rate and unit cost. They should understand the importance of finding unit rates in proportional relationships. At certain points in the lesson, students will encounter decimal division, something they learned how to do in 5th grade. In Unit 3, students learned decimal division, this topic offers an opportunity for students to practice this skill.

The ratio of Coke to Sprite is 4:3

Coke:  - 20  
 Sprite: 

If there are 20 Cokes, how many Sprites are there?  
 Each section of the tape diagram is worth 5, so there are 15 Sprites.



The ratio of A to B is 5:2

A:   
 B:  18

If there are 18 more A's than B's  
 How many A's? B's? Total?  
 Each section of the tape diagram is worth 6, so there are 30 A's & 12 B's.



The ratio of A to B is 4:3

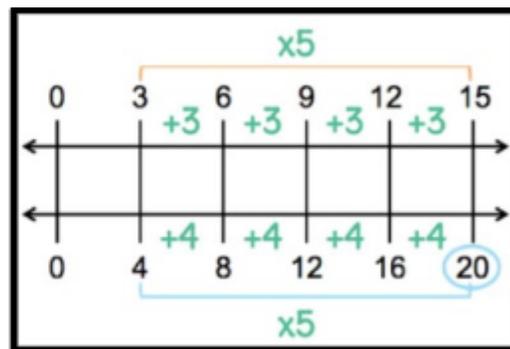
A:   
 B: 

Part-to-Part Comparison:  
 A is  $\frac{4}{3}$  of B & B is  $\frac{3}{4}$  of A  
Part-to-Whole Comparison:  
 A is  $\frac{4}{7}$  of the total  
 B is  $\frac{3}{7}$  of the total



Jars	Cost
1	\$3
2	\$6
5	\$15

$= \frac{\$3}{1}$   
 $= \frac{\$3}{1}$   
 $= \frac{\$3}{1}$



## Topic C Overview – Metric and Customary Conversions

In Lesson 9 and 10, students will use what they learned about unit rate to set up proportions and convert between metric and customary units. First, students make connections to common real-world examples of metric and customary units. They then take these understandings to use the STAAR Reference Chart and convert between units. Most importantly, they learn that it is possible to convert within the metric and customary system using unit rates and proportions.

### Metric Units

Common Metric Units for LENGTH			
kilometer (km)	1 meter (m)	1 centimeter (cm)	1 millimeter (mm)
• a 12 minute walk!	• width of a doorway • the shallow side of a pool (depth)	• width of fingernail • width of a bellybutton • diameter of a dime	• how thick 10 pieces of paper are • thickness of a credit card!

Common Metric Units for VOLUME	
Liter (L)	Milliliters (mL)
• a bottle of soda	• about 20 droplets of water.

④ Julia measured her room and saw that it was 3.5 meters long. How many centimeters long is her room?

$$\frac{3.5 \text{ meters}}{x \text{ cm}} = \frac{1 \text{ meter}}{100 \text{ cm}} \quad \times 100$$

Julia's room is 350 cm long.

### Customary Units

Common Customary Units for WEIGHT or MASS		
ton (T)	pound (lb)	ounces (oz)
• baby whale • Volkswagen beetle	• 1 baseball • 1 pack of spaghetti • 1 shoe	• 1 pencil • 10 pennies • 28 paperclips

Common Customary Units for LENGTH			
mile (mi)	yard (yd)	foot (ft)	inches (in)
• how far you walk in 20 minutes	• the length of a bike • the width of a door	• the length of your foot 😊	• water bottle cap • paperclip

① Parwana bought 1 pint of ice cream. How many cups of ice cream does she have?

$$\frac{1 \text{ pint}}{x \text{ cups}} = \frac{1 \text{ pint}}{2 \text{ cups}} \quad \times 2$$

She has 2 cups.

## CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
<p><b>6.4(B)</b> apply qualitative and quantitative reasoning to solve prediction and comparison of real- world problems involving ratios and rates</p> <p><b>6.4(H)</b> convert units within a measurement system, including the use of proportions and unit rates</p>	<p><b>6.4(C)</b> give examples of ratios as multiplicative comparisons of two quantities describing the same attribute</p> <p><b>6.4(E)</b> represent ratios and percents with concrete models, fractions, and decimals</p> <p><b>6.5(A)</b> represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions</p> <p><b>6.4(D)</b> give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients</p>

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

# ROADMAP

AT A GLANCE: Unit 4 – Introduction to Ratios				
Topic	Day	Date	Lesson	Lesson Title
<b>Topic A</b> Ratios	1		1	Introduction to Ratios
	2		2	Part to Part and Part to Whole Ratios
	3		3	Missing Parts in a Ratio Comparison
	4		4	Sums and Differences with Tape Diagrams
	5		5	Comparing Quantities in a Ratio
<b>Topic B</b> Ratio Tables, Double Number Lines, and Unit Rate	6			Flex Day   <b>Topic 4 Quiz</b>
	7		6	Ratio Tables to Find Missing Quantities
	8		7	Double Number Lines to Find Missing Quantities
	9		8	Introduction to Unit Rate
<b>Topic C</b> Metric and Customary Conversions	10		9	Metric Conversions
	11		10	Customary Conversions
	12			Review Day
	13			Unit Exam

Lesson 1: Introduction to Ratios		Date _____											
Standard(s)	Notes for Intellectual Preparation & Lesson Planning												
<p>◆ <b>6.4E</b> represent ratios and percents with concrete models, fractions, and decimals</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul>												
	<p><b>Lesson Agenda</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%; text-align: center;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>III. Student Practice</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td style="text-align: center;">10 min</td> </tr> </tbody> </table>			Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket
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Important Vocabulary	<p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to identify, simplify, and model ratios. This lesson introduces students to part-to-part ratios which is a new concept.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #6a-d, 7a-c</li> <li>✓ Student Practice #1a-c</li> </ul>												
<ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Tape Diagram</li> <li>▪ Simplify</li> </ul>	<p><b>Other Notes to Inform Your Planning</b> For <b>INM</b>: During the INM, make sure to stamp that <b>order matters</b> in a ratio. Provide a 12x12 multiplication chart. Students who struggle with multiplication facts will struggle during this lesson. It is important to check student work as they are creating tape diagrams. This will ensure that they are learning to model using tape diagrams with ratios accurately.</p>												
<div style="border: 1px solid black; padding: 5px; background-color: #fff9c4; display: inline-block;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #7a-c</b> <b>SP: #1a-c</b></p> </div>													
Lesson Look Fors		Student Know/Do Chart											
<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ask what matters a ratio is (answer: ORDER!)</li> <li><input type="checkbox"/> Stamp that when we simplify, we must divide both parts of the ratio by the same number.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Write a ratio in the proper order.</li> <li><input type="checkbox"/> Divide both parts of a ratio by the same value when simplifying.</li> <li><input type="checkbox"/> Create tape diagrams that represent ratios and have equally sized units</li> </ul>		<p> In a ratio, order matters. The value that is mentioned first should be listed first in the ratio.</p> <p> Ratios should be written in simplest form</p> <p> A ratio can be written as a fraction and/or a phrase.</p> <p> Write a ratio in simplest form based on given situation.</p> <p> Draw a tape diagram to accurately represent a ratio</p>											

Lesson 2: Part to Part and Part to Whole Relationships		Date _____																																				
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors																																				
<p>◆ <b>6.4B</b> represent ratios and percents with concrete models, fractions, and decimals</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>4 pennies</li> <li>3 quarters</li> <li>Document Camera</li> <li>Unit 4 Student Book</li> <li>Projector</li> <li>Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1"> <thead> <tr> <th></th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td>25 min</td> </tr> <tr> <td>III. Student Practice</td> <td>15 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td>10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to write and model part-to-part ratios and part-to-whole ratios. Tape diagrams are used to help students conceptualize the comparison of the two quantities.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #3a-b to #5a-b</li> <li>✓ Student Practice: #3, #6</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For <b>Do Now</b>: The Do Now offers a great opportunity to quickly catch and address misconceptions from Lesson 1.1. For <b>INM</b>: Students who struggle with multiplication facts and division will struggle in this lesson. To support them, provide them with graph paper for division to help with organizing numbers and a multiplication chart. To support student understanding with order you may allow them to use color pencils or highlighters to distinguish which parts correspond to each other.</p> <div style="border: 1px solid black; background-color: #fff9c4; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>Do Now: a-b</b> <b>SP: #1-3</b></p> </div> <p>① The team won 2 games and lost 4 games.</p> <table border="1"> <thead> <tr> <th colspan="2">Tape Diagram:</th> <th colspan="2">Can these numbers be simplified? To what?</th> </tr> </thead> <tbody> <tr> <td>won</td> <td><table border="1"><tr><td> </td><td> </td></tr></table></td> <td>12:4 → 3:1</td> <td></td> </tr> <tr> <td>lost</td> <td><table border="1"><tr><td> </td><td> </td></tr></table></td> <td>Ratio of games won to lost: 3:1</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Ratio of games won to played: 3:4</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Ratio of games lost to played: 1:4</td> <td></td> </tr> </tbody> </table>		Time	I. Do Now	5 min	II. INM/Concept Development	25 min	III. Student Practice	15 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min	Tape Diagram:		Can these numbers be simplified? To what?		won	<table border="1"><tr><td> </td><td> </td></tr></table>			12:4 → 3:1		lost	<table border="1"><tr><td> </td><td> </td></tr></table>			Ratio of games won to lost: 3:1				Ratio of games won to played: 3:4				Ratio of games lost to played: 1:4		<p><b>Lesson Look Fors</b></p> <p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ask: "Is this a part-to-part or part-to-whole ratio?"</li> <li><input type="checkbox"/> Ask: "How can you find the missing part/total?"</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Write the requested ratio in the proper order.</li> <li><input type="checkbox"/> Create tape diagrams that have equally sized units that model the parts and totals.</li> </ul> <p><b>Student Know/Do Chart</b></p> <p><b>Knew</b> The order of the pair of numbers in a ratio matters. The description of the ratio relationship determines the order.</p> <p><b>Knew</b> Ratios compare two measures of the same type and can compare part to a whole or part to a part</p> <p><b>Do</b> Create a tape diagram to illustrate a ratio's parts and total.</p> <p><b>Do</b> Use a tape diagram to find the total when given a part or find a missing part if given a whole/total</p>
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Important Vocabulary	<ul style="list-style-type: none"> <li>Ratio</li> <li>Tape Diagram</li> <li>Simplify</li> <li>Part-to-Part Comparison</li> <li>Part-to-Whole Comparison</li> </ul>																																					

Lesson 3: Missing Parts in a Ratio Comparison		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning													
<p>◆ <b>6.4B</b> represent ratios and percents with concrete models, fractions, and decimals</p> <p>◆ <b>6.4C</b> give examples of ratios as multiplicative comparisons of two quantities describing the same attribute</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Book</li> <li>▪ Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%; text-align: center;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>III. Student Practice</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td style="text-align: center;">10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is to use a tape diagram to find a missing value in a ratio comparison. In this lesson, students will use models to explore possible quantities of each part when given a part-to-part ratio. Students will then use models to solve problems when the part-to-part ratio is given and the value of one of the quantities is given.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #4-6</li> <li>✓ Student Practice: #1b, #2</li> </ul>			Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min
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<ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Tape Diagram</li> <li>▪ Simplify</li> </ul>	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Deliver a clear think-aloud for INM question #1</li> <li><input type="checkbox"/> Gradually release responsibility throughout the INM based on frequent CFU's to gauge students' acquisition of the material</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clearly label the parts of the tape diagram</li> <li><input type="checkbox"/> Find the value of each unit/box</li> </ul>													
	Other Notes to Inform Your Planning	Student Know/Do Chart												
<p>For <b>INM/Student Practice</b>: Students create tape diagrams to find missing parts when given a ratio. They are NOT yet given a total to start with, nor do they have to find sums and differences of ratios which is the next lesson. Encourage students to build their fluency with the tape diagram, but if students bring their own methods that arrive at the correct solution, this is great! Don't discourage them.</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; background-color: #fff9c4;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #1-3</b> <b>SP: #2</b></p> </div> <ul style="list-style-type: none"> <li> Ratios are multiplicative relationships</li> <li> A missing part of a ratio can be found by setting up a tape diagram</li> <li> Accurately create a tape diagram to illustrate a ratio's parts and total.</li> <li> Divide to determine the value of one unit using a tape diagram then determine the missing value</li> </ul>													

Lesson 4: Sums and Difference in Parts of Ratios		Date _____												
<p><b>Standard(s)</b></p> <p>◆ <b>6.4B</b> apply qualitative and quantitative reasoning to solve prediction and comparison of real- world problems involving ratios and rates</p> <p>◆ <b>6.4E</b> represent ratios and percents with concrete models, fractions, and decimals</p>	<p><b>Notes for Intellectual Preparation &amp; Lesson Planning</b></p> <p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 80%;">Lesson Agenda</th> <th style="width: 20%;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td>20 min</td> </tr> <tr> <td>III. Student Practice</td> <td>20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td>10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to find the sums and differences of parts given a ratio or find the part and/or total given a sum or difference. In this lesson students are given ratio and either the total of the two parts or the difference between the two parts.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #2a-d, #3a-d, #6a-b</li> <li>✓ Student Practice: #1, 5, 6</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For INM/Student Practice: Order matters in a ratio, as does properly identifying each part, the total, and the difference in parts. Students may find that they struggle with the word problems that leave out the total. Prepare to address misconceptions around situations that leave out the total such as (i.e., For every 5 apples in a fruit basket there are 2 oranges. There are <b>15 more</b> apples than oranges in the basket.) <b>Ensure that students are setting up and labeling the tape diagram correctly.</b> Consider creating an anchor chart that models' problem situations similar to these.</p>	Lesson Agenda	Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min	<p><b>Lesson Look Fors</b></p> <p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use guided questioning with students in Question #1a-d.</li> <li><input type="checkbox"/> Gradually release responsibility throughout the INM based on frequent CFU's to gauge students' acquisition of the material.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clearly label the parts of the tape diagram</li> <li><input type="checkbox"/> Identify whether a total or a difference is given and model that information correctly on the tape diagram</li> <li><input type="checkbox"/> Find the value of each unit/box</li> </ul>
Lesson Agenda	Time													
I. Do Now	5 min													
II. INM/Concept Development	20 min													
III. Student Practice	20 min													
IV. Student Debrief	5 min													
V. Exit Ticket	10 min													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Tape Diagram</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #1,2</b> <b>SP: #2, 4</b></p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Understand whether a ratio situation is giving a total of parts or a difference in parts</li> <li> Accurately create a tape diagram to illustrate a ratio's parts and total</li> <li> Divide to determine the value of one unit in a tape diagram then determine the missing value</li> </ul>												

Lesson 5: Missing Parts in a Ratio Comparison		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors												
<p>◆ <b>6.4C</b> give examples of ratios as multiplicative comparisons of two quantities describing the same attribute</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1"> <thead> <tr> <th></th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td>20 min</td> </tr> <tr> <td>III. Student Practice</td> <td>20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td>10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to compare quantities in a ratio then describe the part-to-part comparisons and part-to-whole comparisons.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #2, 3, 5</li> <li>✓ Student Practice: #2, 3</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For <b>INM/Student Practice</b>: Stamp for students that just as order matters in a ratio, so does the “order” of the numerator and denominator used in the multiplicative comparison. Consider creating an anchor chart that models multiplicative comparison statements similar to the word problem situations in the INM/Student Practice to support student understanding of this concept.</p> <p>For <b>Student Exit Ticket</b>: Student answers may vary slightly, but you should count them correctly as long as they are true. For example, for 1b students might write, “There are <math>\frac{3}{8}</math> as many dogs as animals,” which is correct.</p>		Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Continuously remind students that order matters in a ratio.</li> <li><input type="checkbox"/> Gradually release responsibility throughout the INM based on frequent CFUs to gauge students’ acquisition of the material.</li> <li><input type="checkbox"/> Explain that a ratio comparison can become a multiplicative comparison when the ratio is written in fraction form.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Correctly “translate” the given ratio to the requested fraction.</li> <li><input type="checkbox"/> Correctly use the parts given to find the total, or the part and total given to find the missing part.</li> <li><input type="checkbox"/> Find the value of each unit/box</li> </ul>
		Time												
I. Do Now	5 min													
II. INM/Concept Development	20 min													
III. Student Practice	20 min													
IV. Student Debrief	5 min													
V. Exit Ticket	10 min													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Tape Diagram</li> <li>▪ Part-to-Part Comparison</li> <li>▪ Part-to-Whole Comparison</li> <li>▪ Multiplicative Comparison</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #1-3</b> <b>SP: #3</b></p> </div>	<p><b>Student Know/Do Chart</b></p> <ul style="list-style-type: none"> <li> Write a multiplicative comparison statement based on a given ratio</li> <li> Find the total if given parts or find a missing part if given a total and a part.</li> </ul>												

Lesson 6: Ratio Tables to Find Missing Quantities		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning													
<p>◆ <b>6.5A</b> represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%; text-align: center;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>III. Student Practice</td> <td style="text-align: center;">20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td style="text-align: center;">5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td style="text-align: center;">10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to create and use a ratio table to display a set of equivalent ratios and use ratio tables to find missing quantities. In this lesson, students explore creating a ratio table to represent a real-life situation involving ratios.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #1b, e-g, #2 (c-f)</li> <li>✓ Student Practice: #1b, d-e</li> </ul>			Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min
		Time												
I. Do Now	5 min													
II. INM/Concept Development	20 min													
III. Student Practice	20 min													
IV. Student Debrief	5 min													
V. Exit Ticket	10 min													
Lesson Look Fors	<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clarify that there is a multiplicative relationship between the first two columns in the ratio tables, but that you add the first two columns to get the third.</li> <li><input type="checkbox"/> Model INM 1(e) so that students know the expectation for 1(f), 2(e), 2(f), and similar types of questions.</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> generate ratio tables correctly</li> <li><input type="checkbox"/> accurately compare two different scenarios based on the information given in the ratio tables</li> </ul>													
Important Vocabulary	Student Know/Do Chart													
<ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Ratio Table</li> </ul>	<p><b>Other Notes to Inform Your Planning</b> For <b>INM/Student Practice</b>: It is important that students are setting up tape diagrams accurately and labeling them; this will really help with student practice #1d-e. Students who struggle with multiplication facts will struggle in this lesson. Provide them with a 12x12 multiplication chart. For students that struggle with writing multiplicative comparison statements, support them with the use of sentence starters. For example: "There are _____ times as many _____ as _____."</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>INM: #1d-e, #2b SP: #1</p> </div>													
	<p><b>Know</b> All ratios in a ratio table are equivalent and simplify to the same rate.</p> <p><b>Know</b> Ratios display multiplicative relationships. This changes if a column for "total" is added beside the columns for the parts</p> <p><b>Do</b> Create a ratio table when given a ratio and use the ratio table to find equivalent ratios</p> <p><b>Do</b> Write multiplicative comparison statements based on a given ratio table</p>													

Lesson 7: Double Number Lines to Find Missing Quantities		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors												
<p>◆ <b>6.4B</b> represent ratios and percents with concrete models, fractions, and decimals</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul> <p><b>Lesson Agenda</b></p> <table border="1"> <thead> <tr> <th></th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5 min</td> </tr> <tr> <td>II. INM/Concept Development</td> <td>20 min</td> </tr> <tr> <td>III. Student Practice</td> <td>20 min</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5 min</td> </tr> <tr> <td>V. Exit Ticket</td> <td>10 min</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> The primary goal of this lesson is for students to use a double number line diagram to solve real-world ratio problems. In this lesson, students explore equivalent ratios using a double number line.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #2a-c, #4b</li> <li>✓ Student Practice: #1a-c, #2b, #4a-c</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For <b>INM/Student Practice</b>: Ensure that students are making sense of ratio situations and <b>drawing/labeling</b> the number line correctly as this could cause them to continue to arrive at an incorrect answer and become frustrated. It may be a good idea to have them label then highlight in two different colors so that they will pay close attention to the labeling when determining their answers. If students struggle with multiplication facts, they will struggle with this lesson. Provide them with a 12x12 Multiplication Chart.</p>		Time	I. Do Now	5 min	II. INM/Concept Development	20 min	III. Student Practice	20 min	IV. Student Debrief	5 min	V. Exit Ticket	10 min	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Deliver a clear think-aloud for INM question #1, PUNCHING that the double number line is labeled “girls” and “boys.”</li> <li><input type="checkbox"/> Ask students what is happening as the number lines travel left to right (we are skip counting by a different number on top than we are on bottom) and up to down (we are keeping the same ratio with each vertical pair of numbers)</li> </ul> <p>Look for students to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Correctly label both number lines</li> <li><input type="checkbox"/> Skip count correctly “left to right” as they generate double number line</li> <li><input type="checkbox"/> Be able to “jump” across the ratio table, skipping ratios in between, by the end of the lesson.</li> </ul>
		Time												
I. Do Now	5 min													
II. INM/Concept Development	20 min													
III. Student Practice	20 min													
IV. Student Debrief	5 min													
V. Exit Ticket	10 min													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ Ratio</li> <li>▪ Double Number Line</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #4</b> <b>SP: #3, 4</b></p> </div>	<p><b>Student Know/Do Chart</b></p> <p> A double number line can be used to find missing parts and totals.</p> <p> The double number line is another strategy that can be used like ratio tables and tape diagrams to find the missing quantity.</p> <p> Create a <b>labeled</b> double number line when give a ratio</p> <p> Use a double number line to find a missing value and/or a simplified ratio</p>												

Lesson 8: Introduction to Unit Rate		Date _____											
Standard(s)	Notes for Intellectual Preparation & Lesson Planning												
<p>◆ <b>6.4D</b> Give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul>												
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I. Do Now	5 min												
II. INM/Concept Development	24 min												
III. Student Practice	16 min												
IV. Student Debrief	5 min												
V. Exit Ticket	10 min												
Important Vocabulary	<p><b>Mathematical Goal of this Lesson</b> The primary goal of the lesson is for students to identify a rate or unit rate from a given ratio and find ratios associated with a given rate. In this lesson, students begin to build an understanding of unit rate and unit cost.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #5, 6a, #7b-c, #8b</li> <li>✓ Student Practice: #2, #4a-b</li> </ul> <p><b>Other Notes to Inform Your Planning</b> For <b>INM/Student Practice</b>: This lesson requires students to do a lot of division. If students struggle with division, support them with the use of graph paper. If students struggle with multiplication facts; allow them to use a 12x12 Multiplication Chart so that they can access the lesson. You may even decide to provide students with calculators to check their answers when dividing. Although most students will not be able to use a calculator on STAAR, their will be more opportunities for them to practice between this lesson and STAAR. It's most important that students are able to access the lesson.</p>												
<ul style="list-style-type: none"> <li>▪ Unit Rate</li> <li>▪ Unit Cost</li> </ul>	<div style="background-color: #fff9c4; padding: 5px; border: 1px solid black; margin-bottom: 5px;"> <p><b>Focus on Disciplinary Literacy</b></p> </div> <div style="display: flex; align-items: center; justify-content: center;">  <p>INM: #2, 3 SP: #3, 4c</p> </div>												
		Lesson Look Fors											
		<p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Give students the opportunity to explain INM #s 2 and 3</li> <li><input type="checkbox"/> Connect the word UNIT with the Spanish word uno to stamp that a unit rate always has a denominator of 1.</li> <li><input type="checkbox"/> Stamp placement of numbers when dividing.</li> </ul> <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Accurately place values when dividing</li> <li><input type="checkbox"/> Correctly select the optimal unit rate when asked</li> </ul>											
		Student Know/Do Chart											
		<p> A unit rate is a rate with a denominator of one</p> <p> Identify which part of the ratio should be the dividend and which should be the divisor.</p> <p> Divide to find the unit rate</p> <p> Compare unit rates to find the optimal rate.</p>											

Lesson 9: Metric Conversions		Date _____											
Standard(s)	Notes for Intellectual Preparation & Lesson Planning												
<p>◆ <b>6.4H</b> Convert units within a measurement system, including the use of proportions and unit rates</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ 6<sup>th</sup> Grade STAAR Reference Chart</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul>												
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II. INM/Concept Development	25 min												
III. Student Practice	15 min												
IV. Student Debrief	5 min												
V. Exit Ticket	10 min												
Important Vocabulary	<p><b>Mathematical Goal of this Lesson</b></p> <p>The primary goal of this lesson is for students to use unit rates to solve real world problems involving metric unit conversions. During the INM, students brainstorm common examples of metric units for length, volume, and mass. Then they get multiple at bats converting within the metric system.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #2, #4, #7</li> <li>✓ Student Practice: #2, 5, 6, 7</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>INM</b>: For Part II #2 the decimal may confuse students that are not comfortable with working with decimals. This can be modeled using an array model to multiply the whole thing out or you may decide to use Powers of 10 to multiply it out. On #6 – Students who understand Powers of 10 will grasp this concept but students who are not comfortable with Powers of 10 will struggle. Print out the student reference chart (class set), this will help students in becoming familiar with how/when it should be used, preparing them for STAAR.</p>												
<ul style="list-style-type: none"> <li>▪ Metric System</li> <li>▪ Customary System</li> <li>▪ Length</li> <li>▪ Volume</li> <li>▪ Weight/Mass</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center; background-color: #fff9c4;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #3, 7</b> <b>SP: #1-3</b></p> </div>												
		Lesson Look Fors											
		<p><b>Look for teachers to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure that each student has STAAR Reference Material</li> <li><input type="checkbox"/> Guide scholars to see the reference chart conversions as unit rates</li> <li><input type="checkbox"/> Review common examples of kilometer, meter, centimeter, and millimeter</li> </ul> <p><b>Look for students to...</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know the difference between the metric units</li> <li><input type="checkbox"/> Use the reference chart to set up proportions to convert between metric units, given a problem situation</li> </ul>											
		Student Know/Do Chart											
		<p> Have a general idea of the difference between metric units.</p> <p> Convert within the metric system by using unit rates, given a scenario</p>											

Lesson 10: Customary Conversions		Date _____											
Standard(s)	Notes for Intellectual Preparation & Lesson Planning												
<p>◆ <b>6.4H</b> Convert units within a measurement system, including the use of proportions and unit rates</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ Document Camera</li> <li>▪ Projector</li> <li>▪ 6<sup>th</sup> Grade STAAR Reference Chart</li> <li>▪ Unit 4 Student Workbook</li> <li>▪ Debrief Slide</li> </ul>												
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IV. Student Debrief	5 min												
V. Exit Ticket	10 min												
Important Vocabulary	<p><b>Mathematical Goal of this Lesson</b></p> <p>The primary goal of this lesson is for students to use unit rates to solve real-world problems involving customary unit conversions. This lesson is a continuation of the previous one. Students use the unit rates given in the STAAR reference chart to solve customary conversion problems.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: #4, 5, 7</li> <li>✓ Student Practice: #3, 4, 5, 8, 9</li> </ul>												
<ul style="list-style-type: none"> <li>▪ Metric System</li> <li>▪ Customary System</li> <li>▪ Length</li> <li>▪ Volume</li> <li>▪ Weight/Mass</li> </ul>	<p><b>Other Notes to Inform Your Planning</b></p> <p>For <b>INM</b>: If you are able to have actual containers like a gallon jug and a quart and can show that it is possible to pour four quarts of water into a gallon that would assist students in understanding this material conceptually. Gallon man is also a great way to reinforce understanding of this concept. Encourage students to draw out “Gallon Man” as they are solving problems with volume and capacity. Consider creating an anchor chart with “Gallon Man” for them to reference as they work independently. Print out the student reference chart (class set) this will help students to become familiar with how/when it should be used, preparing them for STAAR.</p>												
	<p><b>Focus on Disciplinary Literacy</b></p> <div style="display: flex; align-items: center; justify-content: center;">  <div> <p><b>INM: Part I:</b> What is the customary system? <b>SP: #1, 4</b></p> </div> </div>												
Lesson Look Fors		<p>Look for teachers to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Review common real-world examples of customary units.</li> <li><input type="checkbox"/> Create an anchor chart of “Gallon Man” for students to reference</li> <li><input type="checkbox"/> Ensure that students have a STAAR Reference Chart</li> </ul> <p>Look for students to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Know the difference between customary units</li> <li><input type="checkbox"/> Use the reference chart to set up proportions to convert between customary units</li> </ul>											
Student Know/Do Chart		<p> It is possible to convert within the customary system by using unit rates.</p> <p> Convert within the customary system by using unit rates, given a situation</p>											

## Recommended Success Day Materials and Resources

### 6.4B, 6.4H, 6.4E, 6.5A, 6.4D, 6.5A Ratios and Metric/Customary Conversions

- Metric and Customary Conversions Practice  
Representing Ratios  
Extra Practice SE  
Extra Practice TE

#### Notes to Inform Your Planning

These resources can be used for either small-group or whole-group reteach.

*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.*

Using exit ticket data can help you prioritize what to review. For example, if you remember that students did poorly on Lesson 5, pull problems from lesson 6, especially if they are problems students did not do before (for example, SP or INM problems you skipped during class). You can also take questions from the resources linked above.

All unit exams should be given online to prepare students for STAAR online.

# UNPACKED STANDARDS

Focus standards for this unit.

Standards	Specificity	Notes/Explanations/Examples
<p>6.4(B) <b>apply</b> qualitative and quantitative reasoning to <b>solve</b> prediction and comparison of real-world problems involving ratios and rates</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>•Writing part-to-part and part-to-whole ratios.</li> <li>•Finding missing parts in ratios</li> <li>•Modeling and comparing ratio relationships</li> <li>•Finding and comparing unit rates</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>• Apply</li> <li>• Solve</li> </ul> <p><b>Clarifications including but not limited to:</b></p> <ul style="list-style-type: none"> <li>•Simplifying ratios.</li> <li>•Distinguishing between part-to-part and part-to-total ratios.</li> <li>•Finding a missing part or total in a ratio relationship when given one part, a difference a parts, or a total.</li> <li>•Creating a tape diagram, double number line, or ratio table to find a missing value.</li> <li>•Finding a missing value when given a tape diagram, double number line, ratio table, or word problem.</li> <li>•Comparing rates to decide which is more optimal for a given situation</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>• Models are limited to whole numbers</li> <li>• Division includes only whole number divisors, but dividends may contain decimals</li> </ul> <p><b>Vertical Alignment:</b></p>	<p>2025 – Q6</p> <p>A floor is made of green tiles and blue tiles. The ratio of green tiles to blue tiles is 7:13. The floor has a total of 3,000 tiles.</p> <p>How many of the floor tiles are blue?</p> <p><input type="radio"/> Ⓐ 1,950</p> <p><input type="radio"/> Ⓑ 150</p> <p><input type="radio"/> Ⓒ 429</p> <p><input type="radio"/> Ⓓ 1,615</p> <hr/> <p>2025 – Q3</p> <p>A school counselor sorts 875 students into 35 classrooms with the same number of students in each classroom. Which rate best represents the relationship between the number of students and the number of classrooms?</p> <p><input type="radio"/> Ⓐ 25 classrooms per student</p> <p><input type="radio"/> Ⓑ 35 classrooms per student</p> <p><input type="radio"/> Ⓒ 25 students per classroom</p> <p><input type="radio"/> Ⓓ 35 students per classroom</p> <p>* <b>Correct Answer (C)</b></p>

Standards	Specificity	Notes/Explanations/Examples
	<p>In 5th grade students learned how to generate a pattern when given a rule and to identify the difference between additive and multiplicative patterns, but they did not encounter the concept of “ratio.”</p> <p>In 7th grade students use proportional reasoning to build their understanding of the constant of proportionality <math>k</math>.</p>	
<p><b>6.4(H)</b> convert units within a measurement system, including the use of proportions and unit rates</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>• Converting between customary units of length (yards, feet, inches)</li> <li>• Understanding equivalence between units through multiplication or division</li> <li>• Recognizing multiple representations of the same measurement</li> </ul> <p><b>Skill:</b></p> <ul style="list-style-type: none"> <li>• Identify equivalent measurements through unit conversion</li> </ul> <p><b>Clarifications including but not limited to:</b></p> <ul style="list-style-type: none"> <li>• Using conversion facts (1 yard = 3 feet, 1 foot = 12 inches) to solve problems</li> <li>• Multiplying to scale a measurement into different units (e.g., 6 yards → 18 feet; 18 feet → 216 inches)</li> <li>• Distinguishing between correct and incorrect conversions when presented with multiple choices</li> <li>• Applying logical checks (e.g., “6 yards should be longer than 72 inches”) to avoid errors</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>• Conversions limited to linear measurements (no area or volume)</li> </ul>	<p>2025 – Q23</p> <p>The length of a wall is 6 yards. Which measurements are equivalent to 6 yards? Select <b>TWO</b> correct answers.</p> <p><input type="checkbox"/> 2 feet</p> <p><input type="checkbox"/> 18 feet</p> <p><input type="checkbox"/> 9 feet</p> <p><input type="checkbox"/> 108 inches</p> <p><input type="checkbox"/> 216 inches</p> <p><input type="checkbox"/> 72 inches</p> <p>* Correct Answer (2nd option; 5th option)</p>

Standards	Specificity	Notes/Explanations/Examples
	<ul style="list-style-type: none"> <li>• No mixed numbers or fractional yards/feet presented in this item</li> <li>• Problem requires whole number conversions only</li> </ul> <p><b>Vertical Alignment:</b>  <b>Grade 5:</b> Students learned how to convert units within a measurement system, typically using multiplication and division (e.g., feet ↔ inches).  <b>Grade 6:</b> Students deepen this work by handling larger numbers, multiple equivalent representations, and multi-select tasks requiring precision.  <b>Grade 7:</b> Students extend to proportional reasoning in scale drawings, constant of proportionality, and unit conversions within proportional contexts (tables, graphs, equations).</p>	

## VERTICAL STANDARDS

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

5 <sup>th</sup> Grade	6 <sup>th</sup> Grade	7 <sup>th</sup> grade Pre-Algebra
<p>5.3(C) Solve with proficiency for quotients of up to a four-digit dividend by a two-digit divisor using strategies and the standard algorithm</p> <p>5.3(G) solve for quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using strategies and algorithms, including the standard algorithm</p> <p>5.4(C) generate a numerical pattern when given a rule in the form <math>y = ax</math> or <math>y = x+a</math> and graph</p> <p>5.4(D) recognize the difference between additive and multiplicative numerical patterns given in a table or graph.</p>	<p>6.4(B) apply qualitative and quantitative reasoning to solve prediction and comparison of real- world problems involving ratios and rates</p> <p>6.4(C) give examples of ratios as multiplicative comparisons of two quantities describing the same attribute</p> <p>6.4(D) give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients</p> <p>6.4(E) represent ratios and percents with concrete models, fractions, and decimals</p>	<p>7.4(A) represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including <math>d = rt</math>.</p> <p>7.4(B) calculate unit rates from rates in mathematical and real-world problems</p> <p>7.4(D) solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems.</p>
8 <sup>th</sup> Grade Algebra I	<p>6.5(A) represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions</p> <p>6.4H Convert units within a measurement system, including the use of proportions and unit rates</p>	
<p>8.4(A) use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems</p> <p>A.2(B) write linear equations in two variables in various forms given one point and the slope and given two points.</p>		