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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

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

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

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**

Date: \_\_\_\_\_

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

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	
<b>3.4K</b> solve one-step and two-step problems involving multiplication and division within 100 using strategies based on objects; pictorial models, including arrays, area models, and equal groups; properties of operations; or recall of facts	<b>Necessary Materials and Pre-Lesson Prep</b> <ul style="list-style-type: none"> <li>▪ (S) Multiply by 2 (1–5) Pattern Sheet</li> <li>▪ (S) Personal white board</li> <li>▪ (S) Three's array no fill template</li> <li>▪ (S) Blank paper</li> </ul>	
	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)

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

Using what students already know about positive and negative whole numbers and multiplication with its relationship to division, students should generalize rules for multiplying and dividing rational numbers. They will then learn that multiplying or dividing integers is the same as for positive numbers, the only difference is that they will need to designate the sign when there are two positive integers or a positive and negative integer. Students will build an understanding of the process of multiplying and dividing integers with the comparison to repeated addition, number line or integer chips. Students will also explore and formalize rules for operations with fractional rational numbers. They will apply the rules they discovered with multiplying and dividing integers to operate with rational numbers. Students will use concrete models and their prior knowledge of operating with integers to derive algorithms for operating with rational numbers. Students will connect models to the algorithm of each operation. This will be a new concept for students, as they only worked with integers and positive rational numbers in 6<sup>th</sup> grade. Students should analyze and solve these problems leading to the generalization of the rules for operations with integers. Students will need these skills for solving two-variable systems of equations and inequalities and multiplying polynomials in future courses.

## Topic A Overview – Multiplying and Dividing Integers

In Topic A, students build an understanding of the process of multiplying and dividing integers by connecting to prior knowledge, exploring the conceptual meaning of multiplication, and recognizing patterns and generalizing. Students will derive the rules for multiplying and dividing with signed numbers using their discoveries.

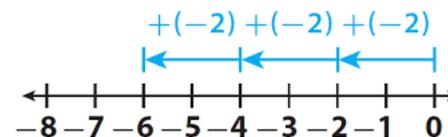
### Multiplication is repeated addition:

“I know”:  $4 \times 3 = 4 + 4 + 4$

“so then”:  $-4 \times 3 = -4 + -4 + -4$

### Multiplication as repeated addition on a number line:

$$-2 \times 3$$



Multiplication is taking a certain number of groups of a quantity. Multiplication as “x” groups of “y”

“I know”  $4 \times 6$  means four groups of six.

“so then”  $4 \times -6$  means four groups of negative six.

$$4 \times -6$$



4 groups of -6

### Patterns in Multiplication

$5 \times 4$	$5 \times 3$	$5 \times 2$	$5 \times 1$	$5 \times 0$	$5 \times -1$	$5 \times -2$	$5 \times -3$
20	15	10	5	0	-5	-10	-15

$-3 \times 4$	$-3 \times 3$	$-3 \times 2$	$-3 \times 1$	$-3 \times 0$	$-3 \times -1$	$-3 \times -2$	$-3 \times -3$
-12	-9	-6	-3	0	3	6	9

**Pattern:** Each time the multiplier decreases by one, the product decreases by 5. Thus, I can discover that a positive multiplied by a negative must be a negative number.

**Pattern:** Each time the multiplier decreases by one, the product increases by 3. Thus, I can discover that a negative multiplied by a negative must be a positive number.

### Division is the Inverse of Multiplication:

$18 \div 6$  is asking you what number multiplied by 6 will give you 18.

$-18 \div 6$  is asking what number multiplied by 6 will give you -18.

$-18 \div -6$  is asking what number multiplied by -6 will give you -18.

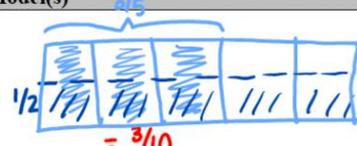
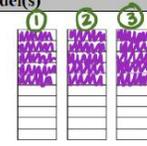
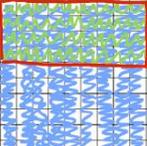
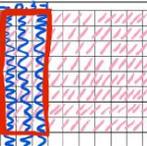
### How many groups of x go into y?

$-8 \div -2$  or  $\frac{-8}{-2}$  is asking how many groups of -2 go into -8.



## Topic B Overview – Order of Operations and Multiplying and Dividing Rational Numbers

In Topic B, students explore and formalize rules for operations with fractional rational numbers. They apply the rules they discovered earlier in the unit about operating with integers to operate with rational numbers. Students will use concrete models and their prior knowledge of operating with integers to derive algorithms for operating with rational numbers. Students will connect models to the algorithm of each operation. These will be new concepts for students, as they only worked with integers and positive rational numbers in 6<sup>th</sup> grade. While only 6 lessons are devoted to topic D in this unit, students will continue to operate with rational numbers throughout the school year. Topic D brings everything students learned in topics A-C together and helps solidify students understanding of operating with negative numbers. Students will use models, area models, t-charts, number-lines and standard algorithms to operate with fraction and decimal values.

Model(s)	Algorithm	Model(s)	Algorithm
④ $\frac{1}{2} \times \frac{3}{5} =$ 	$\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$	⑦ $0.5 \times 3 =$ 5 tenths 	$\begin{array}{r} 0.5 \\ \times 3 \\ \hline 1.5 \end{array}$
⑤ $-\frac{7}{10} \times \frac{1}{5} =$ 	$-\frac{7}{10} \times \frac{1}{5} = -\frac{7}{50}$	⑧ $-0.9 \times 0.4 =$ neg x pos = neg 	$\begin{array}{r} -0.9 \\ \times 0.4 \\ \hline 0.36 \\ -0.36 \end{array}$
⑥ $-\frac{3}{4} \cdot -\frac{2}{3} =$ 	$-\frac{3}{4} \times -\frac{2}{3} = \frac{6}{12} = \frac{1}{2}$	⑨ $-0.8 \cdot -0.3 =$ neg-neg=pos 	$\begin{array}{r} -0.8 \\ \times -0.3 \\ \hline 0.24 \end{array}$

C.)

$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$	➔	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$	$\frac{10}{10}$	$\frac{4}{5} = \frac{8}{10}$
$\frac{1}{2}$					➔	$\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{4}{10}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{7}{10}$ $\frac{8}{10}$ $\frac{9}{10}$ $\frac{10}{10}$										$\frac{1}{2} = \frac{5}{10}$

$\frac{4}{5} \div \frac{1}{2}$  is asking how many groups of  $\frac{1}{2}$  can go into  $\frac{4}{5}$ .  $\frac{4}{5} \div \frac{1}{2} = \frac{8}{5}$

Would our rule work for this division problem?  $\frac{4}{5} \div \frac{1}{2} = \frac{4}{5} \times \frac{2}{1} = \frac{8}{5} = \frac{1\frac{3}{5}}$  yes!

## CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
<b>7.3(B)</b> apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers	<b>7.3(A)</b> add, subtract, multiply, and divide rational numbers fluently

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

# ROADMAP

AT A GLANCE: Unit 2 – Products and Quotients of Rational Numbers				
Topic	Day	Date	Lesson	Lesson Title
Topic A: Multiplying and Dividing Integers	1		1	Multiplying Integers – Day 1
	2		2	Multiplying Integers – Day 2
	3		3	Dividing Integers
Topic B: Order of Operations and Multiplying and Dividing Rational Numbers	4		4	Order of Operations
	5		5	Multiplying Rational Numbers
	6		6	Dividing Rational Numbers
	7			Cumulative Review
	8			<b>End of Unit 1 Assessment</b>

Lesson 1: Multiplying Integers Day 1		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors												
<p>◆ <b>7.3(A)</b> add, subtract, multiply, and divide rational numbers fluently</p> <p>◆ <b>7.3(B)</b> apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ MCR SE and TE</li> <li>▪ Create Exemplar SE</li> <li>▪ Rehearse INM</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Lesson Agenda</th> <th style="text-align: left;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5</td> </tr> <tr> <td>II. INM</td> <td>45</td> </tr> <tr> <td>III. Student Practice</td> <td>15</td> </tr> <tr> <td>IV. Student Debrief</td> <td>0</td> </tr> <tr> <td>V. Exit Ticket</td> <td>5</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> This lesson will build students' conceptual understanding of multiplying with integers in several ways: Multiplication as repeated addition, models of multiplication as <math>x</math> groups of <math>y</math>, using patterns to draw conclusions.</p> <p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: Conjectures</li> <li>✓ INM: #4 Prove it Questions</li> <li>✓ Student Practice: Q1, Q3</li> </ul> <p><b>Other Notes to Inform Your Planning</b> Multiplication can be written in the form of <math>a(b)</math>, <math>a \times b</math>, <math>ab</math>, or <math>a \cdot b</math>. Rules for multiplying integers are developed using patterns, models (integer chips or number-lines) and prior knowledge (repeated addition). It is important that students have a deep understanding of why a positive multiplied by a negative will lead to a negative product and a negative multiplied by a negative will lead to a positive product. This lesson will reinforce an understanding that adding more negatives makes you smaller but taking away negatives makes you bigger.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM:</b> #3a-d, #4 <b>SP:</b> #1,2</p> </div>	Lesson Agenda	Time	I. Do Now	5	II. INM	45	III. Student Practice	15	IV. Student Debrief	0	V. Exit Ticket	5	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Guide students to discover the rules for multiplying with signed numbers using patterns, models and prior knowledge.</li> </ul> <p>Look for students to...</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Observe patterns and make conjectures about multiplying integers.</li> <li><input type="checkbox"/> Do the heavy cognitive lifting in the inquiry portion of this lesson.</li> </ul> <p><b>Student Know/Do Chart</b></p> <p><b>Know</b> Multiplication can be represented as repeated addition and will thus show us why the product of a negative and a positive is always negative.</p> <p><b>Know</b> Multiplication represents taking a certain number of groups of an item or can also represent taking away a certain number of groups of an item.</p> <p><b>Know</b> Taking groups of a negative quantity will make your quantity smaller</p> <p><b>Know</b> Taking away groups of a negative quantity will make your quantity larger.</p> <p><b>Do</b> Explain why the rules they derived are true.</p> <p><b>Do</b> Develop a set of rules for multiplying with integers.</p>
Lesson Agenda	Time													
I. Do Now	5													
II. INM	45													
III. Student Practice	15													
IV. Student Debrief	0													
V. Exit Ticket	5													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ <b>Factors</b></li> <li>▪ <b>Integer</b></li> <li>▪ <b>Product</b></li> </ul>														

**Standard(s)**

◆ **7.3(A)** add, subtract, multiply, and divide rational numbers fluently

◆ **7.3(B)** apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers

**Notes for Intellectual Preparation & Lesson Planning**

**Necessary Materials and Pre-Lesson Prep**

- MCR SE and TE
- Create Exemplar SE
- Rehearse INM

Lesson Agenda	Time
I. Do Now	5
II. INM	40
III. Student Practice	10
IV. Student Debrief	5
V. Exit Ticket	5

**Mathematical Goal of this Lesson**

Students will conclude that when there is an even number of negative numbers, the product is always positive and when there is an odd number of negatives, the product will always be negative. Students will also explore the concept of multiplying and dividing by -1 to generate equivalent expressions.

**Opportunities to CFU**

- ✓ INM: “Let’s Write a Rule”
- ✓ INM: Part III
- ✓ Student Practice: Q1 and Q2

**Other Notes to Inform Your Planning**

$-x$  should be read as the opposite of  $x$  rather than negative  $x$ . Multiplication can be written in the form of  $a(b)$ ,  $a \times b$ ,  $ab$ , or  $a \cdot b$ . Expressions are limited to integers. Operations limited to multiplication. In this lesson, you will extend to multiplying more than two products, and the impact of multiplying any value by -1. The Do Now asks students to use what they learned yesterday to find the product of 3 or more factors. You will begin the lesson by connecting to this part of the Do Now.

**Focus on Disciplinary Literacy**

INM: II(last question in the INM)  
**Student Debrief**

**Lesson Look Fors**

Look for teachers to...

- Use guided questioning strategies to allow students to develop rules for the number of negative factors and the sign of the product.

Look for students to...

- Expand on what they learned yesterday to derive rules for the sign of a product given the number of negative factors.

**Student Know/Do Chart**

- Multiplying by -1 makes any value become its opposite
- The product of an even number of negative factors will always lead to a positive product.
- The product of an odd number of negative factors will always lead to a negative product.
- A variable with a negative sign in front of it is being multiplied by -1. A set of parentheses with a negative sign in front of them is also being multiplied by -1.
- $-x$  means the opposite of  $x$ , not negative  $x$ .
- Develop a set of rules for the number of factors that are negative in a multiplication expression if the answer is positive and if the answer is negative.
- Develop a set of rules for multiplying by -1 (taking the opposite of a number).

Lesson 3: Dividing Integers		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors												
<p>◆ <b>7.3(A)</b> add, subtract, multiply, and divide rational numbers fluently</p> <p>◆ <b>7.3(B)</b> apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ MCR SE and TE</li> <li>▪ Create Exemplar SE</li> <li>▪ Rehearse INM</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Lesson Agenda</th> <th style="text-align: left;">Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5</td> </tr> <tr> <td>II. INM</td> <td>40</td> </tr> <tr> <td>III. Student Practice</td> <td>15</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5</td> </tr> <tr> <td>V. Exit Ticket</td> <td>5</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b></p> <p>Students will use their understanding of the relationship between multiplication and division to discover that when they are dividing with positives and negatives the same rules apply as when they were multiplying. Students will also explore equivalent numeric and algebraic expressions involving the division of positive and negative integers.</p>	Lesson Agenda	Time	I. Do Now	5	II. INM	40	III. Student Practice	15	IV. Student Debrief	5	V. Exit Ticket	5	<p><u>Look for teachers to...</u></p> <ul style="list-style-type: none"> <li>☐ Make connections to students' prior knowledge of multiplying with integers to build students' understanding of dividing integers.</li> </ul> <p><u>Look for students to...</u></p> <ul style="list-style-type: none"> <li>☐ Derive rules for dividing with integers using their understanding of multiplying integers.</li> </ul>
	Lesson Agenda	Time												
I. Do Now	5													
II. INM	40													
III. Student Practice	15													
IV. Student Debrief	5													
V. Exit Ticket	5													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ Factors</li> <li>▪ Integer</li> <li>▪ Opposite Value</li> <li>▪ Product</li> <li>▪ <b>Quotient</b></li> </ul>	<p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: "Let's write a rule"</li> <li>✓ INM: True or False at end</li> <li>✓ Student Practice: Q3, Q4, Q5</li> </ul> <p><b>Other Notes to Inform Your Planning</b></p> <p>Division may be written as <math>a \div b</math> or as <math>\frac{a}{b}</math>. Expressions are limited to integers. Operations limited to division.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p>INM: 'Lets Write a Rule', #1-3 <b>Lesson Debrief</b></p> </div>	<p><b>Student Know/Do Chart</b></p> <p> When you are dividing integers, you follow the same set of rules as when you multiply integers</p> <p> The quotient of two negatives will always be positive and the quotient of a negative and a positive will always give you a negative quotient.</p> <p> Apply properties of multiplying integers to derive rules for dividing integers.</p> <p> Identify equivalent division expressions.</p> <p> Divide fluently with integers</p>												

Lesson 4: Order of Operations		Date _____												
Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors												
<p>◆ <b>7.3(A)</b> add, subtract, multiply, and divide rational numbers fluently</p> <p>◆ <b>7.3(B)</b> apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers</p>	<p><b>Necessary Materials and Pre-Lesson Prep</b></p> <ul style="list-style-type: none"> <li>▪ MCR SE and TE</li> <li>▪ Create Exemplar SE</li> <li>▪ Rehearse INM</li> </ul> <table border="1"> <thead> <tr> <th>Lesson Agenda</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>I. Do Now</td> <td>5</td> </tr> <tr> <td>II. INM</td> <td>25</td> </tr> <tr> <td>III. Student Practice</td> <td>20</td> </tr> <tr> <td>IV. Student Debrief</td> <td>5</td> </tr> <tr> <td>V. Exit Ticket</td> <td>5</td> </tr> </tbody> </table> <p><b>Mathematical Goal of this Lesson</b> In this lesson, students will build an understanding of the need for the order of operations by analyzing two real-world situations. They should conclude that when you do not follow the correct order to simplify a numeric expression, you get an incorrect answer.</p>	Lesson Agenda	Time	I. Do Now	5	II. INM	25	III. Student Practice	20	IV. Student Debrief	5	V. Exit Ticket	5	<p>Look for teachers to...</p> <ul style="list-style-type: none"> <li>☐ Guide the discussion, by asking students probing questions, and allow the students to do the cognitive lifting.</li> </ul> <p>Look for students to...</p> <ul style="list-style-type: none"> <li>☐ Use the order of operations to justify the process for simplifying a numeric expression with multiple operations.</li> </ul>
	Lesson Agenda	Time												
I. Do Now	5													
II. INM	25													
III. Student Practice	20													
IV. Student Debrief	5													
V. Exit Ticket	5													
<p><b>Important Vocabulary</b></p> <ul style="list-style-type: none"> <li>▪ <b>Exponent</b></li> <li>▪ <b>Grouping Symbol</b></li> <li>▪ Integer</li> <li>▪ <b>Order of Operations</b></li> </ul>	<p><b>Opportunities to CFU</b></p> <ul style="list-style-type: none"> <li>✓ INM: Q2a</li> <li>✓ INM: Order of Operations Section</li> </ul> <p>✓ Student Practice: Q1-5</p> <p><b>Other Notes to Inform Your Planning</b> Division may be written as <math>a \div b</math> or as <math>\frac{a}{b}</math>. Addition and subtraction can be written in the forms of <math>a + b</math>, <math>a - b</math>, <math>a + (-b)</math> or <math>a - (-b)</math>. Multiplication can be written in the form of <math>a(b)</math>, <math>a \times b</math>, <math>ab</math>, or <math>a \cdot b</math>. Grouping symbols are limited to parenthesis.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Focus on Disciplinary Literacy</b></p>  <p><b>INM: #1a, 2a</b> <b>Debrief: Error Analysis</b></p> </div>	<p><b>Student Know/Do Chart</b></p> <p> The OOO is a set of rules that tell us which operation to perform first (and second, third ...) When given an expression with more than one operation</p> <p> The OOO is important, b/c it ensures everyone reads and simplifies expressions the same way.</p> <p> Simplify a numeric expression using the OOO.</p> <p> Justify the steps that they take to simplify a numeric expression using the order of operations.</p>												

Lesson 5: Multiplying Rational Numbers

Date \_\_\_\_\_

**Standard(s)**

◆ **7.3(A)** add, subtract, multiply, and divide rational numbers fluently

◆ **7.3(B)** apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers

**Notes for Intellectual Preparation & Lesson Planning**

**Necessary Materials and Pre-Lesson Prep**

- MCR SE and TE
- Create Exemplar SE
- Rehearse INM

Lesson Agenda	Time
I. Do Now	5
II. INM	36
III. Student Practice	15
IV. Student Debrief	4
V. Exit Ticket	5

**Mathematical Goal of this Lesson**

Students should build procedural fluency and reinforce their conceptual understanding that they learned in previous grades using models, repeated addition, and taking a certain number of groups of a quantity.

**Lesson Look Fors**

Look for teachers to...

- Connect to students' prior knowledge
- Connect concrete models of multiplication w/ the algorithm

Look for students to...

- Use models and the standard algorithm to multiply w/ fractions & decimals.
- Connect what they learned about multiplying with negative and positive integers to multiplying with all rational numbers.

**Important Vocabulary**

Factors  
 Fraction Greater than 1  
 Product  
 Rational Number

**Opportunities to CFU**

✓ INM: Q11 and Q12                      Student Practice: Q7 and Q8

**Other Notes to Inform Your Planning**

Both models and the standard algorithm should be used to multiply rational numbers. Expressions include all rational numbers, but mostly positive and negative fractions and decimals. In this lesson, students will combine their understanding of operating with positive rational numbers (fractions and decimals) built in 4<sup>th</sup> and 5<sup>th</sup> grades, with their understanding of operating with integers (6<sup>th</sup> grade and this unit) to multiply rational numbers.

Students will be exposed to real world problems and compute using models and the standard algorithms.

**Focus on Disciplinary Literacy**



**Debrief: Error Analysis**

**Student Know/Do Chart**

 Multiplication is the addition of equal groups. One quantity represents the number of groups and the other represents the number of items in each group.

 The same rules apply for multiplying with positive and negative fractions that apply to multiplying with integers.

 Extend the rules of multiplying with positive and negative integers that they discovered earlier in the unit to multiply with positive and negative rational numbers.

**Standard(s)**  
 ◆ **7.3(A)** add, subtract, multiply, and divide rational numbers fluently  
 ◆ **7.3(B)** apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers

**Notes for Intellectual Preparation & Lesson Planning**

**Necessary Materials and Pre-Lesson Prep**

- MCR SE and TE
- Create Exemplar SE
- Rehearse INM

Lesson Agenda	Time
I. Do Now	05
II. INM	40
III. Student Practice	15
IV. Student Debrief	05
V. Exit Ticket	05

**Mathematical Goal of this Lesson**  
 Students should build an understanding that when dividing with fractions, it is the same as multiplying by the reciprocal, and that when dividing with decimals you can multiply by powers of 10 until all of your numbers are whole.

**Opportunities to CFU**

- ✓ INM: Steps to Divide Fractions
- ✓ Student Practice: Q3 and Q4
- ✓ Student Practice: Last Part(Identifying the Error) 1

**Other Notes to Inform Your Planning**  
 In this lesson, students will combine their understanding of operating with rational numbers (fractions and decimals), built in 4<sup>th</sup> and 5<sup>th</sup> grades, with their understanding of operating with integers (6<sup>th</sup> grade and this unit) to divide rational numbers. Expressions include all rational numbers, but mostly positive and negative fractions and decimals. Both models and the standard algorithm should be used to divide rational numbers.

**Focus on Disciplinary Literacy**



**INM:** The Concept of Dividing Fractions A-D  
**SP:** Last Table, Error Analysis

**Lesson Look Fors**

**Look for teachers to...**

- Use think-aloud strategies as they model division and connect the model to the standard algorithm.

**Look for students to...**

- Use models and the standard algorithm to divide fractions

**Student Know/Do Chart**

 Division can be interpreted as measurement or partitive. You start with a total amount of something you are going to split into groups. In measurement division (repeated subtraction), you need to find the number of groups. In partitive division (sharing), you need to find the number of items in each group. Dividing by a fraction and multiplying by its reciprocal produce the same result.

 Connect the procedure for dividing with rational numbers with models that represent the concept of division. Extend their understanding of the rules for dividing with integers to dividing with rational numbers

## Recommended Success Day Materials and Resources

### 7.3A and 7.3B Multiplying and Dividing Rational Numbers

Multiplying and Dividing Rational Numbers SE  
Multiplying and Dividing Rational Numbers TE  
Review Lesson SE  
Review Lesson TE

#### Notes to Inform Your Planning

This resource is relatively brief and 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.*

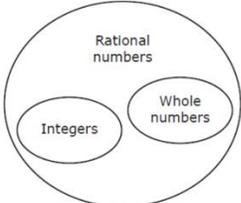
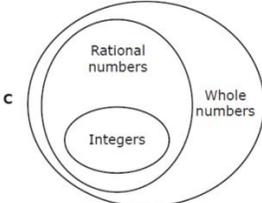
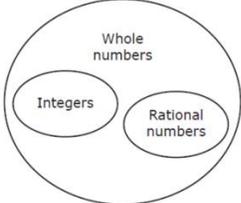
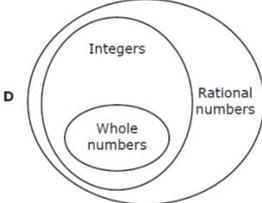
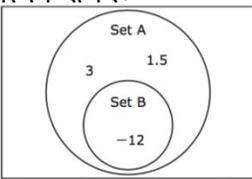
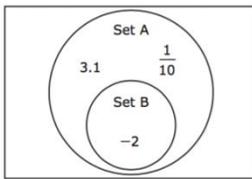
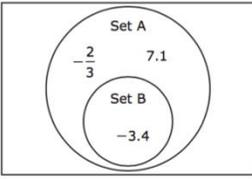
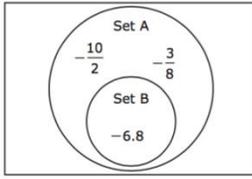
Using exit ticket data can help you prioritize what to review. For example, if you remember that students did poorly on Lesson 2, pull problems from lesson 2, especially if they are problems students did not do before (for example, SP or INM problems you skipped during class). You can also take questions 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.

Standard Breakdown		
Standard	Specificity	STAAR Alignment
<p><b>7.3(B)</b> apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>- Addition &amp; Subtraction of Rational Numbers</li> <li>- Multiplication &amp; Division of Rational Numbers</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>- Apply</li> <li>- Extend</li> <li>- Solve</li> </ul> <p><b>Clarifications Including but Not Limited To:</b></p> <ul style="list-style-type: none"> <li>- Solve real-world and mathematical problems involving the four operations with rational numbers.</li> <li>- Operations with integers</li> <li>- Operations with positive and negative fractions</li> <li>- Operations with positive and negative decimals</li> <li>- Operations with fractions greater than one</li> <li>- Modeling operations with integers on a number-line</li> <li>- Modeling operations with integers using integer chips.</li> <li>- Equivalent Numeric Expressions</li> <li>- Numeric Expressions with more than one operation</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>- Exponents and radicals are not included in numeric expressions</li> <li>- Models are limited to whole numbers and integers</li> <li>- Number-line operations include addition, subtraction and multiplication of whole numbers and integers</li> </ul> <p><b>Vertical Alignment:</b></p> <p>In 6<sup>th</sup> grade students were limited to integers and positive fractions/decimals</p> <p>In Algebra 1, students will be introduced to operations of exponents and radicals</p>	<p><b>2019:</b></p> <p><b>Q1:</b> Fatima paid for 5 pallets of grass to be delivered.</p> <ul style="list-style-type: none"> <li>• Each pallet of grass cost \$129.95.</li> <li>• Fatima paid \$76.20 for delivery.</li> </ul> <p>What is the total amount Fatima paid?</p> <p><b>Q21 :</b> This week Andres will practice with his band for <math>1\frac{1}{2}</math> hours on Monday, <math>1\frac{3}{4}</math> on Tuesday, and 2 hours on Wednesday. Next week, Andres will practice with his band the same number of hours on Monday, Tuesday and Wednesday. What is the total number of hours Andres will practice with his band over these 6 days?</p> <p><b>2018:</b></p> <p><b>Q17:</b> Maya has 120 caramel apples to sell. Each caramel apple is covered with one topping</p> <ul style="list-style-type: none"> <li>• <math>\frac{1}{5}</math> of the caramel apples are covered with peanuts.</li> <li>• <math>\frac{1}{3}</math> are covered with chocolate chips.</li> <li>• <math>\frac{3}{10}</math> are covered with coconut.</li> <li>• The rest are covered with sprinkles.</li> </ul> <p>How many caramel apples are covered with sprinkles?</p> <p><b>Q35:</b> Marsha gave the cashier \$20 to pay for 3 pairs of socks. The cashier gave her \$5.03 in change. Each pair of socks cost the same amount.</p> <p>What is the cost in dollars and cents of each pair of socks?</p>

Standard	Specificity	STAAR Alignment
<p><b>7.2(A)</b> extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>- Sets and Subsets</li> <li>- Visual Representation</li> <li>- Rational Numbers</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>- Extend</li> <li>- Describe</li> </ul> <p><b>Clarifications Including but Not Limited To:</b></p> <ul style="list-style-type: none"> <li>- Diagrams can include all 3 classifications (rational, integer, whole) or only 2 of the classifications</li> <li>-</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>- Limited to rational numbers</li> </ul> <p><b>Vertical Alignment:</b></p> <p>In 6<sup>th</sup> grade, students classify whole numbers, integers and rational numbers using a visual representation.</p> <p>In Algebra 1, students will extend their understanding to include irrational numbers.</p>	<p><b>2018:</b></p> <p><b>Q37</b> Which diagram best represents the relationship among integers, rational numbers and whole numbers?</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p><b>A</b></p>  </div> <div style="width: 50%;"> <p><b>C</b></p>  </div> <div style="width: 50%;"> <p><b>B</b></p>  </div> <div style="width: 50%;"> <p><b>D</b></p>  </div> </div> <p><b>2016</b></p> <p><b>Q29</b> Set A represents rational numbers. Set B represents integers. Which diagram shows the numbers placed in the correct sets?</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p><b>A</b></p>  </div> <div style="width: 50%;"> <p><b>C</b></p>  </div> <div style="width: 50%;"> <p><b>B</b></p>  </div> <div style="width: 50%;"> <p><b>D</b></p>  </div> </div>

Standard	Specificity	STAAR Alignment
<p><b>7.3(A)</b> add, subtract, multiply, and divide rational numbers fluently</p>	<p><b>Concepts:</b></p> <ul style="list-style-type: none"> <li>- Rational numbers</li> </ul> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>- Add</li> <li>- Subtract</li> <li>- Multiply</li> <li>- Divide</li> </ul> <p><b>Clarifications Including but Not Limited To:</b></p> <ul style="list-style-type: none"> <li>- Operations with integers</li> <li>- Operations with positive and negative fractions</li> <li>- Operations with positive and negative decimals</li> <li>- Operations with fractions greater than one</li> <li>- Modeling operations with integers on a number-line</li> <li>- Modeling operations with integers using integer chips.</li> <li>- Equivalent Numeric Expressions</li> <li>- Numeric Expressions with more than one operation</li> <li>- Real-world application</li> <li>- Real-world situations could include profit/loss, money, weight, sea level, debit/credit, football yardage, etc.</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>- Numbers limited to rational numbers.</li> </ul> <p><b>Vertical Alignment:</b></p> <p>In 6<sup>th</sup> grade, students operate with positive fractions and decimals and with integers. In Algebra 1, students will be expected to continue to operate fluently with rational numbers.</p>	<p><b>2019:</b></p> <p><b>Q24</b> What is the value of the expression <math>6\frac{3}{4}(-11.5)</math>?</p> <p><b>Q30</b> What is the value of the expression <math>-9 \times 2.2</math>?</p> <p><b>2017</b></p> <p><b>Q23</b> Stephanie has <math>3\frac{3}{4}</math> bags of soil to put in her garden. Each bag of soil will cover <math>125.3 \text{ ft}^2</math>. How many square feet will Stephanie be able to cover if she uses all of these bags of soil?</p> <p><b>2016</b></p> <p><b>Q25</b> The diameter of the handle of a softball bat is <math>1\frac{3}{4}</math> inches. What is the length in inches of the diameters of 8 of these bat handles?</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	8 <sup>th</sup> Grade & Algebra 1
<p><b>5.3(K)</b> add and subtract positive rational numbers fluently</p> <p><b>5.4(F)</b> simplify numerical expressions that do not involve exponents, including up to two levels of grouping</p> <p><b>5.3(E)</b> solve for products of decimals to the hundredths, including situations involving money, using strategies based on place-value understandings, properties of operations, and the relationship to the multiplication of whole numbers</p> <p><b>5.3(G)</b> 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><b>5.3(L)</b> divide whole numbers by unit fractions and unit fractions by whole numbers</p> <p><b>5.3(A)</b> estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division</p> <p><b>5.3(D)</b> represent multiplication of decimals with products to the hundredths using objects and pictorial models, including area models</p> <p><b>5.4(E)</b> describe the meaning of parentheses and brackets in a numeric expression</p> <p><b>5.3(F)</b> represent quotients of decimals to the hundredths, up to four-digit dividends and two-digit whole number divisors, using objects and pictorial models, including area models</p> <p><b>5.3(J)</b> represent division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as <math>1/3 \div 7</math> and <math>7 \div 1/3</math> using objects and pictorial models, including area models</p>	<p><b>6.3(D)</b> add, subtract, multiply, and divide integers fluently</p> <p><b>6.3(E)</b> multiply and divide positive rational numbers fluently</p> <p><b>6.7(A)</b> generate equivalent numerical expressions using order of operations, including whole number exponents, and prime factorization</p> <p><b>6.2(A)</b> classify whole numbers, integers, and rational numbers using a visual representation such as a Venn diagram to describe relationships between sets of numbers</p> <p><b>6.2(E)</b> extend representations for division to include fraction notation such as <math>a/b</math> represents the same number as <math>a \div b</math> where <math>b \neq 0</math></p> <p><b>6.3(A)</b> recognize that dividing by a rational number and multiplying by its reciprocal result in equivalent values</p> <p><b>6.3(C)</b> represent integer operations with concrete models and connect the actions with the models to standardized algorithms</p>	<p><b>8.2(A)</b> extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers</p> <p><b>A.11(B)</b> simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents</p> <p><b>A.10(A)</b> add and subtract polynomials of degree one and degree two</p> <p><b>A.10(B)</b> multiply polynomials of degree one and degree two</p> <p><b>A.10(C)</b> determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend</p> <p><b>A.10(D)</b> rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property</p>