

► Grade 3 Topic 3: Apply Properties: Multiplication Facts for 3, 4, 6, 7, 8

Big Conceptual Idea: [Operations and Algebraic Thinking, K-5](#) (pp. 22-28)

Prior to instruction, view the *Topic 3 Professional Development Video* located in Pearson Realize online. Read the *Teacher's Edition (TE): Cluster Overview/Math Background* (pp. 105A-105F), the *Topic Planner* (pp.105I-105K), all 8 lessons, and the *Topic Performance Assessment* (pp. 163-164A).

Mathematical Background: Read Topic 3-4 Cluster Overview/Math Background (pp. 105A-105F)	Topic Essential Question: How can unknown multiplication facts be found using known facts? <i>Reference Answering the Topic Essential Question (TE, pp. 161-162) for key elements of answers to the Essential Question.</i>
--	--

Topic 3 Apply Properties: Multiplication Facts for 3,4,6,7,8 Number of Lessons: 8 A/D/E: 3 days NVACS Focus: O.A.B Total Days: ~11

The lesson map for this topic is as follows:

3-1	3-2	3-3	3-4	3-5	3-6	3-8	3-7	Assessment
-----	-----	-----	-----	-----	-----	-----	-----	------------

3 A/D/E days used strategically throughout the topic

[3rd Grade Curriculum Pacing Framework: Balanced Calendar](#)

Instructional note:

The Nevada Academic Content Standard (NVACS) cluster 3.OA.B states, "Understand properties of multiplication and the relationship between multiplication and division". In Topic 3, students work with the Properties of Operations to build reasoning strategies using known facts explored in Topic 2. Students do this by multiplying with 3, 4, 6, 7, and 8 as factors. Students will continue to work with multiplication using contextual problems (3.OA.A.3) and explore patterns that occur with factors and products (3.OA.D.9). Building understanding of multiplication strategies, including using the Distributive and Associative Properties will lead to fluency later in grade 3 (See Topic 5).

The *Topic 3 Professional Development Video* states, "Using known facts along with the properties of multiplication is a strategy for learning the multiplication facts for 3, 4, 6, 7, and 8" (Dr. Schielack, enVisionmath2.0, 2016). This topic introduces the Distributive and Associative Properties of Multiplication with a focus on the standard 3.OA.B.5, "Apply properties of operations as strategies to multiply and divide." (NVACS, p. 23). While grouping symbols are not explicitly stated in the standards until 5th grade, the use of parentheses is an assumed part of the mathematics in the properties and should be used to communicate the grouping of the expressions and thus the order of the operations. For more information about the use of parentheses in 3rd grade and the progression of Order of Operations please read page 27 of the [K-5, Operations and Algebraic Thinking progression document](#). The footnote on this standard indicates that students do not need to use the formal terms for these properties; therefore, it is acceptable for students to refer to them as the turn-around, break-apart, and order properties of multiplication. However, you may want to consider restating their informal language with the formal terms to support precise mathematical vocabulary development.

Topic 3 uses the Distributive Property of Multiplication extensively to support student understanding by linking an array with the decomposition of a factor. Students model decomposing a factor into smaller factors to breaking apart larger arrays into smaller arrays. For example, given an array that models 7×5 , students may choose to decompose or break the first factor (7) into a 5 and 2 as they know their 5 facts and their 2 facts. Thus, students are using the distributive property to solve unknown facts using known facts: $(5 \times 5) + (2 \times 5)$.

In lesson 3-7, the focus is on understanding the Associative Property, which allows factors to be grouped in different ways. When given three or more factors students are able to group the factors differently depending upon what is more efficient for the student. For example, given the factors $2 \times 5 \times 3$ (which can be modeled with two separate 5×3 arrays), students may group the factors as $(2 \times 5) \times 3$ or as $2 \times (5 \times 3)$. They should see the equivalence between these groupings and the new facts created by associating different factors together; in this case 10×3 or 2×15 . Consider using one of the A/D/E days for this topic to spend more time exploring these ideas from the Associative Property of Multiplication.

When students demonstrate readiness, consider replacing the two-colored counters used in arrays with colored tiles to begin building area models. This will begin to lay the foundation for the connection between the array model and the area model explored in Topic 6. Note: If colored tiles are used, be sure that there are no gaps between tiles as you are now connecting to area concepts.

Looking ahead to the Topic Assessment, consider having tools available for students that may need them. Item 11 Part B requires students to generalize their understanding and apply it to a new situation. In the Topic Performance Assessment for item 2 Part B, accept multiple answers for where students draw the line; also accept responses where students have drawn multiple lines to use the Associative Property of Multiplication.

Focus Math Practice 8: Look for and express regularity in repeated reasoning

Focus on opportunities for students to develop Mathematical Practice 8 behaviors, as this is the focus of the Math Practices and Problem Solving lesson 3-8. Reference the Teacher’s Edition (TE, pp. F28 - F28A) and the Nevada Academic Content Standards for Mathematical Practice (2010, p. 8).

Essential Academic Vocabulary Use these words consistently during instruction.	
New Academic Vocabulary: (First time explicitly taught)	Review Academic Vocabulary: (Vocabulary explicitly taught in prior grades or topics)
Distributive (break-apart) Property of Multiplication Associative (Grouping) Property of Multiplication	<i>factor</i> <i>product</i> <i>commutative property of multiplication</i> <i>doubles</i> <i>halving</i>

Additional terminology that students may need support with: break-apart, addend, sum, compose, decompose, generalization

***Collaborative Team Conversations (CTC)**

Consider using **one** of the following as part of the formative assessment process at the lesson level to **collect student work** to analyze for **evidence of mathematical understanding**:

Guiding question: “Are students using the properties of multiplication and known facts to find products of unknown facts?”

Lesson	Evidence	Look for
3-1	<i>Solve & Share</i> (student work samples)	Focus CTC around the big idea: <ul style="list-style-type: none"> students understand that arrays can be broken apart (decomposed) into smaller arrays based on the distributive property.
3-3	<i>Math Practices and Problem Solving</i> (student work samples) Items 22 and 23	Focus CTC around the big idea: <ul style="list-style-type: none"> students apply the properties of multiplication with 4 as a factor. students use known facts to find products of unknown facts.

Learning Cycle Assessments (summative)	Topic Assessments SE pp. 161-164	Use <i>Scoring Guide</i> TE pp. 161-164A
---	--	--

Standards listed in **bold** indicate a focus of the lesson.

NVACS (Content and Practices)	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Lesson 3-1: The Distributive Property		
3.OA.B.5 MP.2 MP.3 MP.4 MP.6 MP.7	Access Prior Learning: Commutative Property of Multiplication, familiarity with facts that include 2, 5, 0, 1, 10, and 9 as a factor. Developing the Big Idea: Students are <i>beginning</i> to understand that the Distributive Property of Multiplication can be used to break a large array into a small array that represents known facts.	Topic Opener: Introduce the <i>Topic Essential Question</i> , “How can unknown multiplication facts be found using known facts?” (TE, p. 105). Consider making this an anchor chart in your classroom where each day new ideas are added so that students can see the development and make connections throughout the topic. If building an anchor chart, this could be an appropriate time to quickly revisit the Commutative Property of Multiplication and add it to the chart. You may want to expand on this idea and include in the chart that since they already know $2 \times 7 = 14$ they also know that $7 \times 2 = 14$. You might also consider having students complete the <i>Review What You Know</i> prior to beginning instruction on Topic 3 so that you can respond to student instructional needs using the <i>Item Analysis for Diagnosis and Intervention</i> (TE, p. 106-108). Consider introducing vocabulary as they encounter them in the lessons rather than introducing all terms at the beginning of the lesson.
<i>-continues on next page-</i>		

		<p>Solve & Share: Consider waiting to distribute the 25 two-color counters until students suggest them in response to the question, “What tool can you use to solve this problem?” (TE, p. 109).</p> <p>While students are working on the <i>Solve & Share</i> consider asking them:</p> <ul style="list-style-type: none"> • “What equation does the original array represent?” (e.g. 5×4) • “What equation(s) does the broken array represent?” • “Why did you choose to break it up like that?” <p>In these questions, you are starting to lay the foundations for students to understand that breaking up the array using known facts to find the product is one way to make simpler problems. Consider returning to these questions in the whole group discussion of students’ solutions and reasoning.</p> <p>Look Back: Consider discussing as a class the <i>Look Back!</i> question to help students develop an understanding of how the distributive property helps us to use known facts to solve for unknown facts (called derived facts).</p> <p>Visual Learning: Before clicking on <i>Try It!</i> consider having groups make the different possible arrays presented in the <i>Try It!</i> and do a quick Gallery Walk of the different ways to break-up the 7×4 array, taking notice of the known facts in each representation.</p> <p>When watching the video and formalizing the definition of the Distributive Property of Multiplication, consider taking a moment to discuss the meaning of, “the sum of two other facts”. It is easy for students to overlook that in the Distributive Property of Multiplication we are adding the products of our two partial products. Students will also often miss that we are adding the products because we broke one of the factors into addends of the factor.</p> <p>Independent Practice/Math Practices and Problem Solving: The <i>Quick Check</i> asks students to demonstrate understanding of equations representing the Distributive Property of Multiplication. Teachers might find that this needs to be a 2-day lesson.</p> <p>In that case, consider using the “Higher Order Thinking” item 16 as a <i>Solve & Share</i>, making sure to provide counters, and connect student representations to the conventions of writing the equation. You may consider using the <i>Another Look!</i> video as the <i>Visual Learning</i> animation. Lessons 3-2 through 3-6 provide students with the opportunity to gain security in writing equations showing the use of the Distributive Property of Multiplication.</p> <p>Finally, should you choose to make this a 2-day lesson, consider building in time for students to practice building the known fact arrays by giving student pairs a multiplication fact to model with the counters the different factor pairs they can make and then writing the equations. For example, given 6×7 students could create broken arrays that show: $6 \times 7 = (5 \times 7) + (1 \times 7)$; $6 \times 7 = (3 \times 7) + (3 \times 7)$; etc.</p> <p>*CTC: <i>Solve & Share</i> (student work samples)</p>
--	--	--

Lesson 3-2: Apply Properties: 3 as a Factor

<p>3.OA.B.5 3.OA.A.3 3.OA.D.9</p> <p>MP.3 MP.5 MP.7 MP.8</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 2 and 1 as a factor.</p> <p>Developing the Big Idea: Students further <i>develop</i> their understanding of multiplying by 2 and 1 as a factor and the Distributive Property of Multiplication to solve for unknown multiplication problems with 3 as a factor.</p>	<p>Solve & Share: Watch for students that choose to solve this problem using repeated addition. Encourage these students to write the represented multiplication problem and then use what they learned about the Distributive Property of Multiplication to help them solve. You may need to ask these students, “Are there known facts you can use to break-up the array to solve this problem?”</p> <p>Attempt discovering the mathematical understanding described in <i>Transition to the Visual Learning Bridge</i> (TE, p. 115) during the whole class discussion from student solutions and reasoning.</p> <p>Look Back: Consider discussing the <i>Look Back!</i> as it supports students’ developing understanding of MP.8 <i>Look for and express regularity in repeated reasoning</i>. Students continue to work with the Distributive Property of Multiplication to break-apart unknown facts into known facts for solving.</p> <p>Convince Me: Consider discussing the <i>Convince Me!</i> as a class to check for understanding. In the discussion, make sure that students understand that the 3 is decomposed into 2 and 1 because we know facts for 2s and 1s.</p> <p>Assess and Differentiate: If time permits, teach students how to play <i>Toss and Talk</i> (TE, p. 119A). All students should have the opportunity to play this game.</p>
--	--	---

Lesson 3-3: Apply Properties: 4 as a Factor		
<p>3.OA.B.5 3.OA.A.3 3.OA.D.9</p> <p>MP.1 MP.2 MP.3 MP.7</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 2 and 1 as a factor. In lesson 3-2, students used 1s and 2s to solve for problems with 3 as a factor.</p> <p>Developing the Big Idea: Students further <i>develop</i> their understanding of multiplication problems with 1, 2, and 3 as a factor to solve for multiplication facts with 4 as a factor.</p> <p>Students extend their understanding of the Distributive Property of Multiplication to generate the understanding that the Distributive Property of Multiplication can be used to break the 4s multiplication facts into smaller known facts.</p>	<p>Solve & Share: Child-watch for students who decompose 4 using addition and/or multiplication. Focus responses on $2 + 2$ and $1 + 3$ for addition and 2×2 for multiplication as these provide factors for making known facts from multiplication problems with 4 as a factor.</p> <p>Look Back: Depending upon student readiness you may consider discussing the <i>Look Back!</i> question to begin developing understanding of the Associative Property of Multiplication. After reaching the understanding described for the question (TE, p. 121) consider asking students what multiplication fact works with doubles (e.g. 2s). If you feel students are ready and it would not further confuse them, you can then connect the equation $(2 \times 8) + (2 \times 8) = 32$ to having $(2 \times 8) \times 2 = 32$ because we have 2×8 doubled.</p> <p>The <i>Visual Learning Animation</i> will connect the idea that 2's facts are doubles and since 4 is a double of 2, we can think of 4 facts as "double-double." It does not, however, show it in equation form. For more information on decomposing using the Distributive Property read page 26 of the K-5, Operations and Algebraic Thinking. Additionally, more information on this can be found in the <i>Topic Professional Development Video</i>.</p> <p>Visual Learning: If students are struggling with understanding how to break-apart a large array (unknown fact) into known facts, smaller arrays, it may be more helpful to have students build the array and break it apart rather than doing the <i>Try It!</i> digitally.</p> <p>Convince Me: If you did not do the <i>Look Back!</i> as described above, but now feel students are ready to explore those ideas, the <i>Convince Me!</i> provides this opportunity.</p> <p>Independent Practice/Math Practices and Problem Solving: Item 19 provides students the opportunity to reason with a 2-step story problem where the first step requires multiplication and the second step is an additive compare situation. The reasoning students will have to engage in to solve this problem will also help prepare students for the reasoning necessary should you choose to do the Topic Performance Assessment.</p> <p>Assess and Differentiate/Intervention Activity: If time permits, you may consider replacing the <i>Math and Science Activity</i> with a game that will provide an opportunity for meaningful practice with any of the factors that students have already developed strategies.</p> <p>*CTC: <i>Math Practices and Problem Solving</i> (student work samples)</p>

Lesson 3-4: Apply Properties: 6 and 7 as a Factor		
<p>3.OA.B.5 3.OA.A.3 3.OA.D.9</p> <p>MP.1 MP.4 MP.5 MP.7</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 1, 2, and 5 as a factor. In <i>Lesson 3-3</i>, students <i>developed</i> the understanding that a strategy for 4's facts is to think of it as "double-double."</p> <p>Developing the Big Idea: In this lesson, students further <i>develop</i> their understanding of multiplication problems with 1, 2, 3, 4, and 5 as a factor to solve for multiplication facts with 6 or 7 as a factor. Students also further <i>develop</i> their understanding of "double-double" to 6 facts.</p>	<p>(Possible 2-day lesson)</p> <p>Instructional note: Determining if this lesson needs to be a 2-day lesson should be based on child-watching and formative data from previous lessons. If students are still struggling with using 3, 4, or 5-fact as their "known fact" they may benefit from making this a 2-day lesson.</p> <p>Students solving for a 6-fact may use a 5 and 1-fact or a 3-fact they double as their <i>known facts</i>. When solving for a 7-fact students may use a 5 and 2-fact or a 4 and 3-fact. In the event it is determined that students would benefit from a 2-day lesson consider the following structure: Day 1: <i>Solve & Share</i> as is and the <i>Visual Learning Animation</i> Day 2: Rewrite the <i>Solve & Share</i> to have 7 rows with 7 chairs in each. Follow with the <i>Another Look!</i> video</p> <p>Look Back: Consider discussing the <i>Look Back!</i> problem after the <i>Solve & Share</i>, and look for a student that explains the rule as the one provided for the prompt in the teacher's edition. Also look for a student that explains it by decomposing 6 and then uses the Associative Property of Multiplication (e.g. $(2 \times 6) \times 3$ or $2 \times (6 \times 3)$). For students that use the latter equation you might consider posing the question, "What property of multiplication allows us to switch to solving 6×3 first?" Then have both students share their reasoning. While the Associative Property of Multiplication is not an outcome for this lesson, if you have students already using this reasoning it may be helpful to start forming these ideas now.</p> <p style="text-align: right;">-continues on next page-</p>

		<p>Visual Learning: The <i>Visual Learning Animation</i> makes one strategy explicit for solving for a 6 fact. This strategy will also work for 7 facts but the animation does not make this connection. Therefore, you may want to ask students how they could use this strategy to solve for 7's facts.</p> <p>Alternatively, you may consider replacing the <i>Visual Learning Animation</i> with the <i>Another Look!</i> video as it makes the strategy explicit for both 6 & 7's facts. If choosing to go this route, consider pausing after it displays the equations "6 x 4 = ?" to collect student responses on how they might solve using known facts (e.g. double-double with the four so $(6 \times 2) + (6 \times 2) = 24$, double-double with the six so $(3 \times 4) + (3 \times 4)$, or using 2s facts so $(2 \times 4) + (2 \times 4) + (2 \times 4) = 24$, using 3s facts so $(6 \times 3) + (6 \times 1) = 24$). Consider asking students if doubling will work for 7 (e.g. no because 7 is not a double). You may want to build in additional class practice with counters in modeling and writing the equations for these strategies.</p> <p>Assess and Differentiate/Intervention Activity: If time permits, teach students how to play <i>Teamwork</i> (TE p. 131A). All students should have the opportunity to play this game as this reinforces the idea of using known facts to solve for unknown facts and provides meaningful practice with identifying the known fact and working from that fact. Consider modifying to other factors (e.g. have students role dice to get the factors) for future extended play.</p>
--	--	--

Lesson 3-5: Apply Properties: 8 as a Factor

<p>3.OA.B.5 3.OA.A.3 3.OA.D.9</p> <p>MP.1 MP.4 MP.7 MP.8</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 1, 2, and 5 as a factor. In previous lessons within Topic 3, students have <i>developed</i> the understanding that they can use these known facts to solve for facts with 3, 4, 6, and 7 as a factor.</p> <p>Developing the Big Idea: This lesson further <i>develops</i> the idea that we can use known facts to solve for unknown facts using the Distributive Property of Multiplication.</p>	<p>Look Back: Consider assigning the <i>Look Back!</i> prompt after the <i>Solve & Share</i>, and ask groups to take a different factor to share out. These are good ideas to add to the class anchor chart.</p> <p>Visual Learning: Students that are struggling to keep track of all the doubles shown in the <i>Visual Learning Animation</i> may prefer to use the Distributive Property of Multiplication by decomposing the 8 into 5 + 3. This also might be a good time to revisit the Commutative Property of Multiplication by posing the question, "For 8 x 2, what is the most appropriate/efficient strategy for me to solve (e.g. I know $2 \times 8 = 16$ so it's 16)?"</p> <p>Convince Me: You might consider discussing the <i>Convince Me!</i> whole group.</p> <p>Independent Practice/Math Practices and Problem Solving: For more information beyond the explanation provided in the Teacher's Edition on <i>Quick Check</i> item 19, watch the <i>Listen and Look For</i> video for this lesson.</p> <p>Assess and Differentiate/Intervention Activity: If time permits, you may consider replacing the <i>Math and Science Activity</i> with the game <i>Teamwork</i> (TE, p. 131A). Please see the comments for this game in Lesson 3-4.</p>
--	---	---

Lesson 3-6: Practice Multiplication Facts

<p>3.OA.B.5 3.OA.A.3</p> <p>MP.1 MP.2 MP.3 MP.4</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 1, 2, and 5 as a factor. In previous lessons in this topic students have <i>developed</i> the understanding that they can use these known facts to solve for facts with 3, 4, 6, 7, and 8 as a factor.</p> <p>Developing the Big Idea: This lesson further <i>develops</i> the understanding that we can use known facts to solve for unknown facts by including using a bar diagram as a model for the math.</p>	<p>Solve & Share: To assess student readiness, you may consider posing the question, "How can we model multiplication using a bar diagram? What other ways can we model multiplication?"</p> <p>Visual Learning: Consider pausing the video after it shows, "Each section is 3 feet long" and posing the question, "What is our multiplication equation for this problem? (e.g. $9 \times 3 = ?$) How could you solve this?" Provide time for students to solve and use this as an opportunity to see what reasoning strategies students are using to solve.</p> <p>Convince Me: If you already provided time for students to solve for 9×3, you might consider doing the <i>Convince Me!</i> to have students share their strategies and reasoning that wasn't shown in the video. Having exposure to these strategies would be beneficial for the whole group.</p> <p>Independent Practice/Math Practices and Problem Solving: Students have to reason that a week has 7 days in order to solve item 26; therefore, it might be beneficial to assign this item to build problem solving reasoning habits.</p> <p>Assess and Differentiate: If time permits, you may consider replacing the <i>Problem Solving Read Mat</i> with the game <i>Teamwork</i> (TE, p. 131A). Please see the comments for this game in Lesson 3-4.</p> <p>Child-watch to identify students who need additional support and pull them into a small group to do the <i>Intervention Activity</i> (TE, p.23A).</p>
---	--	---

Lesson 3-8: Math Practices and Problem Solving- Repeated Reasoning

<p>3.OA.B.5 3.OA.A.3</p> <p>MP.8 MP.1 MP.3 MP.5 MP.7</p>	<p>Access Prior Learning: In this topic students have developed understanding of how they can use known facts for 1, 2, and 5 to solve for unknown facts for 3, 4, 5, 6, 7, 8, and 9 focusing mostly on the Distributive Property of Multiplication as a justification for why this works.</p> <p>Developing the Big Idea: In this lesson, students <i>develop</i> their understanding of MP.8 Use repeated reasoning to <i>secure</i> their understanding of using the Distributive Property of Multiplication as a strategy for solving unknown facts.</p>	<p>This lesson provides an opportunity to focus on the Thinking Habits and display the behaviors associated with Math Practice 9. Refer to the <i>Math Practices and Problem Solving Handbook</i> (TE p. F28-F28A, F29) for suggestions on how to develop, connect and assess this Math Practice. Also reference the handbook in the student edition (SE, p. F28).</p> <p>Solve & Share: Consider reintroducing MP. 8 <i>Look for and express regularity in repeated reasoning</i> Thinking Habits (SE, p. F28) before introducing the <i>Solve & Share</i>. You may want to restate that an equation is an example of MP. 8 <i>Look for and express regularity in repeated reasoning</i>. In this case, the general method we want students to notice is the use of the Distributive Property of Multiplication in solving for unknown facts.</p> <p>You may also consider using the time where students are working on the <i>Solve & Share</i> as an opportunity to child-watch for behaviors associated with MP.8 that are listed in the <i>Math Practices and Problem Solving Handbook</i> (F28A), and afterwards discussing student solution methods and reasoning. Ask students to self-score for the behaviors associated with this math practice.</p> <p>Finally, during the whole group discussion on students' solution strategies and reasoning, ensure that the generalization recognizes that when decomposing a factor, it's being broken into addends. For further ideas on how to facilitate the conversation so that students recognize this, preview the <i>Listen and Look For</i> video prior to teaching the lesson so that you can use their questions. This understanding is important as students learn to decompose factors and make known facts from unknown facts.</p> <p>Visual Learning: During the <i>Visual Learning Animation</i>, consider asking the students what they decomposed the factors for each equation into to make a known fact (e.g. A 3 was decomposed into the addends 2 and 1, B 4 was decomposed into the addends 2 & 2, C 6 was decomposed into the addends 5 and 1, D 7 was decomposed into the addends 5 and 2).</p> <p>Independent Practice/Math Practices and Problem Solving: Watch for students that do not recognize the "35 minutes to bake the pizzas" is extraneous information and try to use it to solve the problem. These students are not reasoning with the context to make sense with the mathematics and need additional support on how to problem solve.</p> <p>Assess and Differentiate/Intervention Activity: If time permits, teach students how to play <i>Clip and Cover</i> (TE, p. 155A). All students should have the opportunity to play the games.</p> <p>Child-watch to identify students who need additional support and pull them into a small group to do the <i>Intervention Activity</i> (TE, p.155A).</p>
---	--	---

Lesson 3-7: The Associative Property: Multiply by 3 Factors

<p>3.OA.B.5 3.OA.A.3</p> <p>MP.1 MP.2 MP.3 MP.4 MP.8</p>	<p>Access Prior Learning: In Topic 2, Grade 3 students identified the patterns in multiplying with 1, 2, and 5 as a factor. In previous lessons in this topic, students have <i>developed</i> the understanding of using the Distributive Property of Multiplication to use known facts to solve for facts with 3, 4, 6, 7, and 8 as a factor.</p> <p>Developing the Big Idea: This lesson extends the understandings they developed in the previous lessons to apply the strategies for solving for facts with 0, 1, 2, 5, 9, and 10.</p>	<p>Watching the <i>Topic Professional Development Video</i> will help to clarify the ideas around the Associative Property of Multiplication and strengthen facilitation of the <i>Visual Learning Animation</i> during instruction.</p> <p>Solve & Share: The <i>Listen and Look For</i> video for this lesson goes into detail about how to use this problem to facilitate understanding of the Associative Property of Multiplication.</p> <p>While students work to solve this problem, watch for those that do not include parentheses as a grouping symbol. These students might be working with the misconception that parentheses are limited to the Distributive Property of Multiplication. Offer the clarification that parentheses are used anytime we want to communicate that we have grouped expressions together.</p> <p>Watch for students that represent the problem as $(5 \times 3) + (5 \times 3)$ or $15 + 15$. Help them connect these forms of repeated addition to multiplication; ask students to write a number sentence for this situation using only multiplication. 2×15 could be a first step. Where did the 15 come from? Do students notice it represents the total number of squares in one quilt? Can they replace the 15 with (5×3) to create the number sentence $2 \times (5 \times 3)$? Help students to see the equivalence between these different forms. What will happen now if we decide to use the $2 \times (5 \times 3)$ model but instead associate the factors 2 and 5? We have created a new number sentence, $(2 \times 5) \times 3$ and a different number sentence of 10×3. Do students notice that there are 10 rows between the two quilts with 3 squares in each row? The associative property allows us to represent the same situation using different but equivalent number sentence models.</p> <p style="text-align: right;"><i>-continues on next page-</i></p>
---	--	---

		<p>Visual Learning: The <i>Visual Learning Animation</i> uses a very similar problem to model use of the Associative Property of Multiplication. Help students make connections between their reasoning and strategies used during the <i>Solve & Share</i> and those seen in the <i>Visual Learning Animation</i>.</p> <p>In this lesson, students have seen that when working with 3 factors, the order they multiply them does not change the final product although it does require an extra step. Connect to our <i>Topic Essential Question</i>, "How can unknown multiplication facts be found using known facts?" by asking, "How can we use the Associative Property of Multiplication to decompose an unknown multiplication fact into known facts? Can we solve $4 \times 2 \times 5$ as 8×5 or 4×10? How can we use this property to make simpler problems for solving?"</p> <p>Assess and Differentiate: If time permits, you may consider returning to the game <i>Teamwork</i> (TE p.131A) with a variety of factors (see notes in Lesson 3-4) and have students decomposing the larger arrays into 2 or more small arrays while writing the multiplication equation modeled.</p>
--	--	---

References

- Common Core Standards Writing Team. (2011, May 29). *Progressions for the Common Core State Standards in Mathematics (draft). K, Counting and Cardinality; Grades K-5, Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.
- Council of Chief State School Officers. (2010). The Nevada Academic Content Standards. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Standards_Instructional_Support/Nevada_Academic_Standards/Math_Documents/mathstandards.pdf.
- Fosnot, C. T., & Dolk, M. (2001). *Young mathematicians at work: Constructing multiplication and division*. Portsmouth, N.H.: Heinemann.
- Van de Wall, J., Karp, K., Lovin, L., & Bay-Williams, J. (2014). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3-5* (2nd ed.). New York, NY: Pearson.

This page is intentionally left blank