

► Grade 3 Topic 10: Multiply by Multiples of 10

Big Conceptual Idea: [Numbers and Operations in Base Ten, K-5](#) (p. 12)

Prior to instruction, view the *Topic 10 Professional Development Video* located in Pearson Realize online. Read the *Teacher's Edition (TE): Cluster Overview/Math Background* (pp. 571A-571F), the *Topic Planner* (pp.535A-535B), all 4 lessons, and the *Topic Assessments* (pp. 569-570A).

<p>Mathematical Background: Read Topic 10 Cluster Overview/Math Background (TE, pp. 571A-571F)</p>	<p>Topic Essential Question: What are ways to multiply by multiples of 10? <i>Reference Answering the Topic Essential Question (TE, pp. 567-568) for key elements of answers to the Essential Question.</i></p>
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The lesson map for this topic is as follows:

10-1	10-2	10-3	10-4	Assessment
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4 A/D/E days used strategically throughout the topic

Instructional note:

In Topics 1 through 5 students developed conceptual understanding of multiplication and division. These critical mathematical understandings come together in Topic 10 to develop understanding regarding multiplying by a multiple of 10. Topic 10 is part of a topic cluster with Topics 8 and 9 that share the big idea of using place-value understanding and properties of operations to perform multi-digit arithmetic. A big idea specific to Topic 10 is the place value pattern that exists when multiplying by 10. This understanding will be critical in establishing the “write a zero” rule that is the focus of lesson 10-3.

It is important that the work in this topic not be minimized to having students memorize that they can write a zero and multiply the remaining digits. Teaching the “zero trick” without developing the mathematical understanding behind the rule creates misconceptions when students need to generalize this understanding to working with multiples of 100, 1,000, etc., when confronted with a zero in the middle of a number such as 6,402 and in later grades when students begin working with decimals. Students should understand that a place value is being added to a number when it becomes 10 times greater because of the base-10 place value system.

To help develop this understanding, many learners need to model groups of 10 with the base-ten blocks. For example, in lesson 10-2 the Associative and Distributive Property of Multiplication are used to decompose the multiple of 10. In the *Visual Learning Animation*, the 20 is decomposed into 2 x10 so that the expression 4 x 20 becomes 4 x 2 x 10. Allowing students to build the two different but equivalent expressions with base-ten blocks makes these ideas more accessible and concrete for all students.

Focus Math Practice 7: Look for and make use of structure

The standard states, “Mathematically proficient students look closely to discern a pattern or structure” (NVACS, 2010, p. 8). To help students work towards security, consider connecting ideas for the “write a zero” rule to our base-10 place value system. Behaviors associated with MP.7 are described in the *Teacher's Edition (TE, pp. F27 - F27A)* and the Nevada Academic Content Standards for Mathematical Practice.

Looking ahead to the Topic Performance Assessment, students will have to apply strategies for division to answer item 6. Topic 4 developed students’ ability to reason and solve for division situations without having to formally divide.

Finally, please note there is an error in the *Teacher's Edition* on page 567. The error is indicated in the image; the multiplication symbol should be an addition symbol.

• Multiplication by multiples of 10 can be shown by using the Associative Property of Multiplication to regroup factors. The multiple of 10 can be broken into two factors. The Distributive Property can also be used to decompose a factor.

Example:	
Associative Property	Distributive Property
$8 \times 50 = 8 \times (5 \times 10)$	$8 \times 50 = (4 + 4) \times 50$
$8 \times 50 = (8 \times 5) \times 10$	$8 \times 50 = (4 \times 50) + (4 \times 50)$
$8 \times 50 = 40 \times 10$	$8 \times 50 = 200 + 200$
$8 \times 50 = 400$	$8 \times 50 = 400$

• After using different strategies to multiply by multiples of 10, students can use a rule: a basic fact can be multiplied first and then write one zero after the product.

Example: To find 7×40 , you can think: $7 \times 4 = 28$;
 $7 \times 40 = 280$.

Handwritten note: Error (pointing to the multiplication symbol in the distributive property example)

Meaningful Fluency Practice & Assessment:

For students to attain security with NVACS 3.OA.C.7 and 3.NBT.A.2 it is critical that the established meaningful fluency practice and assessment practices continue. Refer to Topic 1 for details about meaningful fluency practice and assessment practices. Topics 1-5 include games for meaningful fluency practice for multiplication and division (NVACS 3.OA.C.7). Topics 8 and 9 include games for meaningful fluency practice for multi-digit addition and subtraction within 1000 (NVACS 3.NBT.A.2). The following game will support students developing understanding of multiplying with 10s and provides sentence frames to support language development necessary for explanations.

Topic 10
Multiply by Multiples of 10

Number of Lessons: 4

A/D/E: 4 days

NVACS Focus:
NBT.A

Total Days: ~8

[3rd Grade Curriculum](#)

[Pacing Framework:](#)

[Balanced Calendar](#)

Phase 3: Multiply by Multiples of 10

- Materials: set of cards (0-9)
 Game board (one for each player)
 Sentence frames (one for each player)
 Counters and/or Base-10 blocks to support student understanding

Directions: Shuffle the cards and place them face down in a stack. Each player flips over two cards from the top of each stack and places the cards on the empty boxes on the gameboard (at the end of this document) to make the multiplication equation. Each player solves their own equation and explains their thinking, using the sentence frames (at the end of this document), if needed. The player with the largest product earns 1 point. Play continues until a player earns 10 points.

Essential Academic Vocabulary Use these words consistently during instruction.	
New Academic Vocabulary: <small>(First time explicitly taught)</small>	Review Academic Vocabulary: <small>(Vocabulary explicitly taught in prior grades or topics)</small>
open number line	<i>equation</i> <i>product</i> <i>multiple</i> <i>Associative Property of Multiplication</i> <i>Distributive Property of Multiplication</i>

Additional terminology that students may need support with: pattern, relationship, basic fact (see 10-3 Visual Learning Animation for details)

***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: "How are students applying place value understanding to add and subtract whole numbers?"

Lesson	Evidence	Look for
10-2	<i>Solve & Share</i> (student work samples)	Focus CTC around the big idea: <ul style="list-style-type: none"> look for students who explain the properties. differences and similarities between student examples. applying multiplication to multiples of 10 and use of basic facts.
10-4	<i>Quick Check</i> (digital platform) Items 1 and 3	Focus CTC around data analysis and collection of student workspace (scratch paper). Printable version available under "Teacher Resources". <ul style="list-style-type: none"> understanding patterns based on multiples of 10.

Learning Cycle Assessments (summative)	Topic Assessments SE pp. 567-570	Use <i>Scoring Guide</i> TE pp. 567-570A
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Standards listed in **bold** indicate a focus of the lesson.

NVACS (Content and Practices)	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Lesson 10-1: Use an Open Number Line to Multiply		
3.NBT.A.3 MP.2 MP.4 MP.7 MP.8	Access Prior Learning: In Topic 1, students learned how to use number lines to show multiplication and that multiplication is the joining of equal groups. Developing the Big Idea: Students <i>begin</i> to understand strategies for multiplying by a multiple of 10 by showing the multiplication on an open number line.	Topic Opener: Introduce the <i>Topic Essential Question</i> , "What are ways to multiply by multiples of 10?" (TE p. 535). Consider using this question to make an anchor chart with your student. As new ideas are added during the topic, students will see the development of ideas and make connections. You might also consider having students complete the <i>Review What You Know</i> prior to beginning instruction on Topic 10 so that you can respond to students' instructional needs using the <i>Item Analysis for Diagnosis and Intervention</i> (TE, p. 536-537). Consider introducing vocabulary as terms are encountered in the lessons rather than introducing all terms at the beginning of the lesson.
<i>-continues on next page-</i>		

		<p>Solve & Share: The questions provided in the <i>Build Understanding</i> (TE, p. 539) help students access prior learning in the conventions of using an open number line to show multiplication. Watch for students struggling to find an appropriate strategy and consider asking these questions to scaffold as students are working.</p> <p>If students do not offer a solution method similar to “Alex’s Work”, then consider discussing “Alex’s Work” as a class (TE, p. 539). Alex’s work shows an example of using repeated addition to solve for multiplication which helps to make the reasoning accessible to all students.</p> <p>Look Back: To support students’ development of MP. 7, consider discussing the <i>Look Back!</i> prompt and, if necessary, providing students with a multiplication table to help them develop conjectures for patterns with the 2’s facts, 10’s facts, and the facts they solved for in today’s <i>Solve & Share</i>.</p> <p>Independent Practice/Math Practices and Problem Solving: Consider assigning and discussing item 9 to help students develop schema for patterns that can be used when multiplying with 10s. This problem also offers language that can support students’ ability to connect multiplying facts they know to multiplying with 10s.</p> <p>Assess and Differentiate: If time permits, you may consider replacing the <i>Math and Science Activity</i> with games from previous topics or the <i>Fluency Practice Activity</i> (TE, p. 563).</p> <p>Child-watch to identify students who need additional support and consider the <i>Intervention Activity</i> provided (TE, p. 543A).</p>
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Lesson 10-2: Use Properties to Multiply

<p>3.NBT.A.3</p> <p>MP.1 MP.3 MP.6 MP.7</p>	<p>Access Prior Learning: In Topic 3, students learned the Associative and Distributive Properties of Multiplication.</p> <p>Developing the Big Idea: Students are further <i>developing</i> their understanding of strategies for multiplying by a multiple of 10 by using their understanding of place value and the properties of multiplication.</p>	<p>Solve & Share: Watch for students that say that Earl’s response is incorrect because he starts his argument with an equation that shows the product on the wrong side (e.g., $30 = 3 \times 10$). These students are misinterpreting the equal sign as a symbol for “the answer goes here” and need support on understanding the equal sign as a symbol that communicates equivalence.</p> <p>Look Back: Consider discussing the <i>Look Back!</i> prompt as a key idea to understanding the use of the Associative Property of Multiplication to get a basic fact.</p> <p>Visual Learning: Consider pausing and discussing strategies to answer, “How can you find the product 4×20?”.</p> <p>Convince Me: Consider assigning and discussing the <i>Convince Me!</i> to give students the opportunity to reason with the Associative Property of Multiplication after it’s been applied.</p> <p>Independent Practice/Math Practices and Problem Solving: Consider assigning item 16 <i>Number Sense</i> to support students’ development of number sense and the application of the Associative Property of Multiplication to reason with numbers.</p> <p>Assess and Differentiate: If time permits, you may consider replacing the <i>Problem Solving Reading Mat</i> with games from previous topics or the <i>Fluency Practice Activity</i> (TE, p. 563).</p> <p>Child-watch to identify students who need additional support and consider the <i>Intervention Activity</i> provided (TE, p. 549A).</p> <p>*CTC: <i>Solve & Share</i> (student work samples)</p>
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Lesson 10-3: Multiply by Multiples of 10

<p>3.NBT.A.3</p> <p>MP.1 MP.3 MP.4 MP.5 MP.7 MP.8</p>	<p>Access Prior Learning In the previous lesson, students used the properties of multiplication to multiply by a multiple of 10.</p> <p>Securing the Big Idea Students are <i>securing</i> their understanding of strategies for multiplying by a multiple of 10 by using their understanding of place</p>	<p>Solve & Share: Watch for students that appear to be struggling with 4×50, as the basic fact ends with zero. For these students have them identify the basic fact product (e.g., 20). An instructional suggestion is offered in <i>Prevent Misconceptions</i> (TE, p. 552).</p> <p>After students have shared their solution methods and reasoning, consider discussing the <i>Look Back!</i> prompt. Ask students to generalize and create a rule for multiplying with 10s based on their observations of patterns in the products in the <i>Solve and Share</i> problems.</p> <p>Visual Learning: Consider discussing the <i>Convince Me!</i> prompt if you feel your students need an additional opportunity to apply the Associative Property of Multiplication for multiplying by multiples of 10.</p> <p style="text-align: right;"><i>-continues on next page-</i></p>
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	value and the properties of multiplication.	<p>Independent Practice/Math Practices and Problem Solving: Consider assigning item 21 to give students the opportunity to reason about products made when multiplying by a multiple of 10, and how these ideas can be applied when the basic fact product ends in 0.</p> <p>Consider assigning item 23 <i>Algebra</i> to support students' reasoning with multiples of 10 when dividing. The strategy of thinking of division as an unknown factor problem can be very helpful in supporting students understanding of both operations.</p> <p>Assess and Differentiate: If time permits, you may consider replacing the <i>Math and Science Activity</i> with games from previous topics or the <i>Fluency Practice Activity</i> (TE, p. 563).</p> <p>Child-watch to identify students who need additional support and consider the <i>Intervention Activity</i> provided (TE, p. 555A).</p>
Lesson 10-4: Math Practices and Problem Solving- Look for and Use Structure		
<p>3.NBT.A.3</p> <p>MP.7</p> <p>MP.1</p> <p>MP.3</p> <p>MP.4</p> <p>MP.8</p>	<p>Access Prior Learning: In Grade 2, students learned how to use the structure of place value to compare numbers.</p> <p>Securing the Big Idea: In this lesson, students <i>secure</i> their understanding of strategies for multiplying by multiples of 10 by using the structure of the multiplication table and place value to solve problems.</p>	<p>This lesson provides an opportunity to focus on the Thinking Habits and display the behaviors associated with Math Practice 7, "<i>Look for and make use of structure.</i>" Refer to the <i>Math Practices and Problem Solving Handbook</i> (TE, pp. F27-F27A, F29) for suggestions on how to develop, connect and assess this Math Practice. Also reference the handbook in the Student Edition (SE, p. F27).</p> <p>Solve & Share: Consider revisiting MP. 7 Thinking Habits (SE p. F27) before introducing the <i>Solve & Share</i>. Asking the questions in <i>Build Understanding</i> can help students to make sense of the problem as they work to solve.</p> <p>Consider using the time when students are working on the <i>Solve & Share</i> as an opportunity to child-watch for behaviors associated with MP.7 that are listed in the <i>Math Practices and Problem Solving Handbook</i> (TE, p. F27A). After discussing student solution methods and reasoning, have students self-score for the behaviors associated with this math practice.</p> <p>Look Back: After students have had an opportunity to share, compare and discuss their solution methods and reasoning used for the <i>Solve and Share</i>, consider discussing the <i>Look Back!</i> prompt to extend opportunities for reasoning. Are students connecting ideas to place value and the properties of multiplication? Ask students to justify their explanations and if possible, generalize to create a rule for multiplying with multiples of 10.</p> <p>Convince Me: Consider assigning the <i>Convince Me!</i> as it provides an opportunity for students to generalize the understanding discussed in the <i>Visual Learning Animation</i> and reason more with MP.7.</p> <p>Assess and Differentiate: If time permits, you may consider replacing the <i>Problem Solving Reading Mat</i> with games from previous topics or the <i>Fluency Practice Activity</i> (TE, p. 563).</p> <p>Child-watch to identify students who need additional support and consider the <i>Intervention Activity</i> provided (TE, p. 561A).</p> <p>*CTC: <i>Quick Check</i> (digital platform)</p>

References

Common Core Standards Writing Team. (2015, March 6). *Progressions for the Common Core State Standards in Mathematics (draft). K-5, Numbers in Operations Base Ten*. 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

K-5Math. Multiples of Ten Multiply. Retrieved June 6, 2018 from <https://www.k-5mathteachingresources.com/support-files/multiples-of-ten-multiply.pdf>

Multiply by Multiples of 10

 x  $=$

Multiply by Multiples of 10

Sentence Frames

I know that _____ times _____
is _____, so _____ times tens
equals _____ tens or _____.

I know that _____ times _____
is _____, so _____ times tens
equals _____ tens or _____.

_____ times _____ means
_____ groups of tens, which is
_____ tens or _____.

_____ times _____ means
_____ groups of tens, which is
_____ tens or _____.