

► Grade 4 Topic 1: Generalize Place Value Understanding

Big Conceptual Idea: [K-5 Progression on Number and Operations in Base Ten](#) (pp. 12-15)

Prior to instruction, view the *Topic 1 Professional Development Video* located in *Pearson Realize online*. Read the *Teacher Edition (TE): Cluster Overview/Math Background* (pp. 1A-1F), the *Topic Planner* (pp. 1I-1J), all 5 lessons, and the *Topic Assessments* (pp. 41-42A).

<p>Mathematical Background: Read Cluster Overview (TE, pp. 1A-1F)</p>	<p>Topic Essential Questions: How are greater numbers written? How can whole numbers be compared? How are place values related?</p> <p><i>Reference TE p. 1 and Answering the Topic Essential Questions (TE, pp. 39-40) for key elements of answers to the Essential Questions.</i></p>
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<p>Topic 1 Generalize Place Value Understanding</p> <p>Number of lessons: 5</p> <p>A/D/E: 5 days</p> <p>NVACS Focus: NBT.A</p> <p>Total Days: ~10</p>

The lesson map for this topic is as follows:

1-1	1-2	1-3	1-4	1-5	Assessment
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5 A/D/E days used strategically throughout the topic.

[4th grade Curriculum](#)
[Pacing Framework:](#)
[Balanced Calendar](#)

Instructional note:

This topic focuses on place value understandings and relationships. Focus instruction on Nevada Academic Content Standards (NVACS) 4.NBT.A.1, 4.NBT.A.2 and 4.NBT.A.3. Emphasis for standard 4.NBT.A is “Place-value understanding requires an integration of new and difficult-to-construct concepts of grouping by tens (the base-ten concept) with procedural knowledge of how groups are recorded in our place-value scheme, how numbers are written, and how they are spoken” for whole numbers (Van de Walle, Karp, Bay-Williams, 2010, p. 188).

As students work with number names, Van de Walle, et. al., states, “there are several variations of the base-ten language for 53- 5 tens and 3; 5 tens and 3 ones; 5 tens and 3 singles; and so on. Each may be used interchangeably with the standard name, fifty-three” (p. 189). Students will develop the understanding that one place value position to the left is **ten times greater** than the previous place value position. For example, when comparing the values of the digit 4 in the whole number 440, 400 is ten times greater than 40.

In this topic, students will also compare and round whole numbers. Rounding whole numbers is one type of **estimation** strategy. “The term estimation refers to a number that is a suitable approximation for an exact number given the particular context” (Van de Walle, et al., 2010, p. 241). Rounding is one strategy used to estimate. Number lines are useful tools to help students round numbers. Other estimation strategies include; compatible numbers, front-end methods, clustering and using tens and hundreds. Students should be able to use and recognize words and phrases for estimation like; about, approximately, close to; etc. Van de Walle, et al., (2010) states,

Do not reward or emphasize the answer that is the closest. It is already very difficult for students to handle “approximate” answers; worrying about accuracy and pushing for the closest answers only exacerbates this problem. Instead, focus on whether the answers given are *reasonable* for the situation or problem at hand (p. 242).

Students should be able to use rounding flexibly and understand it conceptually, so it can be a useful estimation strategy (Van de Walle, et al., 2010).

Focus Math Practice 3: Construct viable arguments and critique reasoning of others

Focus opportunities for students to develop *Mathematical Practice 3* behaviors, as this is the focus of *Math Practices and Problem Solving* lesson 1-5. Reference the Teacher’s Edition (pp. F23-F23A) and the Nevada Academic Content Standards for Mathematical Practice (NVACS, 2010, pp. 6-8).

This topic has five lessons with additional days for assessment (A), differentiation (D) and enrichment (E) or (A/D/E). Finally, please note that lessons 1-1 and 1-2 indicate that these are possible 2-day lessons. Additional A/D/E days were built into the [2019/2020 WCSD 4th Grade Pacing Framework](#) so that you could take additional time to establish class routines and expectations for:

- Accessing and returning manipulatives
- Classroom discussion norms
- Mathematical Mindset (Growth vs. Fixed)
- Integrating ideas from the *Math Practices and Problem Solving Handbook* (TE, Vol 1, pp. F19-F36)
 - Pay particular attention to the ideas found in the *Problem Solving Guide* (p. F31)

***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 developing conceptual understanding around place value understanding and relationships?"

Lesson	Evidence	Look for
1-2	<i>Math Practice and Problem Solving</i> (student work samples) Item 14	Focus CTC around the big idea: <ul style="list-style-type: none"> students recognize the same digit will have a different value based on its place-value position.
1-4	<i>Convince Me!</i> (digital platform or student work samples)	Focus CTC around the big idea: <ul style="list-style-type: none"> students flexibility within place value to round. Printable version available under "Teacher Resources".

Learning Cycle Assessments (summative)	<i>Topic Performance Assessments</i> SE pp. 39-42	Use <i>Scoring Guide</i> TE pp. 39-42A
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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>
millions period	<i>place value</i> <i>expanding form</i> <i>greater than symbol</i> <i>less than symbol</i> <i>rounding</i> <i>conjecture</i>

Additional terminology that students may need support with: number names, value, relationship, generalize, digit

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

NVACS <small>(Content and Math Practices)</small>	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Lesson 1-1: Numbers Through One Million		
4.NBT.A.2 MP.2 MP.3 MP.5 MP.6 MP.7	Access Prior Learning: In third grade, WCSD's outcome is students are to work with whole numbers in the ten thousands. Beginning of the Big Idea: Students will read, write and compare multi-digit numbers. Students will work with whole numbers to the millions, but may need some work around numbers less than the millions place.	(Possible 2-day lesson) Day 1: Topic Opener: Consider having students answer the Essential Questions before beginning the lesson. This will give you an idea of what students may know regarding place value understanding and relationships. You may also want to consider doing the <i>Review What You Know</i> which will give you an item analysis and Intervention based on how students perform. Consider using a blank page or a separate math journal, so students have more space to explain their thinking and to include learning opportunities. For example, students may make their own place-value chart in the journal. Solve & Share: Consider using item 13 "MP.5 Use Appropriate Tools" or item 17 "Higher Order Thinking" for your <i>Solve & Share</i> (SE, p. 8). These problems have a higher cognitive demand and may elicit more strategies or models as you begin setting up problem solving routines. Introduce problem-solving routines, tool use and management strategies. Students should have access to, and be encouraged to use tools throughout the math instruction. Day 2: Visual Learning: In the <i>Visual Learning Animation</i> , mathematical vocabulary is introduced throughout the animation. Consider the use of a Math Focus Wall for vocabulary and emphasizing accurate mathematical terminology or language use throughout the lesson.
<i>-continues on next page-</i>		

		<p>Consider making a Place Value Anchor Chart or referring/adding to a Place Value Poster to support the <i>Visual Learning Animation</i> and <i>Guided Practice</i> portions of the lesson. This anchor chart or poster should have pictures that show place value positions and their relationships. Consider having students make and add to a place-value chart in their math journals. You will need room to add details as you progress through the lessons in Topic 1.</p> <p>Guided Practice: Consider a math discussion around item 2, to elicit knowledge students have regarding place-value understanding specifically to relationships between moving from one period to the next.</p> <p>Independent Practice/Math Practices and Problem Solving: Remember, students do NOT need to do all the problems in their Student Edition. Ask students to complete the <i>Quick Check</i> items (marked with a pink check mark) first and continue on to other items as appropriate.</p> <p>Note: If item 17 was used in lieu of the <i>Solve & Share</i>, consider using item 13 as a <i>Quick Check</i> replacement.</p> <p>Assess and Differentiate/Intervention Activity: If students are having difficulty in expanded form and number names, consider using the <i>Intervention Activity</i> (TE, Vol. 1, p. 9A) with a group of students or the whole class. Additional problems can be found online under <i>Practice Buddy</i> or <i>Re-teach page</i>.</p> <p>Homework & Practice: Item 11 reinforces the <i>Solve & Share</i> (item 17) and <i>Quick Check</i> (item 13). Consider using this item as part of the formative assessment process in class or for homework.</p>
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Lesson 1-2: Place Value Relationships

<p>4.NBT.A.1 4.NBT.A.2</p> <p>MP.2 MP.3 MP.8</p>	<p>Access Prior Learning: In previous grades, students learned the size of the number does not change the relationship between place values within the number.</p> <p>Beginning of the Big Idea: Students will begin to explore the relationship between each place in a number. Students begin to understand the place value to the left is ten times greater than the previous position.</p>	<p>(Possible 2-day lesson)</p> <p>Day 1:</p> <p>Solve & Share: Consider using item 14 in the <i>Math Practices and Problem Solving</i> for your <i>Solve & Share</i>. This problem has a higher cognitive demand and may elicit more strategies or models as you continue setting up problem solving routines. Students should have access to, and be encouraged to use tools throughout math instruction.</p> <p>Day 2:</p> <p>Visual Learning: Consider having students make their own place value chart as you add to your anchor chart or place-value poster. Students may need some opportunity to use place value blocks to develop their understanding of larger numbers. Students were given some place-value blocks in their tool bag (concrete) but may use Teaching Tool 4 and 5 (representational) (located in <i>Teacher's Resource Masters Vol. 2</i>) to help build the big idea.</p> <p>Convince Me: Consider using the <i>Convince Me!</i> as part of the formative assessment process based on the big idea. Students need to understand the digits are the same, but the value of those digits are different due to place value position.</p> <p>Another Example: <i>Another Example!</i> may appear in the lesson. Some reiterate the mathematical focus of the <i>Visual Learning Animation</i>, while others may introduce relevant new information needed for understanding the big idea.</p> <p>Assess and Differentiate/Intervention Activity: Consider doing the <i>Intervention Activity</i> (TE, Vol. 1, p. 15A) with the whole class. Some students may write whole numbers where the same digit is next to each other (i.e., 9,972), or students may write whole numbers such as 9,989 where multiple digits are the same but in different place value positions. In doing this activity, students will continue their understanding of place value relationships and positions of the digits.</p> <p>*CTC: <i>Math Practice and Problem Solving Item 14</i> (student work samples)</p>
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Lesson 1-3: Compare Whole Numbers		
<p>4.NBT.A.2</p> <p>MP.1 MP.2 MP.3 MP.4</p>	<p>Access Prior Learning: Students worked on comparing numbers less than 1,000 in previous grades.</p> <p>Developing the Big Idea: In this lesson, students will continue to develop place-value understanding by using strategies (example: number lines, place value charts) to compare the relative magnitude of multi-step whole numbers.</p>	<p>Note: When comparing whole numbers, be cautious as students may develop a misconception if a number is "longer" it has a greater value. This misconception may not be exposed in this topic, but as students begin their work with comparing rational numbers, fractions and decimals in later topics or grades the misconception may surface. For example, 484.03 and 484.3 students may say $484.03 > 484.3$ because it is "longer", but it does not have a greater value, $484.03 < 484.3$.</p> <p>Solve & Share: If students do not use a number line or place value chart to compare multi-digit whole numbers as a strategy, then consider using <i>Analyze Student Work</i> (TE p. 17, and available online under the <i>Solve & Share</i> as "Teacher Resources") to display Marco's Work (place-value chart) and Liana's Work (number line) and have students analyze and critique their strategies.</p> <p>Visual Learning: The <i>Visual Learning</i> gives students another strategy to use when comparing multi-digit whole numbers, which connects to the <i>Solve & Share</i> strategies students shared and compared.</p> <p>Convince Me: Consider using the <i>Convince Me!</i>, as it may help with students' developing conceptions (misconception). When discussing the solution with your class, make sure <u>whole numbers</u> is emphasized. This will not be the case when students begin work with rational numbers, fractions and decimals.</p> <p>Independent Practice/Math Practices and Problem Solving: Remember, students do NOT need to do all the problems in their student edition. Ask students to complete the <i>Quick Check</i> items (marked with a pink check mark) first and continue on to other items as appropriate.</p>
Lesson 1-4: Round Whole Numbers		
<p>4.NBT.A.3</p> <p>MP.2 MP.3 MP.5</p>	<p>Access Prior Learning: In third grade (3.NBT.A.1), students estimated by rounding whole numbers to the nearest 10 or 100.</p> <p>Developing the Big Idea: In this lesson, students will estimate by rounding whole numbers to the nearest thousand, ten thousand and hundred thousand.</p>	<p>Note: Rounding is one of many estimation strategies. Ensure students understand that rounding is not separate from estimation; it is one type of estimation.</p> <p>Solve & Share: You may consider extending the <i>Solve & Share</i> by having students explain why they chose their whole numbers close to 300. When discussing the <i>Solve & Share</i>, consider using the language of underestimate and overestimate. Students can decide if the numbers they chose gave an underestimate or overestimate when rounding to 300.</p> <p>Visual Learning: Consider starting an anchor chart with estimation strategies and adding to the chart as estimation strategies arise throughout the year.</p> <p>Convince Me: Consider using the <i>Convince Me!</i> as part of the formative assessment process or as a discussion, regarding rounding and what it means to round. See the "Instructional Note" for additional information.</p> <p>Independent Practice/Math Practices and Problem Solving: Consider a focus on item 34 as it reiterates the discussion from <i>Solve & Share</i>.</p> <p>*CTC: <i>Convince Me!</i> (digital platform or student work samples)</p>
Lesson 1-5: Math Practices and Problem Solving- Construct Arguments		
<p>4.NBT.A.1 4.NBT.A.2 4.NBT.A.3</p> <p>MP.3 MP.1 MP.2 MP.6</p>	<p>Access Prior Learning: In previous grades, students have constructed arguments.</p> <p>Developing the Big Idea: When constructing an argument, students should analyze the information given and use previously learned concepts to draw conclusions.</p>	<p>Solve & Share: Consider having students work on the problem independently and then have students work together to make a poster of one of their strategies or models by asking students to justify their reasoning. Next, engage students in a Gallery Walk (ELL Toolkit pg. 22) where students will analyze and evaluate other groups' responses by providing complete and clear explanations of their thinking.</p> <p>Visual Learning: The mathematical vocabulary word, conjecture is discussed in the <i>Visual Learning Animation</i>. This word should have been introduced in the 3rd grade instructional materials, however, consider further discussions regarding the idea of conjecture.</p> <p>Convince Me: Consider using the <i>Convince Me!</i> as part of the formative assessment process, or as a place to model the thinking habits for constructing arguments. Even though students have constructed arguments in previous grades, they still need to hear and see those thinking habits.</p>

References

- 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.
- Van de Wall, J., Karp, K., & Bay-Williams, J. (2010). *Elementary and middle school mathematics: Teaching developmentally*. Boston, MA: Pearson

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