CLAREZA ACADEMY

Grade 4 -- Mathematics Math

Free sample: Unit 1, Lessons 1 to 8

These are 8 lessons from *Clareza Grade 4: Mathematics*, a fourth grade year a parent runs at the kitchen table. Each lesson is a short script for you, a page to read together, and a practice sheet you may copy for your household. Answers are at the back.

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Clareza Grade 4: Mathematics. Sample edition.

Clareza is a secular curriculum. Standards references: Common Core State Standards and the Next Generation Science Standards.

MATH · UNIT 1

Place Value to One Million

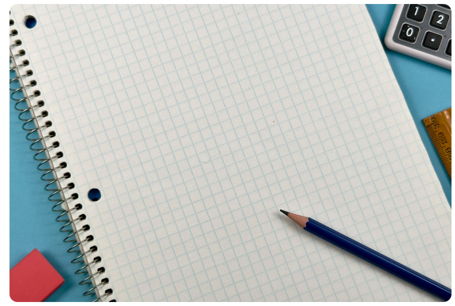
Your child learns to read, write, compare, and round numbers up to a million, always with a place value chart or number line next to the numbers so digits never float free of meaning. This is the same grouping idea from grade 3 (tens, hundreds, ones), just stretched further, with the added idea of "periods", the comma-separated groups of three digits.

In this unit

1. Place value of a digit within a number up to 1,000,000
2. Standard, expanded, and word form of multi-digit numbers
3. Periods (ones, thousands, millions) as a grouping structure in the base-ten system
4. Comparison of multi-digit numbers using place value
5. The relationship between digit count and number size
6. Rounding multi-digit numbers to a specified place
7. Justification of a rounding decision using benchmark position
8. Place value, comparison, and rounding applied to an unfamiliar real-world numeric context

MATH · UNIT 1 · LESSON 1

Place value of a digit within a number up to 1,000,000



Goal: Identify the value of a digit in a multi-digit number based on its position, up to the millions place.

About 20 minutes

Teach it FOR THE PARENT

1. **Say:** Look at the number 55,555. Every digit is a 5. Are they all worth the same amount? Think about that for a second.
   Look for: Student guesses no, because position might matter, even without knowing the rule yet.
2. **Say:** Each spot in a number has a name: ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions. A digit's value is the digit times its place. The same digit is worth more in a bigger place.
   Look for: Student can repeat that value depends on place, not just the digit.
3. **Say:** Let's find the value of the 6 in 4,672,193. First I find its place: hundred thousands. Then I multiply: 6 × 100,000 = 600,000. Check: does that match a hundred-thousands spot? Yes.
   Look for: Student follows the two steps: name the place, then multiply.
4. **Say:** Your turn. Find the value of the 3 in 231,509. Name its place first. Then multiply the digit by that place.
   Look for: Student states ten thousands place, then answers 30,000.
5. **Say:** In 55,555, is the leftmost 5 worth the same as the rightmost 5? Tell me the value of each one.
   Look for: Student says leftmost 5 is 50,000 and rightmost 5 is 5, showing position changes value.
6. **Say:** Now you'll practice finding digit values in bigger numbers, all the way up to the millions place. Always name the place first, then multiply.
   Look for: Student is ready to start independent items using the same two-step method.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

Every digit in a number has a job. Its job depends on where it sits. In 458,201 the 5 sits in the ten-thousands spot. That means the 5 is worth 50,000, not just 5. Think of each spot like a different-size box. A digit in a small box is worth less. The same digit in a big box is worth much more. To find a digit's value, name its spot, then write the digit followed by zeros to fill that spot.

Going further: A digit's value depends on its place, not just the digit itself. Place value names each spot: ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions. To find the value of a digit, multiply the digit by its place. In 458,201, the 5 is in the ten thousands place, so its value is $5 \times 10{,}000 = 50{,}000$. The same digit changes value completely when its place changes.

Watch it work

What is the value of the 6 in 4,672,193?

1. Write the number with place labels under each digit: 4=millions, 6=hundred thousands, 7=ten thousands, 2=thousands, 1=hundreds, 9=tens, 3=ones.
2. Find the digit 6. It sits in the hundred thousands place.
3. Multiply the digit by its place: $6 \times 100{,}000$.
4. The value of the 6 is 600,000.

The idea: The value of a digit is the digit times its place, not the digit alone.

What is the value of the 3 in 231,509?

1. Label each place: 2=hundred thousands, 3=ten thousands, 1=thousands, 5=hundreds, 0=tens, 9=ones.
2. Find the digit 3. It sits in the ten thousands place.
3. Multiply the digit by its place: $3 \times 10{,}000$.
4. The value of the 3 is 30,000.

The idea: Even a small-looking digit can have a big value if it sits in a big place.

Practice: Place value of a digit within a number up to 1,000,000

1. What is the value of the 7 in 3,721?

(A) 700 (B) 7 (C) 7,000 (D) 70

2. What is the value of the 5 in 458,201?

(A) 5 (B) 5,000 (C) 50,000 (D) 500,000

3. What is the value of the 8 in 2,809,415?

(A) 80,000 (B) 8 (C) 8,000,000 (D) 800,000

4. Which is bigger: 45,000 or 9,000,000?

(A) 45,000, because it has fewer zeros so it must be smaller (B) They are equal

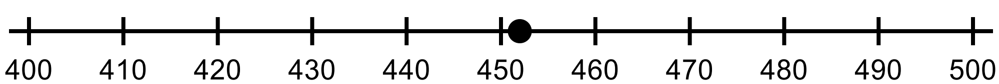
(C) 9,000,000, because it has a digit in the millions place

(D) 45,000, because 4 comes before 9

5. What is the value of the 4 in 4,672,193?

(A) 4,000,000 (B) 40,000,000 (C) 4 (D) 400,000

6. Round 452,000 to the nearest hundred thousand.



in thousands: 400,000 to 500,000, mark at 452,000

(A) 500,000 (B) 400,000 (C) 450,000 (D) 460,000

Standard, expanded, and word form of multi-digit numbers

Goal: Write a multi-digit number up to 1,000,000 in standard, expanded, and word form.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Look at this number: 512,038. I can write it three ways. Standard: 512,038. Expanded: 500,000 + 10,000 + 2,000 + 30 + 8. Word: five hundred twelve thousand, thirty-eight. Notice the 0 in the hundreds place disappears in the other two forms, it holds a spot but adds no value.
   Look for: Student can point to which form is which and notice the zero contributes nothing to expanded or word form.
2. **Say:** Take the number 274,905. Your first job: write it in expanded form. Write the value of each digit that is not zero, joined with plus signs.
   Look for: 200,000 + 70,000 + 4,000 + 900 + 5, with zero-value places correctly skipped.
3. **Say:** Same number, 274,905. Now write it in word form. Name the thousands period first, then the ones period, and put a comma between them.
   Look for: two hundred seventy-four thousand, nine hundred five, correct period names and comma placement.
4. **Say:** Now I'll give you words instead: six hundred three thousand, eighty. Your job: write the standard form. Turn each period into its 3-digit group.
   Look for: 603,080, correct digit placement including zero as a placeholder.
5. **Say:** You just moved a number between all three forms. The practice questions ask you to do the same thing, read the form you're given, and write the one that's missing.
   Look for: Student is ready to start independent items.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

A number can be written three ways. Standard form uses digits, like 452,301. Word form spells it out, like four hundred fifty-two thousand, three hundred one. Expanded form shows what each digit is worth, added up: 400,000 + 50,000 + 2,000 + 300 + 1. It's like a name, a photo, and a recipe for the same number.

Going further: Standard form is digits grouped by commas: 452,301. Expanded form breaks the number into the value of each digit, added: 400,000 + 50,000 + 2,000 + 300 + 1. Word form spells the number using period names (thousand) and hyphens in two-digit numbers: four hundred fifty-two thousand, three hundred one. Every digit's value equals the digit times its place value.

Watch it work

Write 306,024 in expanded form and word form.

1. Read the digits by place: 3 hundred-thousands, 0 ten-thousands, 6 thousands, 0 hundreds, 2 tens, 4 ones.
2. Skip any digit that is 0, it adds no value, so it is left out of expanded form.
3. Expanded form: 300,000 + 6,000 + 20 + 4.
4. Word form: three hundred six thousand, twenty-four.

The idea: Zero digits still hold a place but add nothing to expanded or word form.

Write nine hundred forty thousand, five hundred in standard form and expanded form.

1. Split the words at the comma: 'nine hundred forty' is the thousands period, 'five hundred' is the ones period.
2. Write the thousands period digits: 940, then the ones period digits: 500.
3. Combine with a comma: 940,500.
4. Expanded form: 900,000 + 40,000 + 500.

The idea: Each period in word form becomes a 3-digit group in standard form, separated by commas.

Practice: Standard, expanded, and word form of multi-digit numbers

1. What is the expanded form of 45,213?

(A) 40,000 + 5,000 + 200 + 10 + 3 (B) 40,000 + 5,000 + 20 + 1 + 3

(C) 4 + 5 + 2 + 1 + 3 (D) 45,000 + 200 + 13

2. What is the word form of 812,000?

(A) eighty-one thousand, two hundred (B) eight hundred twelve thousand

(C) eight hundred twelve thousand, zero (D) eight hundred twelve

3. What is the standard form of 300,000 + 20,000 + 4,000 + 60 + 7?

(A) 324,670 (B) 324,067 (C) 324,607 (D) 32,467

4. What is the value of the digit 7 in 573,central,412? (the number is 573,412)

(A) 70,000 (B) 7 (C) 7,000 (D) 700,000

5. Write nine hundred five thousand, sixty in standard form.

(A) 95,060 (B) 905,600 (C) 900,560 (D) 905,060

6. Which number is larger: 89,999 or 100,004?

(A) 100,004, because it has a digit in the hundred-thousands place and 89,999 does not

(B) They are equal in size, since both numbers have either five or six digits and that is close enough to be the same

(C) 89,999, because it has more nonzero digits (D) 89,999, because 9 is the biggest digit

MATH · UNIT 1 · LESSON 3

Periods (ones, thousands, millions) as a grouping structure in the base-ten system

Goal: Explain why grouping digits into periods of three helps read and write large numbers.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Look at this number: 1,205,040. I read it in three small chunks: one million, two hundred five thousand, forty. Each chunk has three digits. Each chunk gets its own name. That's the whole trick.
   Look for: Student notices the number is split into three-digit chunks, each read like a small number, each with a group name attached.
2. **Say:** Part 1: Pick a number from the box on your page. Split it into its periods using commas. Write down each chunk by itself, like I did with 1,205,040.
   Look for: Student correctly splits the chosen number into groups of three digits, matching the comma positions.
3. **Say:** Part 2: Now write one sentence that explains why splitting into three-digit chunks makes the number easier to read than reading all the digits at once.
   Look for: Sentence names the specific benefit: smaller chunks, each read the same way, instead of tracking many digits at once. Not just 'it's easier'.
4. **Say:** Part 3: Write a second sentence using your own number as the example. Show the chunks and their period names, like: '325 is the thousands period.'
   Look for: Student ties the general reason from Part 2 to their specific number, naming at least one period correctly.
5. **Say:** You just explained why periods help, using your own number. Now try the practice questions. Some ask you to spot the same idea in new numbers.
   Look for: Student moves into practice ready to apply the periods idea to numbers they have not seen yet.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

A period is a group of three digits, like ones, thousands, or millions. Commas split big numbers into these groups. Each group is read like a small number under 1,000, then you say its group name. Think of 5,672,100. Split it: 5 / 672 / 100. Read each chunk small: five, six hundred seventy-two, one hundred. Add the group names: million, thousand, (nothing). That gives five million, six hundred seventy-two thousand, one hundred. Grouping turns one scary long number into three easy small numbers.

Going further: Our base-ten system groups digits into periods of three: ones, thousands, millions. Each period is read the same way, using hundreds, tens, and ones within that group. Commas mark where one period ends and the next begins. This means you never read more than three digits at once. For 4,325,000, you read '4' as the millions period and '325' as the thousands period. The pattern repeats because place value is built on groups of ten, and grouping by three keeps each chunk small enough to read at a glance.

Watch it work

Explain why grouping into periods helps read 5,672,100.

1. Split by commas: 5 / 672 / 100. Each group has three digits.
2. Read each group like a small number under 1,000: five, six hundred seventy-two, one hundred.
3. Attach the period name to each group except the last: million, thousand, (no name for ones).
4. Say it all together: five million, six hundred seventy-two thousand, one hundred.
5. Without grouping, you would have to read 5672100 as one long string, with no clear break.

The idea: Periods turn one long number into a few short, easy-to-read chunks.

Explain why grouping into periods helps write 'three million, forty thousand, six' in digits.

1. Find each period name: million, thousand, ones.
2. Write the digits for the millions period: 3.
3. Write the digits for the thousands period: 040 (forty needs a leading zero to fill three spots).
4. Write the digits for the ones period: 006.
5. Put the periods together with commas: 3,040,006.

The idea: Each period always holds exactly three digit spots, even when zeros are needed to fill them.

Practice: Periods (ones, thousands, millions) as a grouping structure in the base-ten system

1. In 6,381,204, which three digits make up the thousands period?

6 , 381 , 204

(A) 381 (B) 204 (C) 638 (D) 6

2. Why do we put commas in 2,450,900 instead of writing 2450900?

(A) Commas are only needed when you are writing amounts of money, not for other numbers

(B) Commas mark where each three-digit period starts, so it is easier to read

(C) Commas make the number bigger

3. A student says 45,231 is bigger than 9,000,000 because 45,231 'looks longer to say'. What is wrong with that reasoning?

(A) 45,231 has fewer digits, so it belongs to a smaller period than 9,000,000

(B) Nothing is wrong; more digits spoken means a bigger number

(C) 9,000,000 is smaller because it has fewer non-zero digits

4. Which sentence best explains why periods make 7,048,300 easier to write correctly?

(A) Each period holds exactly three digit spots, so you know how many zeros to fill in

(B) Periods let you skip writing any zeros

(C) Periods only matter for reading numbers out loud to other people, not for writing them down on paper

5. In 3,502,000, what is the value of the digit 5?

3 , 502 , 000

(A) 5 (B) 50,000 (C) 500,000

6. Which explanation correctly connects periods to reading 812,004,700?

812 , 004 , 700

(A) Read all nine digits in order from left to right without stopping at any of the commas along the way

(B) Read 812 as the millions period, 004 as the thousands period, and 700 as the ones period

(C) Read only the first three digits, 812, and ignore all of the rest of the number after the comma

MATH · UNIT 1 · LESSON 4

Comparison of multi-digit numbers using place value

Goal: Compare two multi-digit numbers up to 1,000,000 using >, <, or =, based on place value.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Two players score points: Player A gets 356,000. Player B gets 89,999. Who won? Don't guess yet, let's find a way to always get this right.
   Look for: Student attempts an answer using place value or digit count, giving Clara a starting point to correct or confirm.

2. **Say:** To compare big numbers, line them up by place, right side lined up. Start at the LEFT, the biggest place. Compare digit by digit until you find one place that's different. That place decides the winner.
   Look for: Student can restate: start left, find first place that differs, that digit decides.

3. **Say:** Let's compare 456,789 and 456,912. Same digit count. Check hundred thousands, ten thousands, thousands, all equal. Now hundreds: 7 vs 9. Which is bigger?
   Look for: Student identifies 9 > 7 , concludes 456,789 < 456,912.

4. **Say:** Now compare 82,540 and 725,300. Count the digits first. Does more digits always mean bigger? Check the value of the leading digit to be sure.
   Look for: Student notices 725,300 has a digit in the hundred thousands place worth 700,000, so it wins even though digit count looks like the obvious clue.

5. **Say:** Your turn. Compare 304,150 and 340,020. Work left to right, place by place. Which sign goes in the middle: >, <, or =?
   Look for: Student compares hundred thousands (3=3), then ten thousands (0 vs 4), correctly picks 304,150 < 340,020.

6. **Say:** You just compared numbers by checking place value, left to right, not by counting digits. Now try it on your own with the practice questions.
   Look for: Student moves into independent practice ready to apply the left-to-right place value method.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

To compare two big numbers, line up their place value charts. Start at the left, the biggest place. Compare digits in the same place, one place at a time. The first place where digits differ tells you which number is bigger. If a number has more digits, check the values first, don't just count digits.

Going further: Compare multi-digit numbers by place value, left to right. Line up digits by place: hundred thousands, ten thousands, thousands, hundreds, tens, ones. Find the leftmost place where digits differ. The bigger digit in that place makes the whole number bigger, no matter what happens in smaller places. Use >, <, or = to show the comparison.

Watch it work

Compare 456,789 and 456,912. Use >, <, or =.

1. Line up the digits by place: 456,789 456,912
2. Compare from the left: hundred thousands 4=4, ten thousands 5=5, thousands 6=6. All match so far.
3. Compare the next place, hundreds: 7 vs 9. 7 is less than 9.
4. Since hundreds is the first place that differs, stop there. 456,789 < 456,912

The idea: When digit counts match, move left to right until you find the first place that differs, that place decides it.

Compare 82,540 and 725,300. Use >, <, or =.

1. Count the digits: 82,540 has 5 digits. 725,300 has 6 digits.
2. More digits usually means a bigger number, but check the value to be sure.
3. 82,540 has no hundred thousands place (its leading digit 8 is ten thousands). 725,300 has 7 in the hundred thousands place, worth 700,000.
4. 700,000 is far bigger than any 5-digit number. 82,540 < 725,300

The idea: A number with more digits is usually bigger, but always check the value of the leading digit, don't just count digits.

Practice: Comparison of multi-digit numbers using place value

1. Compare 82,304 and 82,540. Which sign is correct?

82,304 ___ 82,540

(A) 82,304 > 82,540 (B) 82,304 = 82,540 (C) 82,304 < 82,540

2. Compare 45,000 and 9,200,000. Which sign is correct?

45,000 ___ 9,200,000

(A) 45,000 = 9,200,000 (B) 45,000 > 9,200,000 (C) 45,000 < 9,200,000

3. What is the value of the 5 in 458,201?

(A) 5 (B) 500,000 (C) 50,000 (D) 500

4. Compare 673,410 and 673,140. Which sign is correct?

673,410 ___ 673,140

(A) 673,410 = 673,140 (B) 673,410 < 673,140 (C) 673,410 > 673,140

5. Compare 512,900 and 89,999. Which sign is correct?

512,900 ___ 89,999

(A) 512,900 = 89,999 (B) 512,900 > 89,999 (C) 512,900 < 89,999

6. Compare 928,001 and 928,010. Which sign is correct?

928,001 ___ 928,010

(A) 928,001 < 928,010 (B) 928,001 = 928,010 (C) 928,001 > 928,010

MATH · UNIT 1 · LESSON 5

The relationship between digit count and number size

Goal: Determine whether a number with more digits is always greater, by comparing counterexamples.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Which is bigger: 45,000 or 9,000,000? Look at the digits, not just the count. Tell me your answer before I show you mine.
   Look for: Student picks 9,000,000 and gives some reason, even a shaky one.
2. **Say:** More digits usually means a bigger number. That's because each new place is ten times bigger. But 'usually' is not 'always.' We have to check.
   Look for: Student can repeat that more digits is a hint, not a guarantee.
3. **Say:** Watch me test 720,000 and 68,000. I count digits first, then I check the leftmost place value to be sure. Which place is bigger?
   Look for: Student can name hundred-thousands as bigger than ten-thousands.
4. **Say:** Now you test 999,999 and 1,000,000. Which has more digits? Which is actually bigger?
   Look for: Student sees 1,000,000 has one more digit and is greater, so digit count held even at this tricky boundary.
5. **Say:** New pair: 3,400,000 and 890,000. Is the one with more digits bigger? Check the leftmost place value to be sure.
   Look for: Student compares millions place to hundred-thousands place and confirms 3,400,000 is greater.
6. **Say:** So digit count is a good clue, but checking the leftmost place value is the rule that never fails. Let's practice finding pairs where digit count could trick someone.
   Look for: Student is ready to reason about digit count versus place value on new number pairs.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

More digits usually means a bigger number. But not always! Compare 45,000 and 9,000,000. 45,000 has 5 digits. 9,000,000 has 7 digits. 9,000,000 is way bigger, that fits the rule. Now try 999,999 and 1,000,000. Both have lots of digits, but check carefully. 1,000,000 has 7 digits, 999,999 has 6 digits. So 1,000,000 wins. The real rule: always check the leftmost digit's place value first. Digit count is just a hint, not proof.

Going further: A number with more digits is usually greater, but 'usually' is not 'always.' The digit count rule works because each new place is ten times bigger than the last. To be sure, compare the leftmost (highest) place value first, then move right if needed. This works every time, even for tricky pairs like 999,999 versus 1,000,000. Counterexamples test a rule's limits. Finding one proves the rule is not universal, even if it holds most of the time.

Watch it work

Is a number with more digits always greater? Test with 45,000 and 9,000,000.

1. Count digits: 45,000 has 5 digits. 9,000,000 has 7 digits.
2. Compare leftmost place value: 4 is in ten-thousands. 9 is in millions.
3. Millions place is bigger than ten-thousands place.
4. So 9,000,000 is greater. Digit count matched the answer here.

The idea: More digits matched greater value this time, but one match does not prove 'always.'

Test the rule again with 720,000 and 68,000.

1. Count digits: 720,000 has 6 digits. 68,000 has 5 digits.
2. Compare leftmost place value: 7 is in hundred-thousands. 6 is in ten-thousands.
3. Hundred-thousands is bigger than ten-thousands.
4. So 720,000 is greater. Digit count matched again.

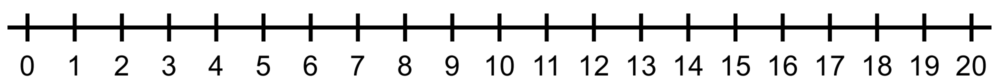
The idea: Checking leftmost place value is the method that always works, not counting digits.

Practice: The relationship between digit count and number size

1. Which number is greater: 8,000,000 or 720,000?

- (A) They are equal, since 8 and 720 are both just numbers in front of zeros
- (B) 8,000,000, because it has a digit in the millions place
- (C) 720,000, because the digit 7 is a bigger digit than the digit 8 when you compare them

2. Does the number with more digits always win? Test 45,000 and 9,000,000.



Not to scale, just for comparing size

- (A) No, because 45,000 is greater since it was written first in the problem, and first always wins
- (B) Yes, 9,000,000 is greater, and this fits the more-digits rule
- (C) No, because 45,000 and 9,000,000 are the same size once you take away all of the zeros

3. What is the value of the 5 in 458,201?

(A) 500 (B) 50,000 (C) 5

4. Which is greater: 999,999 or 1,000,000?

- (A) 999,999, because all of its digits are 9, which is the biggest digit there is, so it must be bigger
- (B) 1,000,000, because it has one more digit and a value in the millions place
- (C) They are equal

5. A student says: 'The number with more digits is always bigger.' Find a pair of numbers that shows this is not always true.

- (A) There is no such pair. More digits always means bigger
- (B) 45,000 and 9,000,000, because 45,000 has fewer digits but feels bigger
- (C) Actually, digit count always correctly predicts which number is bigger, when both numbers are written normally without extra zeros

6. Round 452,000 to the nearest hundred thousand.

(A) 500,000 (B) 450,000 (C) 400,000

MATH · UNIT 1 · LESSON 6

Rounding multi-digit numbers to a specified place

Goal: Round a multi-digit number to a specified place using a number line model.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Quick question: is 452,000 closer to 400,000 or 500,000? Take a guess, we'll check it in a second.
   Look for: A guess, right or wrong; just engagement with the idea of 'closer.'
2. **Say:** Rounding means picking the closer round number. On a number line, we find the two marks around our number, then check ONE digit, the digit right after the place we're rounding to. 5 or more, round up. 4 or less, round down.
   Look for: Nothing graded here; listening.
3. **Say:** Let's round 452,000 to the nearest hundred thousand. The marks are 400,000 and 500,000. The digit right after the hundred-thousands place is 5. What does that tell us, round up or down?
   Look for: Says 'round up' because the digit is 5 or more.
4. **Say:** So 452,000 rounds to 500,000. Now let's try 83,400 to the nearest thousand. The marks are 83,000 and 84,000. What's the digit right after the thousands place?
   Look for: Identifies the hundreds digit, 4, and says round down to 83,000.
5. **Say:** Your turn, fresh number: round 267,300 to the nearest ten thousand. What are the two ten-thousand marks around it, and which way does it round?
   Look for: States marks 260,000 and 270,000, checks the thousands digit (7), rounds up to 270,000.
6. **Say:** You've got the routine: find the two marks, check the one digit after your place, round that way. Let's practice it on more numbers now.
   Look for: Ready to move into independent items.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

Rounding means finding a close, simpler number. Picture a number line with your number as a dot. Find the two 'round' numbers on either side of it, like 40,000 and 50,000. Your number is closer to one of them. That closer one is your answer. Look at the digit right after the place you're rounding to, that digit tells you which way to go.

Going further: To round to a place, find the two multiples of that place on a number line, one below and one above your number. Check the digit right after the rounding place. If that digit is 5 or more, round up to the higher mark. If it's 4 or less, round down to the lower mark. Example: rounding 452,000 to the nearest hundred thousand uses 400,000 and 500,000 as the marks.

Watch it work

Round 452,000 to the nearest hundred thousand.

1. Find the two hundred-thousand marks around it: 400,000 and 500,000.
2. Draw them as the ends of a number line, with 452,000 as a dot between them.
3. Look at the digit right after the hundred-thousands place: it's 5 (in 452,000, that's the ten-thousands digit).
4. A digit of 5 or more means round up. 452,000 rounds to 500,000.

The idea: The number line shows two nearby round numbers; the digit after the rounding place picks which one is closer.

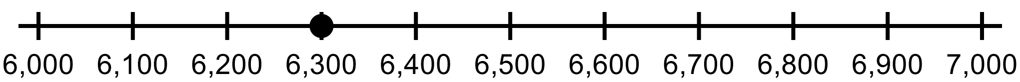
Round 83,400 to the nearest thousand.

1. Find the two thousand marks around it: 83,000 and 84,000.
2. Place 83,400 as a dot between them on a number line.
3. Look at the digit right after the thousands place: it's 4 (the hundreds digit).
4. A digit of 4 or less means round down. 83,400 rounds to 83,000.

The idea: Even with a bigger number, the same one digit, right after the rounding place, decides the direction.

Practice: Rounding multi-digit numbers to a specified place

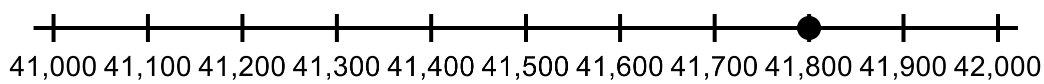
1. Round 6,300 to the nearest thousand.



6,300 between 6,000 and 7,000

(A) 6,000 (B) 6,300 (C) 7,000

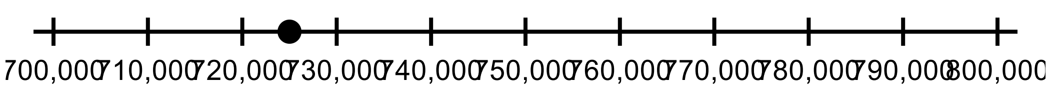
2. Round 41,800 to the nearest thousand.



41,800 between 41,000 and 42,000

(A) 41,000 (B) 42,000 (C) 41,800

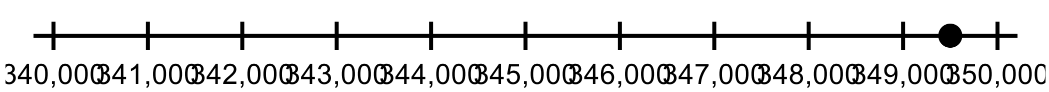
3. Round 725,000 to the nearest hundred thousand.



725,000 between 700,000 and 800,000

(A) 700,000 (B) 800,000 (C) 725,000

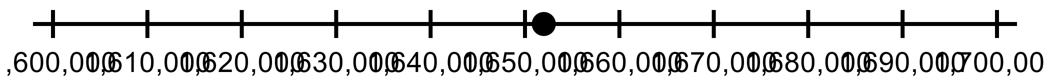
4. Round 349,500 to the nearest ten thousand.



349,500 between 340,000 and 350,000

(A) 350,000 (B) 349,000 (C) 340,000

5. Round 1,652,000 to the nearest hundred thousand.



1,652,000 between 1,600,000 and 1,700,000

(A) 1,600,000 (B) 9,000,000 (C) 1,700,000

6. What is the value of the 4 in 843,201?

(A) 400,000 (B) 40,000 (C) 4

MATH · UNIT 1 · LESSON 7

Justification of a rounding decision using benchmark position

Goal: Justify a rounding choice by identifying the number's position between two benchmark values on a number line.

About 18 minutes

Teach it FOR THE PARENT

1. **Say:** Quick check: which is bigger, 45,000 or 9,000,000? Don't count digits, think about place value. Tell me why.
   Look for: Student says 9,000,000 is bigger because it has a digit in the millions place, not because it 'has more digits.'
2. **Say:** Today you justify a rounding choice, not just give an answer. You'll name two benchmarks, find the halfway point between them, and say which side your number is on.
   Look for: Student can restate: name benchmarks, find halfway, state position.
3. **Say:** Let's round 452,000 to the nearest hundred thousand together. What are the two benchmarks it sits between?
   Look for: Student says 400,000 and 500,000. Then finds halfway: 450,000. Then says 452,000 is past halfway, so it rounds to 500,000.
4. **Say:** Why did 452,000 round up to 500,000, instead of down to 400,000?
   Look for: Student references the halfway point 450,000 and says 452,000 is past it, not just 'it felt closer.'
5. **Say:** Your turn, new number: round 683,000 to the nearest ten thousand. Name both benchmarks, the halfway point, and which side 683,000 is on.
   Look for: Student names 680,000 and 690,000, halfway 685,000, states 683,000 is before halfway, rounds to 680,000.
6. **Say:** A friend says 683,000 rounds to 690,000 because '683 is a big number.' What's wrong with that reasoning?
   Look for: Student identifies the friend ignored the halfway point and just judged by the number's overall size.
7. **Say:** Now you'll justify rounding choices on your own. Every answer needs both benchmarks, the halfway point, and which side the number is on.
   Look for: Student moves into practice ready to state a full justification, not just a rounded number.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

To round a number, find the two benchmark numbers it sits between on a number line. A benchmark is a round number, like 450,000 or 460,000. Find the halfway mark between them. If your number is past halfway, round up. If it is before halfway, round down. You must say which benchmark is closer and why, using the halfway point.

Going further: Rounding means replacing a number with the nearest benchmark value at a target place. Plot the number between the lower and upper benchmark for that place. Find the halfway point between the two benchmarks. Compare your number's position to that halfway point. A justification names both benchmarks, the halfway point, and states which side the number falls on.

Watch it work

Round 452,000 to the nearest hundred thousand. Justify your choice using the number line.

1. Find the two benchmarks at the hundred thousands place: 400,000 and 500,000, because 452,000 sits between them.
2. Find the halfway point: 450,000, exactly between 400,000 and 500,000.
3. Locate 452,000 on the line: it is just past 450,000, so it is past the halfway mark.
4. Since 452,000 is past halfway, it is closer to 500,000. Rounded: 500,000.

The idea: The halfway point between the two benchmarks decides which benchmark is closer, not the size of the whole number.

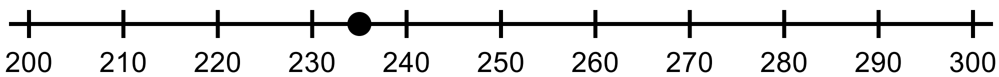
Round 683,000 to the nearest ten thousand. Justify your choice using the number line.

1. Find the two benchmarks at the ten thousands place: 680,000 and 690,000, because 683,000 sits between them.
2. Find the halfway point: 685,000, exactly between 680,000 and 690,000.
3. Locate 683,000 on the line: it is before 685,000, so it is before the halfway mark.
4. Since 683,000 is before halfway, it is closer to 680,000. Rounded: 680,000.

The idea: Compare the number's position to the midpoint, not to either benchmark alone.

Practice: Justification of a rounding decision using benchmark position

1. Round 235,000 to the nearest hundred thousand. Which justification is correct?



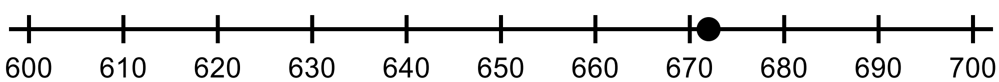
200,000 to 300,000, in thousands

(A) 235,000 has more digits than 200,000 does when you count them all, so it rounds up to 300,000 to match the bigger benchmark.

(B) 235,000 is between 200,000 and 300,000. Halfway is 250,000. 235,000 is before halfway, so it rounds to 200,000.

(C) The last digit is 0, so it rounds down to 200,000.

2. Round 672,000 to the nearest hundred thousand. Which justification is correct?



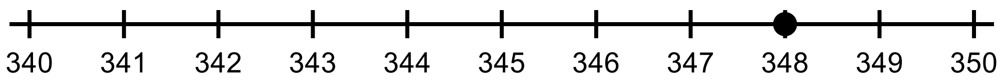
600,000 to 700,000, in thousands

(A) 672,000 is between 600,000 and 700,000. Halfway is 650,000. 672,000 is past halfway, so it rounds to 700,000.

(B) 672,000 rounds down to 600,000 because 6 is the first digit of the number, and the first digit tells you the benchmark.

(C) 672,000 has six digits in it, so it must round to the bigger benchmark of 700,000, since six-digit numbers always round up.

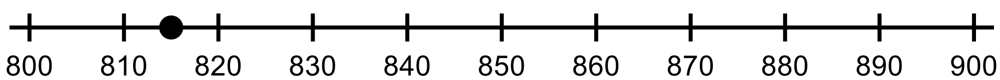
3. Round 348,000 to the nearest ten thousand. Which justification is correct?



340,000 to 350,000, in thousands

- (A) 348,000 rounds to 350,000 because the ones digit is 0.
- (B) 348,000 is between 340,000 and 350,000. Halfway is 345,000. 348,000 is before halfway, so it rounds to 340,000.
- (C) 348,000 is between 340,000 and 350,000. Halfway is 345,000. 348,000 is past halfway, so it rounds to 350,000.

4. Round 815,000 to the nearest hundred thousand. Which justification is correct?



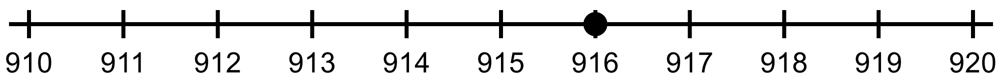
800,000 to 900,000, in thousands

- (A) 815,000 rounds to 900,000 because 900,000 has a bigger first digit.
- (B) 815,000 is between 800,000 and 900,000. Halfway is 850,000. 815,000 is before halfway, so it rounds to 800,000.
- (C) 815,000 is between 800,000 and 900,000. Halfway is 850,000. 815,000 is past halfway, so it rounds to 900,000.

5. A student rounds 528,000 to the nearest hundred thousand and says: 'It rounds to 600,000 because 528,000 has six digits, like 500,000.' What is wrong with this justification?

- (A) Nothing is wrong with the justification. Six digits means the number rounds up, so 528,000 goes to 600,000 just like the student said.
- (B) Digit count does not decide rounding. The student needs to compare 528,000 to the halfway point, 550,000.
- (C) The student should have looked at the ones digit of 528,000 instead of the digit count, and since the ones digit is 0, the number rounds down to 500,000.

6. Round 916,000 to the nearest ten thousand. Which justification is correct?



910,000 to 920,000, in thousands

(A) 916,000 rounds to 910,000 because the digit in the ten thousands place, 1, is small.

(B) 916,000 is between 910,000 and 920,000. Halfway is 915,000. 916,000 is before halfway, so it rounds to 910,000.

(C) 916,000 is between 910,000 and 920,000. Halfway is 915,000. 916,000 is past halfway, so it rounds to 920,000.

Place value, comparison, and rounding applied to an unfamiliar real-world numeric context

Goal: Apply place value, comparison, and rounding together to solve a problem involving an unfamiliar large-number context, such as ranking distances or budgets never used in instruction.

About 20 minutes

Teach it FOR THE PARENT

1. **Say:** A park ranger wants to rank three rivers by length, and pick a rounded number for a sign. We've never done rivers before. Let's see if our place value tools still work.
   Look for: Student recognizes this is a new context, but expects to use known skills.
2. **Say:** Remember three tools: read a digit's real value by its place, compare numbers by checking the highest place first, and round by looking at just one digit next to the target place. Any problem with big numbers uses one or more of these.
   Look for: Student can name the three tools without needing new vocabulary.
3. **Say:** River lengths: Clearwater River is 1,208,400 feet. Bramble River is 998,700 feet. Which is longer? Check the highest place first, don't count digits.
   Look for: Student checks millions place (1 vs 0) and picks Clearwater, explaining by place, not digit count.
4. **Say:** Now round Clearwater's length, 1,208,400, to the nearest hundred thousand. Find the hundred-thousands digit, then check the digit right after it.
   Look for: Student identifies the 2 in hundred-thousands, checks the 0 after it, rounds down to 1,200,000.
5. **Say:** New problem: three towns want donations. Ridgewood raised $645,300. Oak Bend raised $89,900. Sable Creek raised $650,100. Rank them from most to least, then round the top amount to the nearest ten thousand.
   Look for: Student ranks by comparing highest place first (Sable Creek, then Ridgewood, then Oak Bend), then rounds 650,100 to 650,000 using the digit after the ten-thousands place.
6. **Say:** You just used all three tools on a brand new problem, no river or donation practice before today. That's the real test: using the tools, not remembering an example.
   Look for: Student is ready to apply the same three tools to fresh practice questions below.

If they get stuck

- *A number with more digits is always the bigger number.*
  Use a place value chart to align both numbers by place before comparing; ask which place has the first difference in digits, not which number 'looks longer'.
- *The value of a digit is the digit itself, not the digit times its place.*
  Require students to say the full value aloud every time: 'the 5 is in the ten-thousands place, so it is worth 50,000,' using the place value chart as the reference.
- *When rounding, you look at the whole number's size instead of the one digit to the right of the rounding place.*
  Anchor every rounding task to a number line with the two benchmark multiples of the target place marked, and have the student locate the number's position before deciding.

Read together FOR THE STUDENT

Big numbers have places: ones, tens, hundreds, thousands, and more. Each digit's spot tells its real value. To compare two big numbers, look at the leftmost place first. To round, find the target place, then check the digit right next to it. This pack mixes all three skills: reading value, comparing, and rounding, on new problems like ranking rivers or budgets.

Going further: Place value means each digit's worth depends on its position (digit times its place, like 5 in the hundred-thousands place = 500,000). Comparing numbers means checking digits from the highest place down until you find a difference. Rounding means locating the target place, then looking only at the digit right after it to decide up or down. Real problems often need all three together, in an order you choose.

Watch it work

Compare the populations of two towns: Elmridge has 482,600 people. Fairhaven has 89,700 people. Which town has more people?

1. Write both numbers lined up by place: 482,600 and 089,700 (Fairhaven has no hundred-thousands digit, so it's like 0).
2. Compare the hundred-thousands place first: 4 vs 0. Since 4 is bigger, Elmridge is already the winner.
3. Elmridge has more people, even though both numbers have digits, the key was checking the highest place, not the digit count.

The idea: Compare from the highest place value down; stop as soon as the digits differ.

A city budget is $3,652,900. Round this budget to the nearest hundred thousand.

1. Find the hundred-thousands place: in 3,652,900 that digit is 6 (3,6__,___).
2. Look only at the digit right after it, in the ten-thousands place: that digit is 5.
3. Since 5 rounds up, the 6 becomes 7. All digits after the hundred-thousands place become 0.
4. Rounded budget: $3,700,000.

The idea: Rounding only depends on one digit, the one right after the target place.

Practice: Place value, comparison, and rounding applied to an unfamiliar real-world numeric context

1. What is the value of the 7 in 4,782,300?

Ⓐ 7 Ⓑ 70,000 Ⓒ 7,000,000 Ⓓ 700,000

2. Which number is bigger: 512,000 or 89,700?

Ⓐ 89,700, because it has fewer zeros in it than 512,000 does, and numbers with fewer zeros are bigger

Ⓑ They are equal Ⓒ 89,700, because 8 is bigger than 5

Ⓓ 512,000, because it has a digit in the hundred-thousands place and 89,700 does not

3. Round 367,450 to the nearest ten thousand.

Ⓐ 360,000 Ⓑ 400,000 Ⓒ 367,000 Ⓓ 370,000

4. A stadium holds 62,450 people. A stadium is 62,450, another holds 108,900. Which holds more, and why?

Ⓐ They hold the same number of people, because both numbers have a lot of digits

Ⓑ 62,450, because the first digit 6 is bigger than the first digit 1, so it wins

Ⓒ 62,450, because it has more nonzero digits than 108,900 does, so it holds more people

Ⓓ 108,900, because it has a digit in the hundred-thousands place

5. A charity raised $2,845,600. Round this to the nearest hundred thousand.

Ⓐ $2,900,000 Ⓑ $3,000,000 Ⓒ $2,800,000 Ⓓ $2,845,000

6. What is the value of the 3 in 3,914,200?

Ⓐ 300,000 Ⓑ 3 Ⓒ 30,000,000 Ⓓ 3,000,000

Answer key

Math

Lesson 1	1. A 2. C 3. D 4. C 5. A 6. A
Lesson 2	1. A 2. B 3. B 4. A 5. D 6. A
Lesson 3	1. A 2. B 3. A 4. A 5. C 6. B
Lesson 4	1. C 2. C 3. C 4. C 5. B 6. A
Lesson 5	1. B 2. B 3. B 4. B 5. C 6. A
Lesson 6	1. A 2. B 3. A 4. A 5. C 6. B
Lesson 7	1. B 2. A 3. C 4. B 5. B 6. C
Lesson 8	1. D 2. D 3. D 4. D 5. C 6. D
Unit 1 check-up	1. D 2. A 3. A 4. D 5. A 6. C 7. C 8. C 9. B 10. A 11. B 12. B 13. A 14. C 15. A 16. D

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