

Chapter 1 — Place Value, Number Forms, and Comparing Numbers

Teacher Chapter-at-a-Glance

Materials

A place-value chart, printed or drawn on the board. No other materials required.

Talk Prompt

Ask the class to compare 0.5 and 0.48 out loud before teaching the method. Most students will get it right by instinct; the goal is to name WHY, not just confirm the answer.

If Ready-to-Learn Reveals a Gap

If two or more Ready-to-Learn items reveal a gap, stop and rebuild whole-number place value with a chart before moving into decimals. Decimal place value cannot hold up without it.

Mastery Decision Guide

What a missed Tripwire item actually means, and what to do about it before moving on.

Missed Tripwire #1 → Comparing decimals like whole numbers (Mistake 1). *An answer that picks the decimal with more digits after the point, regardless of actual size, signals this exact error.*
Review before the next chapter.

Missed Tripwire #2 → Rounding from the wrong digit (Mistake 4). *A rounded answer that is off by exactly one unit in the target place (for example, 5,362 to the nearest hundred answered as 5,300) signals this error.* Review before the next chapter.

Ready-to-Learn Check

Quick check before starting. A wrong answer below points to a specific gap worth closing first, not just a miss to shrug off.

1. Compare: $582 \underline{\hspace{1cm}} 528$

Correct answer: $582 > 528$

Likely wrong answer: $582 < 528$

Misconception: Does not anchor the comparison at the leftmost place value; guesses the direction instead of checking it.

Next move: Have the student say out loud which number is bigger before choosing the symbol.

2. What is the value of the digit 5 in 3,516?

Correct answer: 500

Likely wrong answer: 5

Misconception: Reads the digit's face value only, ignoring where it sits in the number.

Next move: Point to the column on a place-value chart before answering.

3. Write 4,208 in word form.

Correct answer: four thousand, two hundred eight

Likely wrong answer: four thousand, twenty-eight

Misconception: Skips over the zero in the hundreds place as if it were not there.

Next move: Read each grouping by its column name aloud, including any zero, before writing.

Common Mistakes

Students often run into the same kinds of trouble with this topic. Recognizing these patterns helps avoid them.

Comparing 0.86 and 0.809 by Place Value

	Ones		Tenths	Hundredths	Thousandths
0.86	0	.	8	6	0
0.809	0	.	8	0	9

Ones tie. Tenths tie. Hundredths decide it: $6 > 0$, so $0.86 > 0.809$.

0.86 and 0.809 aligned at the decimal point. The hundredths place decides it.

Mistake 1: Comparing decimals like whole numbers

What students do: Seeing 0.86 and 0.809, and picking 0.809 as bigger because 809 is bigger than 86.

Why this happens: Whole-number comparison says more digits means a bigger number. Decimals do not work that way once the decimal point is involved.

What to do instead: Line up the decimal points first. Compare one place at a time, starting from the left. Stop at the first place where the digits differ.

***Diagnostic trigger:** An answer that picks the decimal with more digits after the point, regardless of actual size, signals this exact error.*

Mistake 2: Thinking a trailing zero changes the value

What students do: Treating 0.5 and 0.50 as different amounts, sometimes assuming 0.50 is bigger because it has more digits.

Why this happens: In every other place in math, more written digits means a bigger number. A trailing zero after a decimal breaks that pattern.

What to do instead: A zero at the very end of a decimal does not add value. $0.5 = 0.50 = 0.500$.

***Diagnostic trigger:** An answer that treats 0.50 as bigger than 0.5, or as a different number entirely, signals this error.*

Mistake 3: Skipping a placeholder zero inside a whole number

What students do: Reading 4,208 as if it were 428, or writing 'four thousand, twenty-eight' instead of 'four thousand, two hundred eight.'

Why this happens: A zero in the middle of a number feels like nothing there, so it gets skipped instead of held as a placeholder.

What to do instead: Every place gets read, including a zero. Read column by column: thousands, hundreds, tens, ones.

***Diagnostic trigger:** Word form or expanded form missing an entire term for a place that should hold a value signals this error.*

Mistake 4: Rounding from the wrong digit

What students do: Checking the digit in the target place itself, instead of the digit to its right.

Why this happens: It feels natural to look at the place being rounded, since that is the place changing.

What to do instead: Always check the digit directly to the RIGHT of the place being rounded. That single digit makes the whole decision.

***Diagnostic trigger:** A rounded answer that is off by exactly one unit in the target place (for example, 5,362 to the nearest hundred answered as 5,300) signals this error.*

Mistake 5: Confusing word form and expanded form

What students do: Writing '5,000 + 200 + 7' when asked for word form, or writing 'five thousand, two hundred seven' when asked for expanded form.

Why this happens: Both forms describe the same number in a different way, and the names sound close enough to blur together.

What to do instead: Word form uses words only. Expanded form uses addition and numbers only. Neither one borrows from the other.

***Diagnostic trigger:** An answer using numbers and plus signs when word form was asked for, or the reverse, signals this error.*

Practice

Teacher solutions follow this practice set.

1. What is the value of the digit 1 in 27,419.3?
2. Write 603.48 in expanded form.
3. Write 91,025 in word form.
4. Write $70,000 + 2,000 + 300 + 9$ in standard form.
5. Compare: 6.24 ____ 6.204
6. Compare: 0.5 ____ 0.47
7. Order from least to greatest: 0.36, 0.3, 0.063, 0.63
8. Round 14.876 to the nearest tenth.
9. Round 38,249 to the nearest hundred.
10. What is the value of the digit 8 in 9.508?

Practice Solutions

Use these concise solutions to check the method as well as the final answer.

1. What is the value of the digit 1 in 27,419.3?

Solution: The digit 1 is in the tens place, so its value is 10.

2. Write 603.48 in expanded form.

Solution: $603.48 = 600 + 3 + 0.4 + 0.08$.

3. Write 91,025 in word form.

Solution: 91,025 is ninety-one thousand, twenty-five.

4. Write $70,000 + 2,000 + 300 + 9$ in standard form.

Solution: $70,000 + 2,000 + 300 + 9 = 72,309$.

5. Compare: 6.24 ____ 6.204

Solution: Write 6.24 as 6.240 . Since 240 thousandths $>$ 204 thousandths, $6.24 > 6.204$.

6. Compare: 0.5 ____ 0.47

Solution: Write 0.5 as 0.50 . Since 50 hundredths $>$ 47 hundredths, $0.5 > 0.47$.

7. Order from least to greatest: 0.36 , 0.3 , 0.063 , 0.63

Solution: Using aligned place values: $0.063 < 0.3 < 0.36 < 0.63$.

8. Round 14.876 to the nearest tenth.

Solution: The hundredths digit is 7, so the tenths digit rounds up: $14.876 \approx 14.9$.

9. Round $38,249$ to the nearest hundred.

Solution: The tens digit is 4, so the hundreds digit stays unchanged: $38,249 \approx 38,200$.

10. What is the value of the digit 8 in 9.508 ?

Solution: The digit 8 is in the thousandths place, so its value is 0.008 .

Tripwire Check

These questions test whether the thinking is solid — not just whether the procedure was memorized. Each wrong answer below points to a specific misconception, not just "try again."

1. Which is greater, 0.6 or 0.58 ?

Correct answer: 0.6 ($0.6 = 0.60$, and 60 hundredths is more than 58 hundredths).

Likely wrong answer: 0.58 , because it has more digits after the decimal point.

Misconception: Longer-is-larger thinking: assuming more decimal digits means a bigger number.

Next move: Re-teach with a place-value chart, lining up both numbers at the decimal point before comparing any digits.

2. Round $26,749$ to the nearest thousand.

Correct answer: $27,000$.

Likely wrong answer: $26,000$, from looking at the thousands digit itself.

Misconception: Rounds based on the target digit instead of checking the digit to its right (the hundreds digit, 7, which forces a round up).

Next move: Have the student circle the digit to the right of the target place before deciding up or down.

Answer Key — Worksheets (Full Diagnostic)

Worksheet A: Guided Practice

1. What is the value of the digit 4 in 462?

1. 400 (4 is in the hundreds place). Likely wrong answer: 4 (names the digit itself, not its place value). Misconception: The digit is reported directly instead of what it represents in that place.

2. What is the value of the digit 0 in 8,104?

2. 0 (0 is in the tens place). Likely wrong answer: 0 (ignores that a zero digit still holds a place and a value). Misconception: A zero digit is treated as having no value to report, instead of the value of its place (0 tens = 0).

3. Write 739 in expanded form.

3. $700 + 30 + 9$. Likely wrong answer: 700, 30, 9 written without addition signs. Misconception: The parts of expanded form are listed instead of written as a sum.

4. What is the value of the digit 1 in 5.16?

4. 0.1 (1 is in the tenths place). Likely wrong answer: 1 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the tenths place.

5. What is the value of the digit 6 in 5.16?

5. 0.06 (6 is in the hundredths place). Likely wrong answer: 6 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the hundredths place.

6. Write 1,809 in word form.

6. one thousand, eight hundred nine. Likely wrong answer: one thousand, eighty-nine (skips the zero in the tens place). Misconception: A zero in the middle of a number is skipped when reading it aloud instead of read as an empty place.

7. Write 4.28 in expanded form.

7. $4 + 0.2 + 0.08$. Likely wrong answer: $4 + 2 + 8$ (treats each digit as a whole number instead of its place value). Misconception: Each digit is written as itself rather than as tenths or hundredths.

8. Compare: 0.4 ____ 0.40

8. $0.4 = 0.40$ (a trailing zero does not change the value). Likely wrong answer: $0.4 < 0.40$ (assumes more digits means a larger value). Misconception: A trailing zero is assumed to add value instead of leaving the number unchanged.

9. Write 6,000 + 300 + 2 in standard form.

9. 6,302. Likely wrong answer: 632 (drops the tens place instead of writing a zero placeholder). Misconception: A missing place value is skipped entirely instead of filled with a zero.

10. Compare: 0.6 ____ 0.59

10. $0.6 > 0.59$. Likely wrong answer: $0.59 > 0.6$ (compares digit count instead of place value). Misconception: More digits after the decimal point is assumed to mean a larger value.

11. Round 271 to the nearest ten.

11. 270. Likely wrong answer: 280 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

12. Order from least to greatest: 0.3, 0.32, 0.302

12. 0.3, 0.302, 0.32. Likely wrong answer: 0.3, 0.32, 0.302 left in the order given (compares digit count instead of value). Misconception: Numbers with a different count of decimal digits are compared without lining up their place values first.

13. Round 271 to the nearest hundred.

13. 300. Likely wrong answer: 270 (rounds to the nearest ten instead of the nearest hundred). Misconception: The wrong place value is used as the rounding target.

14. Compare: 9.05 ____ 9.5

14. $9.05 < 9.5$. Likely wrong answer: $9.05 > 9.5$ (compares digit count instead of place value). Misconception: A number with more digits after the decimal point is assumed to be larger.

15. Write $4,000 + 700 + 8$ in standard form.

15. 4,708. Likely wrong answer: 4,780 (transposes the hundreds and tens places). Misconception: The value of two adjacent places is swapped when assembling the standard form.

16. Round 6.283 to the nearest tenth.

16. 6.3. Likely wrong answer: 6.2 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

Worksheet B: Independent Practice

1. What is the value of the digit 7 in 37,296?

1. 7,000 (7 is in the thousands place). Likely wrong answer: 7 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the thousands place.

2. What is the value of the digit 9 in 37,296?

2. 90 (9 is in the tens place). Likely wrong answer: 9,000 (misreads which place the digit sits in). Misconception: The digit's position is misjudged, assigning it to the wrong place value.

3. Write 51,840.7 in expanded form.

3. $50,000 + 1,000 + 800 + 40 + 0.7$. Likely wrong answer: $50,000 + 1,000 + 800 + 40 + 7$ (treats the decimal digit as a whole number). Misconception: The digit after the decimal point is written as ones instead of tenths.

4. What is the value of the digit 4 in 2.943?

4. 0.04 (4 is in the hundredths place). Likely wrong answer: 4 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the hundredths place.

5. What is the value of the digit 9 in 2.943?

5. 0.9 (9 is in the tenths place). Likely wrong answer: 9 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the tenths place.

6. Write $8,000 + 500 + 3 + 0.09$ in standard form.

6. 8,503.09. Likely wrong answer: 8,53.09 (misplaces the thousands and hundreds digits). Misconception: The parts of expanded form are reassembled in the wrong place-value order.

7. Write 90,603.05 in expanded form.

7. $90,000 + 600 + 3 + 0.05$. Likely wrong answer: $90,000 + 600 + 30 + 0.05$ (treats the tens digit as if it were present). Misconception: A missing place value is filled in with a guessed digit instead of recognizing it as zero.

8. Compare: 0.508 ____ 0.58

8. $0.508 < 0.58$. Likely wrong answer: $0.508 > 0.58$ (compares digit count instead of place value). Misconception: More digits after the decimal point is assumed to mean a larger value.

9. Write $60,000 + 700 + 40 + 0.006$ in standard form.

9. 60,740.006. Likely wrong answer: 60,704.6 (misplaces the tens and hundredths digits). Misconception: The parts of expanded form are reassembled in the wrong place-value order.

10. Compare: 3.09 ____ 3.9

10. $3.09 < 3.9$. Likely wrong answer: $3.09 > 3.9$ (compares digit count instead of place value). Misconception: More digits after the decimal point is assumed to mean a larger value.

11. Order from least to greatest: 5.04 , 5.4 , 5.004 , 5.044

11. 5.004, 5.04, 5.044, 5.4. Likely wrong answer: 5.4, 5.044, 5.04, 5.004 (orders by digit count instead of value). Misconception: Numbers with different digit counts after the decimal point are ordered without lining up their place values first.

12. Compare: 17.6 ____ 17.60

12. $17.6 = 17.60$ (a trailing zero does not change the value). Likely wrong answer: $17.6 < 17.60$ (assumes more digits means a larger value). Misconception: A trailing zero is assumed to add value instead of leaving the number unchanged.

13. Round 4,837 to the nearest ten.

13. 4,840. Likely wrong answer: 4,830 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

14. Compare: 0.7 ____ 0.699

14. $0.7 > 0.699$. Likely wrong answer: $0.7 < 0.699$ (compares digit count instead of place value). Misconception: Fewer digits after the decimal point is assumed to mean a smaller value.

15. Round 4,837 to the nearest hundred.

15. 4,800. Likely wrong answer: 4,900 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

16. Order from least to greatest: 0.08, 0.8, 0.088, 0.808

16. 0.08, 0.088, 0.8, 0.808. Likely wrong answer: 0.8, 0.808, 0.08, 0.088 (orders by digit count instead of value). Misconception: Numbers with different digit counts after the decimal point are ordered without lining up their place values first.

17. Round 4,837 to the nearest thousand.

17. 5,000. Likely wrong answer: 4,000 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

18. Round 62.485 to the nearest tenth.

18. 62.5. Likely wrong answer: 62.4 (rounds using the wrong digit). Misconception: The digit in the place being rounded to is checked instead of the digit to its right.

Worksheet C: Mixed Application

1. What is the value of the digit 7 in 16.75?

1. 0.7 (7 is in the tenths place). Likely wrong answer: 7 (reports the digit instead of its place value). Misconception: The digit itself is given instead of the value it holds in the tenths place.

2. Order from least to greatest: 8.02, 8.2, 8.002

2. 8.002, 8.02, 8.2. Likely wrong answer: 8.2, 8.02, 8.002 (orders by digit count instead of value). Misconception: Numbers with different digit counts after the decimal point are ordered without lining up their place values first.

3. A notebook costs \$24.68. Round to the nearest dollar.

3. \$25. Likely wrong answer: \$24 (rounds down regardless of the cents value). Misconception: The digit that decides the rounding direction is not checked before rounding.

4. Order from shortest to longest: 2.35 m, 2.305 m, 2.53 m

4. 2.305 m, 2.35 m, 2.53 m. Likely wrong answer: 2.305 m, 2.53 m, 2.35 m (misorders due to differing digit counts). Misconception: Measurements with different digit counts after the decimal point are ordered without lining up their place values first.

5. Write the number with 3 thousands, 6 hundreds, 0 tens, 4 ones, 2 tenths.

5. 3,604.2. Likely wrong answer: 3,642 or 3,640.2. Misconception: The zero placeholder and tenths position are not preserved. Next move: Place each digit in a labelled place-value chart before writing the numeral.

6. Compare: 0.905 ____ 0.95

6. $0.905 < 0.95$. Likely wrong answer: $0.905 > 0.95$ (compares digit count instead of place value). Misconception: More digits after the decimal point is assumed to mean a larger value.

7. Round 17,382 to the nearest hundred and nearest thousand.

7. Nearest hundred: 17,400. Nearest thousand: 17,000. Likely wrong answer: nearest hundred 17,300; nearest thousand 17,400 (uses the wrong digit for each rounding target). Misconception: The digit checked to decide the rounding direction does not match the place value being rounded to.

8. Explain why the zero matters in 5,209.

8. The zero holds the tens place. Without it, the number would be a different value entirely. Likely wrong answer: says the zero doesn't matter since it has no value. Misconception: A placeholder zero is assumed to be meaningless because zero itself represents nothing, rather than recognizing it holds a place open.

9. Write 0.617 in expanded form.

9. $0.6 + 0.01 + 0.007$. Likely wrong answer: $6 + 1 + 7$ (treats each decimal digit as a whole number). Misconception: Each digit is written as itself rather than as tenths, hundredths, or thousandths.

10. Which number is closer to 1: 0.87 or 0.178? Explain.

10. 0.87 is closer to 1. Likely wrong answer: 0.178 is closer to 1 (compares digit count instead of value). Misconception: A number with more digits is assumed to be closer to a benchmark without comparing actual distance.

11. Write two equivalent decimals for 6.2.

11. 6.20 and 6.200 (accept any decimal ending in zeros after 6.2). Likely wrong answer: 6.3 and 62 (changes the value instead of preserving it). Misconception: An equivalent decimal is built by changing the digits present, rather than only adding trailing zeros.

12. A student rounds 8,384 to the nearest hundred and answers 8,300. Explain the mistake.

12. 8,400. Likely wrong answer: 8,300. Misconception: The student truncates or checks the hundreds digit instead of the tens digit. Next move: Circle the tens digit, then decide whether the hundreds digit stays or increases.

13. Write a decimal between 0.71 and 0.72.

13. 0.715 (accept any value strictly between 0.71 and 0.72). Likely wrong answer: 0.7 or 0.72 (gives a boundary value instead of one strictly between). Misconception: A value equal to one of the given endpoints is offered instead of one that falls strictly between them.

14. Order from least to greatest: 7.03, 7.003, 7.3, 7.033

14. 7.003, 7.03, 7.033, 7.3. Likely wrong answer: 7.3, 7.033, 7.03, 7.003 (orders by digit count instead of value). Misconception: Numbers with different digit counts after the decimal point are ordered without lining up their place values first.

15. Two runners finish in 9.7 s and 9.68 s. Who is faster? Explain.

15. The runner who finished in 9.68 s is faster. Likely wrong answer: 9.7 s is faster (assumes the larger-looking number is faster). Misconception: A smaller time value is not recognized as representing less time, so the faster runner is misidentified.

Answer Key — Exit Ticket

1. 800
2. $0.42 > 0.402$
3. 1,700