



## Reading and comparing decimals

**GRADE 5 MATH**

Answer keys for the exit ticket and practice worksheet, plus notes for the lesson slides. Each answer shows the steps and the most likely wrong answer (“If wrong”), so you can tell what a mistake means, not just that it is one. Questions go from **fluency** to **application** to **reasoning**.

### Exit Ticket — answer key

**Use:** End of the reading-and-comparing-decimals lesson. Item 1 is worth reading as a SET rather than three marks: a child who writes  $>$ ,  $<$ ,  $<$  has one consistent rule — compare the tails as whole numbers — and is applying it faithfully, which is a different teaching problem from three careless slips. Item 3 asks for the reason rather than the method, deliberately: “compare the tenths first” is correct and leaves the belief that produced the error entirely in place. This is the inverse-relationship thread's fifth appearance — centimetres against inches (G2 MD-02),  $1/6$  against  $1/3$  (G3 NF-03), comparing fractions (the “Comparing fractions” sheet (Grade 4)) — and the hardest, because the unit is INVISIBLE here: a fraction shows its denominator and a decimal makes the child supply the place names before there is anything to compare. Item 4 pairs the two zero errors on purpose; children hold both at once more often than either alone.

**Timing:** 5–8 min · independent · place-value charts available.

#### 1. Three comparisons **FLUENCY**

Answer:  $0.45 < 0.7$ ,  $0.3 > 0.28$ ,  $0.5 = 0.50$

1. 0.45 and 0.7: same ones, then tenths 4 against 7, so 0.45 is less.
2. 0.3 and 0.28: tenths 3 against 2, so 0.3 is greater — the 8 is never reached.
3. 0.5 and 0.50: five tenths is fifty hundredths, so they are equal.

**If wrong:** Answered  $>$ ,  $<$ ,  $<$  throughout — every one decided by the length of the tail. All three are wrong, and consistently so, which is more informative than a mixed set: the child has one rule, applied faithfully.

## 2. Ordering, and one in words APPLICATION

Answer: **0.09, 0.125, 0.35, 0.4 — and 0.406 is four hundred and six thousandths**

1. Count them all in thousandths: 90, 125, 350, 400.
2. So the order is 0.09, 0.125, 0.35, 0.4.
3. 0.406 is 4 tenths, 0 hundredths and 6 thousandths, which is 406 thousandths.
4. Note 0.125 is the longest and second smallest, and 0.4 is the shortest and largest.

**If wrong:** Ordered by length: 0.4, 0.09, 0.35, 0.125. This sheet's numbers are chosen so that length and size disagree as often as possible — the longest is nearly the smallest.

## 3. Nia's reason REASONING

Answer: **because the digits after the point are not a whole number — the 4 means 4 tenths and the 7 means 7 tenths, so 7 tenths is greater; in thousandths they are 450 and 700**

1. 45 IS greater than 7, so the arithmetic in her reason is right.
2. But 0.45 does not contain the number 45; it contains 4 tenths and 5 hundredths.
3. 0.7 contains 7 tenths. Comparing the tenths, 7 beats 4, and the decision is already made.
4. Counting in the same pieces confirms it: 450 thousandths against 700 thousandths, a difference of a quarter of a whole.

**If wrong:** Said “because you compare the tenths first” without saying why. That is the correct method stated as a rule, and it leaves Nia's actual belief — that the tail is a number — untouched, so it will return on the next pair.

## 4. Two kinds of zero REASONING

Answer: **0.5 = 0.50, because five tenths is fifty hundredths; 0.5 is NOT 0.05, because there the 5 has moved into the hundredths place and is worth a tenth as much**

1. In 0.50 the 5 is still in the tenths place; the 0 says there are no hundredths, which adds nothing.
2. So 0.5 and 0.50 are the same amount — 500 thousandths either way.
3. In 0.05 the 5 is in the HUNDREDTHS place, with a 0 holding the tenths.
4. So 0.05 is five hundredths, a tenth of five tenths. A zero after the digits changes nothing; a zero before them moves every digit.

**If wrong:** Answered both parts correctly and explained by digit count — “0.50 has an extra digit at the end, 0.05 has one at the start”. Right answers from a rule about writing; the question asks about place value, which is what makes the rule reliable.

**Quick answers** for fast checking:

| # | Level       | Answer                                                   |
|---|-------------|----------------------------------------------------------|
| 1 | fluency     | $<, >, =$                                                |
| 2 | application | 0.09, 0.125, 0.35, 0.4; four hundred and six thousandths |
| 3 | reasoning   | the tail is not a number; 4 tenths against 7 tenths      |
| 4 | reasoning   | $0.5 = 0.50$ ; 0.05 is a tenth of it                     |

## Practice Worksheet — answer key

**Use:** In-class practice after the deck. Item 5 is the sheet's best item and it is about EVIDENCE rather than decimals: the tail rule agrees with the truth whenever both tails have the same number of digits, which covers most examples a child meets, so its correct answers are what keep it alive. That is the same argument as the “Relating two number patterns” sheet (Grade 5)’s — one confirming case cannot distinguish two rules — and the two banks are worth mentioning together. Item 6 is where the trailing-zero rule gets over-applied: a zero after every digit adds nothing, a zero between digits is load-bearing, and a child who has just learned the first often flattens the second. Item 8's second part is the one to take to the board — “there is nothing between 0.45 and 0.46” is a reasonable belief for anyone who thinks hundredths are the last place there is.

**Timing:** 15–20 min · pairs · place-value charts · items 5, 8 and 9 on the board.

### 1. Tenths decide it FLUENCY

Answer:  $0.6 > 0.59$

1. Tenths first: 6 against 5, so 0.6 is greater.
2. The extra digit in 0.59 does not make it bigger — 9 hundredths is less than one tenth.

**If wrong:** Answered  $<$  — the tails compared as whole numbers, 59 against 6. The comparison starts at the LEFT, at the biggest place.

### 2. The longer number is the smaller FLUENCY

Answer:  $0.125 < 0.2$

1. Tenths first: 1 against 2, so 0.125 is less.
2. This is the one that catches the tail rule hardest: 0.125 has more digits and a bigger tail, and is the smaller number.

**If wrong:** Answered  $>$  — 125 against 2 as whole numbers. Three digits is not three times as much; it is thousandths.

### 3. A trailing zero changes nothing FLUENCY

Answer: **0.70 = 0.7**

1. The 0 in 0.70 says there are no hundredths.
2. 0.7 says the same thing by not mentioning hundredths at all, so the two are equal.

**If wrong:** Answered  $>$  — 70 against 7. Writing both as hundredths, 0.70 and 0.70, makes the equality visible.

### 4. Three hundred six thousandths FLUENCY

Answer: **0.306**

1. 306 thousandths, so the digits 306 end at the thousandths place: 0.306.
2. The 0 in the hundredths place holds the position — without it the 6 would be hundredths.
3. Note the words carry no **and**: **and** is how the decimal point is read aloud, so “three hundred AND six thousandths” would be 300.006.

**If wrong:** Wrote 0.36, dropping the place-holding zero — ten times too big, because every digit after the missing zero moves one place left.

### 5. Four tenths and two thousandths FLUENCY

Answer: **0.402**

1. 4 tenths, no hundredths, 2 thousandths.
2. So 0.402, and the 0 in the hundredths place is what the words specify by skipping hundredths.
3. Here **and** joins two decimal places, so there is nothing ambiguous about it.

**If wrong:** Wrote 0.42, reading the two named places as consecutive digits. That is 42 hundredths, not 402 thousandths.

### 6. 3.024 in words APPLICATION

Answer: **three and twenty-four thousandths (or: three point nought two four)**

1. The whole part is 3.
2. The tenths place is 0, the hundredths 2, the thousandths 4.
3. As a single count of thousandths the decimal part is 24 thousandths, so: three and twenty-four thousandths.
4. Reading it digit by digit — three point nought two four — is also correct and is what most children say aloud.

**If wrong:** Said “three point twenty-four”, which names 3.24. The 0 in the tenths place has to be spoken, either as **nought** or by naming the place the digits end in.

### 7. 3.024 in expanded form APPLICATION

Answer:  **$3 + 0.02 + 0.004$**

1. 3 ones.
2. 0 tenths, so nothing is written for that place.
3. 2 hundredths: 0.02.
4. 4 thousandths: 0.004.
5. So  $3 + 0.02 + 0.004$ , or equivalently  $3 + 2$  hundredths + 4 thousandths.

**If wrong:** Wrote  $3 + 0.2 + 0.04$ , reading the digits in order and ignoring the leading 0 in the tenths place. That number is 3.24, more than ten times too big in its decimal part.

### 8. Ordering four decimals APPLICATION

Answer: **0.08, 0.088, 0.8, 0.808**

1. In thousandths: 80, 88, 800, 808.
2. So the order is 0.08, 0.088, 0.8, 0.808.
3. The two starting 0.0 are both small, whatever their length; the two starting 0.8 are both large.

**If wrong:** Ordered 0.08, 0.8, 0.088, 0.808 — length used as a tie-breaker, which puts 0.088 above 0.8. Reading the tenths digit first separates them immediately.

## 9. When the wrong rule agrees REASONING

Answer: **because a rule that gives the right answer sometimes is not a rule at all — the tail rule agrees whenever the tails have the same number of digits, and disagrees whenever they do not**

1. 0.62 and 0.5: comparing 62 with 5 gives 0.62, and 0.62 really is greater. The rule agreed.
2. 0.45 and 0.7: comparing 45 with 7 gives 0.45, and 0.45 is smaller. The rule disagreed.
3. Nothing about the rule tells you which case you are in, so its correct answers are luck.
4. This is why it survives: it works often enough that no single question exposes it.

**If wrong:** Said “because it was just lucky”. Right, and the useful half is WHEN it is lucky — the rule agrees when the tails are the same length, which is most textbook examples, and that is precisely why a child can carry it for years.

## 10. 0.406 against 0.46 REASONING

Answer: **different — the 0 holds the hundredths place, so the 6 in 0.406 is thousandths while the 6 in 0.46 is hundredths**

1. In 0.406: 4 tenths, 0 hundredths, 6 thousandths — 406 thousandths.
2. In 0.46: 4 tenths, 6 hundredths — 460 thousandths.
3. So 0.46 is the greater, by 54 thousandths.
4. The 0 is not padding. It is holding a place open, and without it the 6 moves one place left and becomes ten times as much.

**If wrong:** Said “the 0 does nothing”, which is the trailing-zero rule applied where it does not hold. A zero AFTER all the digits adds nothing; a zero BETWEEN digits is load-bearing.

## 11. Sam's 206.7 REASONING

Answer: **he used “and” inside the whole number, so when he wrote it down there was nothing left to mark the decimal point and the 6 ended up after it**

1. Reading a decimal aloud, “and” is what marks the point: 206.7 is “two hundred six, and seven tenths”.
2. Sam said “two hundred AND six”, spending the word inside the whole part.
3. Writing from his own reading, the boundary landed after the 200, giving 200.67.
4. His answer is 6.03 too small, and the digits are all correct — only the boundary moved.

**If wrong:** Said “he put the point in the wrong place”. True, and the reason is what stops it recurring: the word “and” had already been used, so the reading itself no longer said where the point went.

## 12. A decimal between 0.4 and 0.5 APPLICATION

Answer: **any of 0.41 to 0.49 — for example 0.45**

1. 0.4 is 40 hundredths and 0.5 is 50 hundredths.
2. So anything from 41 to 49 hundredths sits between them: 0.45 is the middle one.
3. Accept any of the nine, and accept a thousandths answer such as 0.437 too.

**If wrong:** Answered 0.45 only because it is halfway, then said it was the only one. There are nine hundredths between them and infinitely many decimals.

## 13. A decimal between 0.45 and 0.46 APPLICATION

Answer: **any of 0.451 to 0.459 — for example 0.455**

1. There is no hundredth left between 45 and 46 hundredths, so go one place further.
2. 0.45 is 450 thousandths and 0.46 is 460 thousandths.
3. So anything from 0.451 to 0.459 fits, and 0.455 is exactly halfway.
4. THE POINT OF THIS PAIR: there is always another place to go to, so there is always a decimal in between.

**If wrong:** Said it is impossible because 0.45 and 0.46 are “next to each other”. They are consecutive HUNDREDTHS, which is not the same as consecutive numbers — going to thousandths opens nine more.

## 14. Harder than fractions REASONING

Answer: **because a fraction writes its unit down as the denominator, while a decimal makes you supply the place names before you can compare anything**

1. In  $\frac{1}{3}$  against  $\frac{1}{4}$ , the 3 and the 4 tell you the pieces are thirds and fourths.
2. In 0.45 against 0.7, nothing on the page says “hundredths” or “tenths” — the places are known only by position.
3. So a child must first read the number correctly, and only then compare; two steps where a fraction has one.
4. And the digits are sitting there looking like an ordinary whole number, which actively suggests the wrong reading.

**If wrong:** Said “because decimals are harder”. The specific answer is about the INVISIBLE UNIT: a denominator is written down and a place value is not, so the same comparison takes an extra step that can go wrong.

**Quick answers** for fast checking:

| # | Level | Answer |
|---|-------|--------|
|---|-------|--------|

|    |             |                                                                      |
|----|-------------|----------------------------------------------------------------------|
| 1  | fluency     | >                                                                    |
| 2  | fluency     | <                                                                    |
| 3  | fluency     | =                                                                    |
| 4  | fluency     | 0.306                                                                |
| 5  | fluency     | 0.402                                                                |
| 6  | application | three and twenty-four thousandths                                    |
| 7  | application | $3 + 0.02 + 0.004$                                                   |
| 8  | application | 0.08, 0.088, 0.8, 0.808                                              |
| 9  | reasoning   | it agrees when the tails are the same length, which is most examples |
| 10 | reasoning   | the 0 holds the hundredths place open                                |
| 11 | reasoning   | “and” marks the point and was spent early                            |
| 12 | application | any of 0.41 to 0.49                                                  |
| 13 | application | any of 0.451 to 0.459                                                |
| 14 | reasoning   | a denominator is written; a place value is not                       |

## Lesson slides — teaching notes & timing

Mini-lesson slides, then the practice worksheet. Slide numbers match the deck.

| Slide | ~Time | Note                                                                                                                                                                                                                                  |
|-------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1/8   | 0:00  | Open with the comparison, not with a rule. Take a show of hands on 0.45 against 0.7 before saying anything — a real split is the lesson's starting material.                                                                          |
| 2/8   | 0:40  | Say plainly that both reasons for 0.45 are TRUE statements: 45 is bigger than 7, and it does have more digits. The conclusion is wrong and the observations are not, which is why the error is stubborn.                              |
| 3/8   | 1:20  | THE slide. Read the digits with their place names aloud — four tenths, seven tenths — and the comparison answers itself. The invisible unit is the whole difficulty: a fraction shows its denominator, a decimal makes you supply it. |
| 4/8   | 2:20  | The thousandths route, and name the connection out loud: this is exactly the common-denominator move from the “Comparing fractions” sheet (Grade 4), and children who found that convincing will find this convincing.                |
| 5/8   | 3:20  | The leftmost-differing-place rule, which is what to write on the board and keep. Do 0.3 against 0.28 with it, and point out that the 8 is never even looked at.                                                                       |
| 6/8   | 4:20  | Both zero cases together, because a child can hold both errors at once. $0.5 = 0.50$ (nothing changed) against 0.05 (everything changed). A place-value chart makes the difference visible in a way words do not.                     |
| 7/8   | 5:30  | Reading aloud, and the “and” rule. 206.7 misread as “two hundred and six” then written 200.67 is a real error worth showing — the word marks the point, so spending it inside the whole number leaves the boundary unmarked.          |

|     |      |                                                                                                                                             |
|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 8/8 | 6:45 | The ordering task uses four numbers of different lengths on purpose, including 0.125, where longer is genuinely smaller. Exit ticket after. |
|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------|