

The GED Math Foundations Roadmap

Installment 1 — First Lessons

Lessons 1-4: Place Value · Rounding & Estimation · Fractions: The Big Picture ·
Equivalent Fractions (+ a short Interlude: Zero & One)

Start anywhere

Each lesson stands completely on its own — you don't need the one before it. Pick the topic you want to work on today and dive in. Every lesson tells you the idea first, shows you a worked example, gives you practice, and then explains every answer.

Every lesson speaks in the same five colors — after one lesson, you can find your place by color alone:

blue = the idea	green = worked examples	amber = your turn	violet = answers, explained	teal = more practice
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Lesson 1: Place Value & The “Power of 10”

Every Digit Has a Home

LESSON 1 OF 19	PHASE 1 · NUMBER SENSE	ABOUT 20-25 MINUTES
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Warm-Up — start with a win

Two questions you can already do. Answer them in your head — then you've officially started.

1. In 352, which digit is in the tens place?
2. Which is bigger: 90 or 9?

Answers: 5 · 90 — same digit, different home. That's the whole lesson.

The Concept — the idea behind the math

In our math system, a digit's value depends entirely on where it sits. If you move a number one spot to the **left**, it becomes **10 times**

larger. If you move it one spot to the **right**, it becomes **10 times smaller**.

Think of it like a building with different rooms. The room a digit sits in tells you its “power.”

Worked Examples — watch the moves

In the number 5,555:

- The **5** on the far right is just **5**.
- The **5** next to it is **50**.
- The **5** next to that is **500**.
- And the **5** on the far left is **5,000** — same digit, four different values.

Check for Understanding — your turn (5 questions)

1. In the number **4,821**, which digit is in the **hundreds** place?
2. If I have the number **70** and I move the **7** one space to the left (adding a zero), how many times larger did the number become?
3. Write the number **six thousand, forty-two** using digits. (Watch out for the “empty” place!)
4. In the decimal **0.57**, is the **5** in the *tenths* place or the *hundredths* place?
5. Which is larger: **0.08** or **0.8**?

PAUSE HERE — try all five on your own first. Getting them wrong costs nothing; that's what they're for.

Answer Key — every answer, explained

1. **8** (The 8 is in the hundreds place, representing 800.)
2. **10 times larger** (Moving one place to the left always multiplies by 10.)
3. **6,042** (The zero acts as a placeholder for the hundreds.)
4. **Tenths** (The first spot to the right of the decimal.)
5. **0.8** (0.8 is like 80 cents; 0.08 is like 8 cents.)

More Practice — reps make it stick

Name the place, name the value:

1. In **3,905**, which digit is in the thousands place?
2. In **3,905**, what is the *value* of the 9?
3. Write “two thousand, sixty” using digits.
4. In **52.6**, which digit is in the tenths place?

Compare and reason:

5. Which is larger: **0.4** or **0.09**?
6. In **0.83**, which digit is in the hundredths place?
7. What happens to **45** if both digits move one place to the left (a zero fills in behind them)?
8. Which is larger: **3,099** or **3,100**?

More Practice — Answer Key

1. **3** (The far-left room in a four-digit number is the thousands.)
2. **900** (The 9 sits in the hundreds place, so it's worth 9 hundreds.)
3. **2,060** (Zero holds the hundreds place; the 6 lands in the tens.)
4. **6** (First spot after the decimal point.)
5. **0.4** (0.4 is 40 hundredths; 0.09 is only 9 hundredths. Don't let the

extra digit fool you.)

6. **3** (Second spot after the decimal: 8 is tenths, 3 is hundredths.)
7. **It becomes 450 — ten times larger.** (Every digit moving one room left multiplies the number by 10.)
8. **3,100** (Compare room by room from the left: the hundreds place is where they differ, and 1 beats 0.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Place Value	☐	☐	☐
The Power of 10 (moving left and right)	☐	☐	☐

Lesson 2: Rounding & Estimation

Finding the Nearest Landmark

LESSON 2 OF 19

PHASE 1 · NUMBER
SENSE

ABOUT 20-25 MINUTES

Warm-Up — start with a win

Two questions you can already do. Answer them in your head — then you've officially started.

1. Is 68 closer to 60 or to 70?
2. An item costs \$9.95. About how many dollars is that?

Answers: 70 · About \$10 — you just rounded

The Concept — the idea behind the math

Rounding is not just a math rule; it is a life skill. We use it when we estimate a grocery bill or tell someone “it's about 4 o'clock.”

To round a number, you must first identify your **Target Place**. Once you know which “room” you are looking at, you look at the **neighbor to the immediate right** to decide:

- **0, 1, 2, 3, 4:** the target stays the same (round down).
- **5, 6, 7, 8, 9:** the target moves up by one (round up).

Everything to the right of your target becomes a zero — those digits are no longer needed for the estimate.

Worked Examples — watch the moves

Round 1,382 to the nearest hundred.

- **Target:** the **3** (hundreds place).
- **Neighbor:** look right — the **8** (tens place).
- **Action:** 8 is “5 or higher,” so the 3 moves up to a **4**.

- **Result: 1,400.**

Check for Understanding — your turn (5 questions)

1. Round **74** to the nearest **ten**.
2. You are at the grocery store and an item costs **\$12.89**. Round this to the nearest **whole dollar**.
3. Round **4,562** to the nearest **thousand**.
4. A student's GPA is **3.21**. Round this to the nearest **tenth** (the first spot after the decimal).
5. **Critical Thinking:** If you round a number to the nearest ten and the answer is **50**, what is the *smallest* whole number the original value could have been?

PAUSE HERE — try all five on your own first. Getting them wrong costs nothing; that's what they're for.

Answer Key — every answer, explained

1. **70** (The neighbor 4 tells the 7 to stay the same.)
2. **\$13.00** (The neighbor 8 tells the 12 to move up.)
3. **5,000** (The neighbor 5 tells the 4 to move up.)
4. **3.2** (The neighbor 1 tells the 2 to stay the same.)
5. **45** (45 is the lowest number that rounds *up* to 50.)

More Practice — reps make it stick

Round each number:

1. Round **86** to the nearest ten.

2. Round **43** to the nearest ten.
3. Round **\$7.49** to the nearest whole dollar.
4. Round **2,350** to the nearest thousand.
5. Round **6.85** to the nearest tenth.
6. Round **199** to the nearest ten.

Estimate and reason:

7. Estimate **39 + 52** by rounding each number to the nearest ten first.
8. **Reverse it:** what is the *largest* whole number that rounds *down* to 50 (nearest ten)?

More Practice — Answer Key

1. **90** (Neighbor 6 pushes the 8 up.)
2. **40** (Neighbor 3 lets the 4 stay.)
3. **\$7.00** (Neighbor 4 — the 49 cents isn't enough to push it up.)
4. **2,000** (Target is the 2; neighbor is 3, so it stays. The 350 wasn't enough.)
5. **6.9** (Target is the 8 in the tenths; neighbor 5 pushes it up.)
6. **200** (Neighbor 9 pushes the 9 up, which carries all the way over: 199 → 200.)
7. **About 90** (39 rounds to 40, 52 rounds to 50; $40 + 50 = 90$. The exact answer, 91, is right next door — that's the point of estimating.)
8. **54** (54 still rounds down to 50; at 55 the neighbor rule kicks it up to 60. Compare with the Check question — the full family of numbers that round to 50 runs from 45 through 54.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Rounding to a Target Place	☐	☐	☐
Estimation as a Gut-Check	☐	☐	☐

Lesson 3: The “Big Picture” of Fractions

Understanding Parts of a Whole

LESSON 3 OF 19

PHASE 3 · PARTS OF
THE WHOLE

ABOUT 20-25 MINUTES

Warm-Up — start with a win

Two questions you can already do. Answer them in your head — then you've officially started.

1. A pizza is cut into 4 equal slices and you eat 1. What fraction did you eat?
2. Which is more pizza: half of it, or a quarter of it?

Answers: $\frac{1}{4}$ · Half

The Concept — the idea behind the math

Many people think of a fraction as two random numbers separated by a line. In reality, a fraction is a **division problem that hasn't been finished yet**.

- **The bottom number (denominator):** tells you the **size** of the pieces. (How many equal pieces make a whole?)
- **The top number (numerator):** tells you the **quantity**. (How many of those pieces do you actually have?)

The fraction/ratio connection: if a recipe calls for **1 cup of sugar for every 3 cups of flour**, the sugar is $\frac{1}{3}$ of the “dry ingredient” relationship. Fractions and ratios are just different ways of describing how parts relate to each other.

Visual tip: if the bottom number is **large**, the pieces are **small**. Think of a pizza cut into 4 slices versus a pizza cut into 100 slices. Which slice would you rather have?

Worked Examples — watch the moves

Read $\frac{3}{8}$ like a story: the whole was cut into **8** equal pieces (bottom), and you have **3** of them (top).

Same top, different bottoms: $\frac{1}{4}$ of a candy bar is a bigger piece than $\frac{1}{10}$ of the same bar — fewer cuts, bigger pieces.

Parts of a group work too: 7 students out of 10 wearing blue is the fraction **$\frac{7}{10}$** — the “whole” doesn't have to be a pizza.

Check for Understanding — your turn (5 questions)

1. In the fraction **$\frac{3}{8}$** , which number tells you how many pieces make up the **whole**?
2. If you have two identical candy bars, and you cut one into **fourths** and the other into **tenths**, which bar has the **larger** individual pieces?
3. You have a group of 10 students. 7 are wearing blue shirts. What **fraction** of the students are wearing blue?
4. True or False: the fraction **$\frac{4}{4}$** is equal to the whole number **1**.
5. **The Ratio Challenge:** A cleaning solution requires **1 part bleach** and **5 parts water**. What fraction of the total mixture is the bleach? (Hint: how many total parts are in the bucket?)

PAUSE HERE — try all five on your own first. Getting them wrong costs nothing; that's what they're for.

Answer Key — every answer, explained

1. **8** (The denominator defines the whole.)
2. **The fourths** (Fewer cuts means bigger pieces.)
3. **$\frac{7}{10}$** (7 students out of 10 total.)
4. **True** (If you have all the pieces, you have the whole thing.)

5. **$\frac{1}{6}$** (1 part bleach + 5 parts water = 6 total parts.)

More Practice — reps make it stick

Read the fraction:

1. In $\frac{5}{6}$, which number tells you the *size* of the pieces?
2. Write “3 out of 8 students” as a fraction.
3. Which is a bigger piece of the same cake: $\frac{1}{3}$ or $\frac{1}{8}$?
4. $\frac{6}{6}$ equals what whole number?

Fractions in the world:

5. A team wins 4 of its 9 games. What fraction of its games did it win?
6. What fraction of an hour is 30 minutes? (Simplify if you can.)
7. A juice mix is 1 part juice concentrate to 3 parts water. What fraction of the mixture is concentrate?
8. True or False: in a fraction, a **bigger** bottom number means **bigger** pieces.

More Practice — Answer Key

1. **6** (The bottom number — the whole is cut into 6 equal pieces.)
2. **$\frac{3}{8}$** (3 of the 8 total.)
3. **$\frac{1}{3}$** (Fewer cuts, bigger pieces.)
4. **1** (All six of six pieces is the whole thing.)
5. **$\frac{4}{9}$** (4 wins out of 9 games total.)
6. **$\frac{30}{60}$, which is $\frac{1}{2}$** (30 of the hour's 60 minutes — half the hour, just as you'd say out loud.)
7. **$\frac{1}{4}$** (1 part concentrate + 3 parts water = 4 total parts. Same

move as the bleach question.)

- 8. False** (More cuts means *smaller* pieces — a pizza in 100 slices has tiny slices.)

Update your tracker:

Topic	New to this	Practicing	Got this!
What Is a Fraction?	☐	☐	☐
Part-to-Whole Thinking	☐	☐	☐

Lesson 4: Equivalent Fractions

The Identity Principle: The Power of 1

LESSON 4 OF 19

PHASE 3 · PARTS OF
THE WHOLE

ABOUT 20-25 MINUTES

Warm-Up — start with a win

Two questions you can already do. Answer them in your head — then you've officially started.

1. $5 \times 1 = ?$
2. Fold a half of a sheet of paper in half again. How many quarters make that original half?

Answers: $5 \cdot 2$ — so $1/2 = 2/4$

The Concept — the idea behind the math

In math, the number **1** is like a mirror. Anything you multiply by 1 stays exactly the same: $5 \times 1 = 5$, $100 \times 1 = 100$, $1/2 \times 1 = 1/2$.

The secret of “fractional 1”: the number 1 can wear many disguises. Any fraction where the top and bottom are the same is just a fancy way of writing 1:

$$2/2 = 1 \quad 5/5 = 1 \quad 100/100 = 1$$

Changing the appearance (the Golden Rule): because multiplying by 1 doesn't change the value, we can multiply a fraction by any version of “1” to give it a **new name** without changing how much it's worth.

The big idea: we aren't making the fraction bigger or smaller. We are just cutting the same amount into smaller, more numerous pieces.

Worked Examples — watch the moves

Rename $1/2$ using $2/2$:

$$1/2 \times 2/2 = 2/4$$

Rename 1/2 using 5/5:

$$1/2 \times 5/5 = 5/10$$

Same amount of pizza every time — just cut into more, smaller slices. And the move runs in reverse: **dividing** top and bottom by the same number (that's dividing by 1 in disguise) gives the *simpler* name. That reverse move is called **simplifying**, and it stars in Lesson 5.

Check for Understanding — your turn (5 questions)

1. To turn **1/3** into **2/6**, what version of “1” did we multiply by? (For example: 2/2? 3/3?)
2. If I multiply **3/4** $\times$ **10/10**, what is my new equivalent fraction?
3. **True or False:** multiplying a fraction by **5/5** changes the actual value of the number.
4. Fill in the blank to create a “fractional 1”: **7/?**
5. **Mental Math:** If you have **4/12**, and you know that **4/4** is a version of 1, what happens if you **divide** both the top and bottom by 4? (*Hint: dividing by 1 also keeps the value the same!*)

PAUSE HERE — try all five on your own first. Getting them wrong costs nothing; that's what they're for.

Answer Key — every answer, explained

1. **2/2** (Since $1 \times 2 = 2$ and $3 \times 2 = 6$.)
2. **30/40** (Tops: $3 \times 10 = 30$. Bottoms: $4 \times 10 = 40$.)
3. **False** (It only changes the “appearance” — the name.)
4. **7** (Because $7/7 = 1$.)
5. **You get 1/3** ($4 \div 4 = 1$ on top, $12 \div 4 = 3$ on the bottom. This is

“simplifying” the fraction.)

More Practice — reps make it stick

Rename each fraction:

1. $1/2 \times 3/3 = ?$
2. $2/5 \times 2/2 = ?$
3. What version of “1” turns **1/4** into **3/12**?
4. Complete the equivalence: $3/4 = ?/12$

Think it through:

5. Fill in the blank to make a “fractional 1”: $?/9$
6. **True or False:** $2/3$ and $4/6$ are the same amount.
7. Run the move in reverse: simplify **6/8** by dividing top and bottom by the same number.
8. **Money check:** is **50/100** of a dollar the same as **1/2** of a dollar? Explain with cents.

More Practice — Answer Key

1. **3/6** ($1 \times 3 = 3$, $2 \times 3 = 6$.)
2. **4/10** ($2 \times 2 = 4$, $5 \times 2 = 10$.)
3. **3/3** ($1 \times 3 = 3$ and $4 \times 3 = 12$.)
4. **9** (Ask: 4 times what makes 12? Times 3 — so the top gets it too: $3 \times 3 = 9$.)
5. **9** ($9/9 = 1$ — top and bottom must match.)
6. **True** (Multiply $2/3$ by $2/2$ and you get $4/6$ exactly.)
7. **3/4** (Divide both by 2: $6 \div 2 = 3$, $8 \div 2 = 4$.)
8. **Yes** ($50/100$ of a dollar is 50 cents, and $1/2$ of a dollar is 50 cents.)

Two names, one amount — that's the whole lesson.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Equivalent Fractions	☐	☐	☐
The Identity Principle (multiplying by 1)	☐	☐	☐

Interlude: The VIPs of Math — Zero & One

Two Small Numbers With Special Powers

INTERLUDE • AFTER
LESSON 4

PHASE 1 • NUMBER
SENSE

ABOUT 10 MINUTES

Warm-Up — start with a win

Two questions you can already do. Answer them in your head — then you've officially started.

1. $7 + 0 = ?$

2. $7 \times 1 = ?$

Answers: $7 + 0 = 7$ — you already know both VIP rules

The Concept — the idea behind the math

You just met **1** in disguise in Lesson 4. This short interlude gives 1 and its partner **0** their proper introduction — because these two numbers follow special rules that the test loves to lean on.

One is the “change nothing” number for multiplying. Multiply or divide anything by 1 and it stays itself: $43 \times 1 = 43$. That's the whole engine behind equivalent fractions.

Zero is the “change nothing” number for adding. Add or subtract 0 and nothing moves: $43 + 0 = 43$.

But zero has a dark side in multiplication: anything times 0 is wiped out to 0. One single zero in a chain of multiplication zeroes the whole thing: $25 \times 8 \times 0 = 0$.

And one true forbidden move: you can divide 0 by a number ($0 \div 5 = 0$ — share nothing among five people, everyone gets nothing). But you can **never divide by zero**. $5 \div 0$ has no answer — you can't deal five cards into zero hands. Math calls it **undefined**.

Worked Examples — watch the moves

One as the identity:

$$43 \times 1 = 43 \quad 43 \div 1 = 43$$

Zero the eraser:

$$25 \times 8 \times 0 = 0 \quad (\text{one zero wipes the chain})$$

Zero in division — direction matters:

$$0 \div 5 = 0 \quad \text{but} \quad 5 \div 0 \text{ is undefined}$$

Check for Understanding — your turn (5 questions)

1. $999 \times 1 = ?$
2. $999 + 0 = ?$
3. $17 \times 4 \times 0 = ?$
4. $0 \div 8 = ?$
5. **Critical Thinking:** Your calculator shows an error when you try $8 \div 0$. Why?

PAUSE HERE — try all five on your own first. Getting them wrong costs nothing; that's what they're for.

Answer Key — every answer, explained

1. **999** (One changes nothing in multiplication.)
2. **999** (Zero changes nothing in addition.)
3. **0** (One zero in the chain erases everything — no need to multiply 17×4 first.)
4. **0** (Nothing shared among 8 people: everyone gets nothing. This direction is fine.)
5. **Because dividing by zero is undefined** (There's no way to split 8 into zero groups — the question itself has no meaning, so the

calculator refuses.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Properties of One (the identity)	☐	☐	☐
Properties of Zero (including “never divide by zero”)	☐	☐	☐