

The GED Math Foundations Roadmap

Installment 2 — Working With Fractions

Lessons 5-7: Comparing & Simplifying · Adding & Subtracting · Multiplying & Dividing

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 5: Comparing & Simplifying Fractions

Same Amount, Simpler Name

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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. Which is bigger: $\frac{2}{4}$ of a pizza or $\frac{1}{4}$ of it?
2. Half a dollar is how many cents?

Answers: $\frac{2}{4}$ · 50 — and 50/100 is another name for $\frac{1}{2}$, which is where this lesson is headed

The Concept — the idea behind the math

Simplifying a fraction means writing the same amount using the

fewest, biggest pieces possible. The value never changes — only the name gets simpler. **$3/6$ and $1/2$ are the exact same amount;** $1/2$ is just the simpler way to say it.

The trick is to divide the top number and the bottom number by the **same number**, again and again, until no number divides into both anymore. (Dividing top and bottom by the same number is the same move as multiplying by it from Lesson 4 — just run in reverse.)

Comparing fractions is trickier, because you can't compare slices fairly until the pizzas are cut the same way. To compare two fractions, give them the **same bottom number (a common denominator)** — then whichever has the bigger top number is the bigger fraction.

Worked Examples — watch the moves

Simplify $8/12$. Both 8 and 12 can be divided by 4:

$$8 \div 4 = 2 \quad \text{and} \quad 12 \div 4 = 3 \quad \rightarrow \quad 8/12 = 2/3$$

Nothing divides into both 2 and 3, so **$2/3$** is the simplest name.

Compare $2/3$ and $3/4$. Give them the same bottom. The smallest number both 3 and 4 fit into is 12:

$$2/3 = 8/12 \quad 3/4 = 9/12$$

9 is bigger than 8, so **$3/4$ is larger than $2/3$.**

Check for Understanding — your turn (5 questions)

1. Simplify $4/8$.
2. Simplify $10/15$.
3. Which is larger: $1/2$ or $2/5$?
4. Is $9/12$ already in simplest form? If not, simplify it.
5. **Critical Thinking:** Which is bigger, $3/4$ or $5/8$ — and how can you tell without a calculator?

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. **1/2** (Divide top and bottom by 4: $4 \div 4 = 1$, $8 \div 4 = 2$.)
2. **2/3** (Divide top and bottom by 5: $10 \div 5 = 2$, $15 \div 5 = 3$.)
3. **1/2** (Same bottoms: $1/2 = 5/10$ and $2/5 = 4/10$. Five tenths beats four tenths.)
4. **No — it simplifies to 3/4.** (Divide top and bottom by 3: $9 \div 3 = 3$, $12 \div 3 = 4$.)
5. **3/4 is bigger.** (Rename $3/4$ as $6/8$. Now compare $6/8$ to $5/8$ — same pieces, and six of them beats five.)

More Practice — reps make it stick

Simplify each fraction to its lowest terms:

1. $6/8$
2. $9/15$
3. $12/16$
4. $14/21$

Compare each pair. Write > (greater than), < (less than), or = :

5. $3/5$? $1/2$
6. $2/3$? $4/6$
7. $7/8$? $3/4$
8. $5/6$? $4/5$

More Practice — Answer Key

1. **3/4** (Divide by 2: $6 \div 2 = 3$, $8 \div 2 = 4$.)
2. **3/5** (Divide by 3: $9 \div 3 = 3$, $15 \div 3 = 5$.)
3. **3/4** (Divide by 4: $12 \div 4 = 3$, $16 \div 4 = 4$.)
4. **2/3** (Divide by 7: $14 \div 7 = 2$, $21 \div 7 = 3$.)
5. **3/5 > 1/2** ($3/5 = 6/10$, $1/2 = 5/10$.)
6. **2/3 = 4/6** (4/6 simplifies right back to 2/3 — same amount.)
7. **7/8 > 3/4** ($3/4 = 6/8$, and 7/8 beats 6/8.)
8. **5/6 > 4/5** (Common bottom 30: $5/6 = 25/30$, $4/5 = 24/30$.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Simplifying Fractions	☐	☐	☐
Comparing Fractions	☐	☐	☐

Lesson 6: Adding & Subtracting Fractions

You Can Only Combine Like Pieces

LESSON 6 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. One quarter plus two quarters is how many quarters?
2. $\frac{3}{5} - \frac{1}{5} = ?$

Answers: 3 quarters — you just added fractions · $\frac{2}{5}$

The Concept — the idea behind the math

Think about money. Three quarters plus two quarters is easy — it's five quarters — because they're the **same kind of coin**. But one quarter plus one dime? You can't just say “two” of anything until you change them into the same unit (cents).

Fractions work the same way. You can only add or subtract them when the pieces are the **same size** — when the bottom numbers match.

- **If the bottoms already match:** add (or subtract) the top numbers and keep the bottom the same.
- **If the bottoms are different:** first rename the fractions so they share a bottom number, then add or subtract.

If your answer comes out “top-heavy” (like $\frac{6}{4}$), that's fine — it just means more than one whole. $\frac{6}{4} = 1$ and $\frac{2}{4} = 1 \frac{1}{2}$.

Worked Examples — watch the moves

Same bottom:

$2/5 + 1/5 = 3/5$ (two fifths and one more fifth = three fifths)

Different bottoms — $1/2 + 1/3$. The smallest number both 2 and 3 fit into is 6. Rename both:

$$1/2 = 3/6 \quad 1/3 = 2/6 \quad \rightarrow \quad 3/6 + 2/6 = 5/6$$

Subtraction — $3/4 - 1/3$. Both 4 and 3 fit into 12:

$$3/4 = 9/12 \quad 1/3 = 4/12 \quad \rightarrow \quad 9/12 - 4/12 = 5/12$$

Check for Understanding — your turn (5 questions)

1. $3/7 + 2/7 = ?$
2. $5/8 - 1/8 = ?$
3. $1/2 + 1/4 = ?$
4. $2/3 - 1/6 = ?$
5. **Critical Thinking:** A recipe needs $1/2$ cup of oil and $1/3$ cup of water. How much liquid is that altogether?

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. **$5/7$** (Same bottoms — just add the tops: $3 + 2 = 5$.)
2. **$4/8$, which simplifies to $1/2$** ($5 - 1 = 4$ eighths; $4/8$ reduces to $1/2$.)
3. **$3/4$** (Rename $1/2$ as $2/4$. Then $2/4 + 1/4 = 3/4$.)
4. **$1/2$** (Rename $2/3$ as $4/6$. Then $4/6 - 1/6 = 3/6 = 1/2$.)
5. **$5/6$ cup** (Common bottom 6: $1/2 = 3/6$, $1/3 = 2/6$, and $3/6 + 2/6 = 5/6$.)

More Practice — reps make it stick

Add or subtract. Simplify your answer when you can:

1. $1/4 + 2/4$
2. $5/9 + 1/9$
3. $7/10 - 3/10$
4. $1/3 + 1/4$
5. $2/5 + 1/2$
6. $3/4 - 1/2$
7. $5/6 - 1/3$
8. $3/8 + 1/4$

More Practice — Answer Key

1. **$3/4$** ($1 + 2 = 3$ fourths.)
2. **$6/9$, which simplifies to $2/3$** ($5 + 1 = 6$ ninths; divide by 3.)
3. **$4/10$, which simplifies to $2/5$** ($7 - 3 = 4$ tenths; divide by 2.)
4. **$7/12$** ($1/3 = 4/12$, $1/4 = 3/12$; $4 + 3 = 7$.)
5. **$9/10$** ($2/5 = 4/10$, $1/2 = 5/10$; $4 + 5 = 9$.)
6. **$1/4$** ($1/2 = 2/4$; $3/4 - 2/4 = 1/4$.)
7. **$1/2$** ($1/3 = 2/6$; $5/6 - 2/6 = 3/6 = 1/2$.)
8. **$5/8$** ($1/4 = 2/8$; $3/8 + 2/8 = 5/8$.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Adding Fractions	☐	☐	☐
Subtracting Fractions	☐	☐	☐

Lesson 7: Multiplying & Dividing Fractions

Multiply Straight Across — Divide Means Flip

LESSON 7 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. What is half of 10?
2. How many quarters (25¢) are in one dollar?

Answers: 5 — you just multiplied by a fraction · 4 — you just divided by a fraction

The Concept — the idea behind the math

Here's a pleasant surprise: **multiplying fractions is the easy one.** No common denominators, no renaming. You just multiply the top numbers together and the bottom numbers together. That's it.

In fraction language, the word **“of” means multiply.** “Half of a third” is $\frac{1}{2} \times \frac{1}{3}$. And notice something odd but true: multiplying by a fraction less than one makes things **smaller** — half of a third is a sixth, a smaller piece than either.

Dividing has one move to remember: **Keep, Change, Flip.** Keep the first fraction, change the $\div$ sign to $\times$, and flip the second fraction upside down. Then just multiply.

Why flipping works: dividing by $\frac{1}{4}$ is really asking “how many quarters fit in here?” — and counting how many small pieces fit gives you a bigger number. That's why dividing by a fraction usually makes things grow.

Worked Examples — watch the moves

Multiply — $\frac{2}{3} \times \frac{4}{5}$. Straight across:

$$2 \times 4 = 8 \text{ (tops)} \quad 3 \times 5 = 15 \text{ (bottoms)} \quad \rightarrow \quad 8/15$$

Divide — $3/4 \div 1/2$. Keep, Change, Flip:

$$3/4 \div 1/2 \rightarrow 3/4 \times 2/1 = 6/4 = 1 \frac{1}{2}$$

Divide — $1/2 \div 1/4$. “How many quarters fit in a half?”

$$1/2 \times 4/1 = 4/2 = 2 \quad \text{(two quarters fit in a half — makes sense!)}$$

Check for Understanding — your turn (5 questions)

1. $1/2 \times 3/4 = ?$
2. $2/5 \times 5/6 = ?$
3. $1/2 \div 1/4 = ?$
4. $3/4 \div 1/2 = ?$
5. **Critical Thinking:** You have $3/4$ cup of coffee beans, and each pot needs $1/8$ cup. How many pots can you make?

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. **3/8** (Straight across: $1 \times 3 = 3$, $2 \times 4 = 8$.)
2. **1/3** (Straight across: $2 \times 5 = 10$, $5 \times 6 = 30$; $10/30$ simplifies to $1/3$.)
3. **2** (Keep-Change-Flip: $1/2 \times 4/1 = 4/2 = 2$. Two quarters fit in a half.)
4. **1 1/2** (Keep-Change-Flip: $3/4 \times 2/1 = 6/4 = 1 \frac{1}{2}$.)
5. **6 pots** ($3/4 \div 1/8 = 3/4 \times 8/1 = 24/4 = 6$.)

More Practice — reps make it stick

Multiply. Simplify when you can:

1. $\frac{1}{3} \times \frac{1}{2}$

2. $\frac{2}{3} \times \frac{3}{4}$

3. $\frac{4}{5} \times \frac{1}{2}$

4. $\frac{5}{6} \times \frac{6}{5}$

Divide (Keep, Change, Flip). Simplify when you can:

5. $\frac{1}{2} \div \frac{1}{3}$

6. $\frac{2}{3} \div \frac{1}{6}$

7. $\frac{3}{5} \div \frac{1}{5}$

8. $\frac{1}{4} \div \frac{1}{2}$

More Practice — Answer Key

1. **$\frac{1}{6}$** ($1 \times 1 = 1$, $3 \times 2 = 6$.)

2. **$\frac{1}{2}$** ($2 \times 3 = 6$, $3 \times 4 = 12$; $\frac{6}{12} = \frac{1}{2}$.)

3. **$\frac{2}{5}$** ($4 \times 1 = 4$, $5 \times 2 = 10$; $\frac{4}{10} = \frac{2}{5}$.)

4. **1** ($5 \times 6 = 30$, $6 \times 5 = 30$; $\frac{30}{30} = 1$.)

5. **$1 \frac{1}{2}$** ($\frac{1}{2} \times \frac{3}{1} = \frac{3}{2} = 1 \frac{1}{2}$.)

6. **4** ($\frac{2}{3} \times \frac{6}{1} = \frac{12}{3} = 4$.)

7. **3** ($\frac{3}{5} \times \frac{5}{1} = \frac{15}{5} = 3$.)

8. **$\frac{1}{2}$** ($\frac{1}{4} \times \frac{2}{1} = \frac{2}{4} = \frac{1}{2}$.)

Update your tracker:

Topic	New to this	Practicing	Got this!
Multiplying Fractions	☐	☐	☐
Dividing Fractions	☐	☐	☐