

Lesson 3-4 – Converting Fractions to Decimals (Equivalent Base-10 Fractions)

Objectives:

- Students will divide positive integers from the multiplication table without remainders, as evidenced by them passing one-minute quizzes.
- Students will find equivalent fractions, as evidenced by them completing a warm-up worksheet where they do so.
- Students will convert fractions to decimals using equivalent base-10 fractions, as evidenced by them completing a homework assignment where they do so.

Student Materials on Desk Corner:

- Homework #3-3
- Homework Checker
- Warm-up & Notes Checker

Student Materials for Class:

- Homework Log
- Binder Paper
- Pencils

Teacher Materials:

- “Minute Quiz 3-4” for each student
- “Warm-up 3-4” for each student
- “Unit Calendar” transparency
- “Homework #3-4” handout for each student

Homework:

- Finish Homework #3-4
- Continue 1 hour of ALEKS

Time	Activity
10 min	<p style="text-align: center;">MINUTE QUIZ AND ATTENDANCE</p> <p>Minute Quiz and Warm-up When the bell rings, quickly go around and put the minute quiz on each student’s desk, face down. Then, start everyone on the quiz at the same time and give everyone one minute. While students are working on the quiz, pass out the warm-ups so that students can work on them once they’re done with the minute quiz. After the minute is over, have a student collect the minute quizzes and give them to the teacher’s aide (TA) to grade.</p> <p>Attendance, Collect HW, and Warm-up Check While students work on the warm-up, take attendance and have the TA collect homework & stamp homework checkers. At the end of the allotted time, go around and stamp the students’ warm-up & notes checkers.</p>
30 min	<p style="text-align: center;">LESSON</p> <p>Put up the unit calendar transparency and show students where they are in the unit. Then, teach the lesson using the notes. Once students are finished, stamp their warm-up & notes checkers.</p>
10 min	<p style="text-align: center;">CLASSWORK</p> <p>Give students the homework assignment as their classwork. They must do problems 1, 6, 7 before they may work on ALEKS.</p>
30 min	<p style="text-align: center;">ALEKS</p> <p>When students finish their classwork, they should continue with ALEKS. Use this student work time to return graded homework.</p>

Solve the following division problems. You have exactly one minute!

$9 \div 3 =$

$132 \div 12 =$

$36 \div 4 =$

$50 \div 5 =$

$60 \div 6 =$

$7 \div 1 =$

$8 \div 8 =$

$24 \div 12 =$

$84 \div 12 =$

$21 \div 3 =$

$72 \div 12 =$

$10 \div 2 =$

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Solve the following division problems. You have exactly one minute!

$110 \div 11 =$

$30 \div 3 =$

$77 \div 7 =$

$99 \div 9 =$

$66 \div 6 =$

$35 \div 5 =$

$36 \div 4 =$

$24 \div 4 =$

$10 \div 1 =$

$64 \div 8 =$

$45 \div 5 =$

$4 \div 1 =$

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$60 \div 12 =$

$20 \div 2 =$

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$12 \div 4 =$

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$33 \div 11 =$

$12 \div 4 =$

$66 \div 11 =$

Follow the instructions to find equivalent fractions.

1) $\frac{3}{20}$; multiply top & bottom by 5

2) $\frac{23}{40}$; multiply top & bottom by 25

Fill in the blanks so that the following fractions are equivalent.

3) $\frac{2}{5} = \frac{[\quad]}{10}$

4) $\frac{1}{2} = \frac{[\quad]}{10}$

5) $\frac{7}{50} = \frac{[\quad]}{100}$

6) $\frac{4}{25} = \frac{[\quad]}{100}$

7) $\frac{3}{20} = \frac{[\quad]}{100}$

8) $\frac{2}{125} = \frac{[\quad]}{1000}$

Follow the instructions to find equivalent fractions.

1) $\frac{3}{20}$; multiply top & bottom by 5

2) $\frac{23}{40}$; multiply top & bottom by 25

Fill in the blanks so that the following fractions are equivalent.

3) $\frac{2}{5} = \frac{[\quad]}{10}$

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6) $\frac{4}{25} = \frac{[\quad]}{100}$

7) $\frac{3}{20} = \frac{[\quad]}{100}$

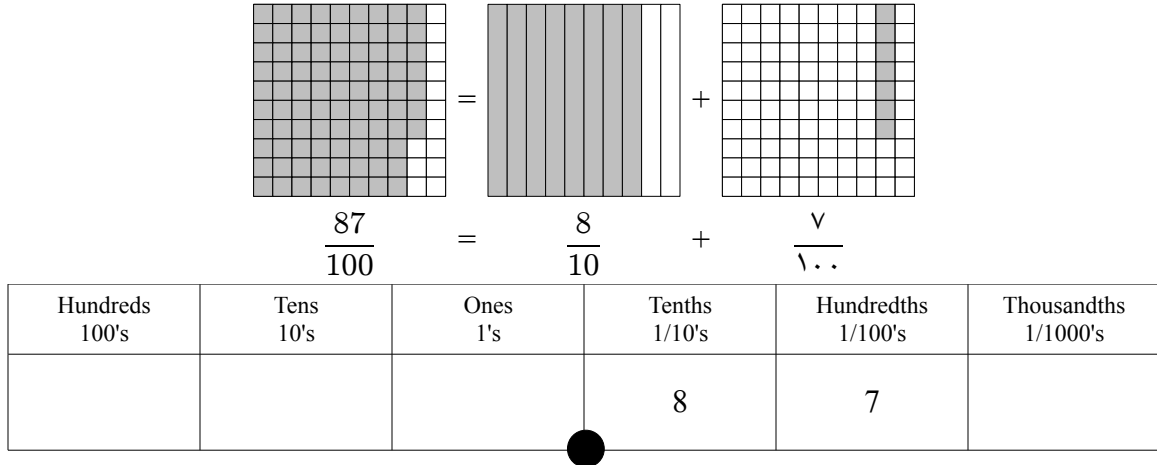
8) $\frac{2}{125} = \frac{[\quad]}{1000}$

Fractions-to-Decimals (Base-10 Fractions)

Introduction

Last week, we learned how to write base-10 fractions as decimals.

Ex: Write $\frac{87}{100}$ as a decimal.



So, $\frac{87}{100} = \boxed{0.87}$

This pattern is always true. So,

$$\begin{aligned} \frac{3}{10} &= 0.3 & \frac{323}{1000} &= 0.323 \\ \frac{17}{100} &= 0.17 & \frac{47}{1000} &= 0.047 \\ \frac{5}{100} &= 0.05 & \frac{9}{1000} &= 0.009 \end{aligned}$$

That makes writing base-10 fractions as decimals easy!

But, what about fractions like $\frac{1}{5}$? There are two ways to write these as decimals:

- 1) Equivalent base-10 fractions (today).
- 2) Long division (next lesson).

Equivalent Base-10 Fractions

Ex: If we write $\frac{1}{5}$ as an equivalent base-10 fraction, then we can easily write it as a decimal:

$$\frac{1}{5} = \frac{1 \cdot 2}{5 \cdot 2} = \frac{2}{10} = \boxed{.2}$$

Ex: Write $\frac{7}{8}$ as a decimal.

$$\frac{7}{8} = \frac{7 \cdot 125}{8 \cdot 125} = \frac{875}{1000} = \boxed{0.875}$$

How did I know to multiply by 125? It's because 10's are made up of pairs of 2's and 5's:

$$\begin{aligned} 10 &= 2 \cdot 5 \\ 100 &= 10 \cdot 10 = 2 \cdot 5 \cdot 2 \cdot 5 \\ 1000 &= 10 \cdot 10 \cdot 10 = 2 \cdot 5 \cdot 2 \cdot 5 \cdot 2 \cdot 5 \end{aligned}$$

Since $\frac{7}{8} = \frac{7}{2 \cdot 2 \cdot 2}$, we need three more 5's to make pairs: $5 \cdot 5 \cdot 5 = 125$.

So, we multiplied the top and bottom by 125.

Ex: Write $\frac{3}{4}$ as a decimal.

$$\frac{3}{4} = \frac{3}{2 \cdot 2} = \frac{3 \cdot 25}{4 \cdot 25} = \frac{75}{100} = \boxed{0.75}$$

↖ So, we need two 5's to make pairs: $5 \cdot 5 = 25$

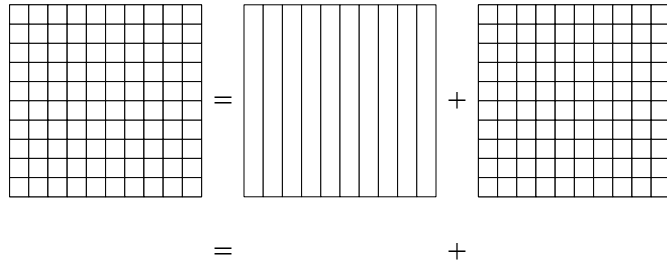
Ex: Write $\frac{1}{3}$ as a decimal.

↖ This 3 makes it so we can't make pairs of 2's and 5's.

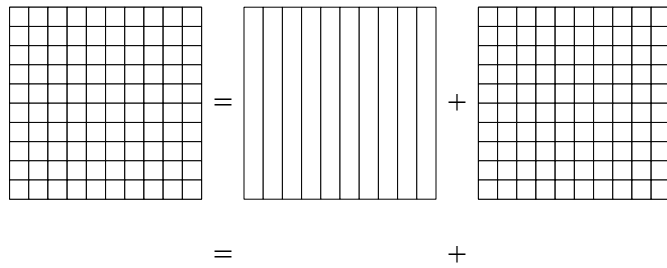
So, we must approximate a base-10 fraction. Let's try a denominator of 1000.

Guess	$3 \cdot \text{Guess}$
300	900
350	1050
325	975
330	990
335	1005
334	1002
333	999

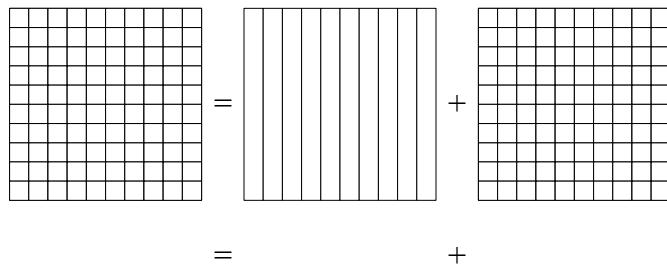
$$\frac{1}{3} = \frac{1 \cdot 333}{3 \cdot 333} = \frac{333}{999} \approx \frac{333}{1000} = \boxed{0.333}$$



Hundreds 100's	Tens 10's	Ones 1's	Tenths 1/10's	Hundredths 1/100's	Thousandths 1/1000's



Hundreds 100's	Tens 10's	Ones 1's	Tenths 1/10's	Hundredths 1/100's	Thousandths 1/1000's



Hundreds 100's	Tens 10's	Ones 1's	Tenths 1/10's	Hundredths 1/100's	Thousandths 1/1000's

Write the following fractions as decimals by finding equivalent base-10 fractions.

Ex: Write $\frac{3}{4}$ as a decimal.

$$\frac{3}{4} = \frac{3}{2 \cdot 2} = \frac{3 \cdot 25}{4 \cdot 25} = \frac{75}{100} = \boxed{0.75}$$

So, we need two 5's to make pairs: $5 \cdot 5 = 25$

1) Write $\frac{3}{25}$ as a decimal.

2) Write $\frac{3}{50}$ as a decimal.

3) Write $\frac{3}{16}$ as a decimal.

4) Write $\frac{2}{5}$ as a decimal.

5) Write $\frac{1}{4}$ as a decimal.

6) Write $\frac{23}{40}$ as a decimal.

7) Write $\frac{1}{2}$ as a decimal.

8) Write $\frac{17}{20}$ as a decimal.

Write the following fractions as decimals by approximating an equivalent base-10 fraction with a denominator of 1000. Show your guesses.

Ex: Write $\frac{1}{3}$ as a decimal.

Guess	$3 \cdot \text{Guess}$
300	900
350	1050
325	975
330	990
335	1005
334	1002
333	999

So,

$$\frac{1}{3} = \frac{1 \cdot 333}{3 \cdot 333} = \frac{333}{999} \approx \frac{333}{1000} = \boxed{0.333}$$

9) Write $\frac{1}{7}$ as a decimal.

10) Write $\frac{7}{12}$ as a decimal.

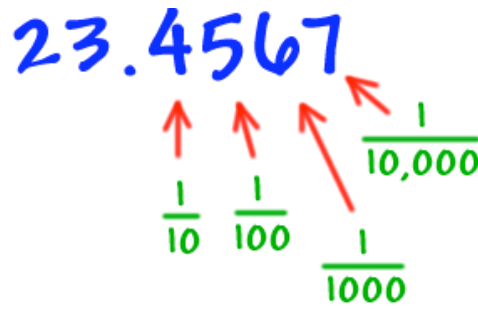
11) Write $\frac{5}{6}$ as a decimal.

Decimals: How to Convert Fractions to Decimals

These will get messier, so I've got a second lesson on this once you learn about division of decimals.

So, here's the simple stuff!

We just keep those decimal place values in mind...



These guys are a snap to convert!

$$\frac{3}{10} = .3$$

$$\frac{17}{100} = .17$$

$$\frac{5}{100} = .05$$

$$\frac{323}{1000} = .323$$

$$\frac{47}{1000} = .047$$

$$\frac{9}{1000} = .009$$

$$\frac{1}{5}$$

What about a fraction like $\frac{1}{5}$?

$$\frac{1}{5}$$

If we can turn the denominator into a 10 or 100 or 1000 (a power of 10), then we can pop it!

Check it out:

$$\frac{1}{5} \times \frac{2}{2} = \frac{2}{10} = .2$$

a magic one!

Here's another one:

$$\frac{3}{25} = \frac{3}{25} \times \frac{4}{4} = \frac{12}{100} = .12$$

One more:

$$\frac{5}{8} = \frac{5}{8} \times \frac{125}{125} = \frac{625}{1000} = .625$$

OK, OK, OK! Wait a minute here! How on earth did I know to multiply that guy by 125?!

Heh, heh... Because I'm smart! Alright, I'll tell you how I knew.

I know that I want that denominator to be 10 or 100 or 1000 or 10,000... a power of 10... And 10's are made up of 2's and 5's:

$$10 = 2 \times 5$$

$$100 = 10 \times 10 = 2 \times 5 \times 2 \times 5$$

$$1000 = 10 \times 10 \times 10 = 2 \times 5 \times 2 \times 5 \times 2 \times 5$$

So, we need a PAIR of 2's and 5's!

Look at this guy:

$$\frac{3}{4}$$

$$\frac{3}{4} = \frac{3}{2 \cdot 2} = \frac{3}{4} \times \frac{25}{25} = \frac{75}{100} = .75$$



So, we need two 5's to make the pairs: $2 \times 5 \times 2 \times 5$

Here's another one:

$$\frac{3}{50} = \frac{3}{2 \cdot 5 \cdot 5} = \frac{3}{50} \times \frac{2}{2} = \frac{6}{100} = .06$$



We need another 2!

Note that this will ONLY work if your denominator is made up of nothing but 2's and/or 5's.

Can you convert $\frac{7}{15}$ this way?

$$\frac{7}{15} = \frac{3}{3 \cdot 5 \cdot 5}$$



Nope! The 3 blows it!

But, there will be another way... There will be another way.

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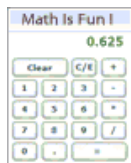
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Convert Fractions to Decimals

The simplest method is to use a calculator.



Just divide the top of the fraction by the bottom, and read off the answer !

Example: What is $\frac{5}{8}$ as a fraction?

... get your calculator and type in "5 / 8 =", the answer should be 0.625

To convert a Fraction to a Decimal manually, follow these steps:

Step 1: Find a number you can multiply by **the bottom of the fraction** to make it 10, or 100, or 1000, or any **1 followed by 0s**.

Step 2: Multiply both top and bottom by that number.

Step 3. Then write down just the top number, putting the decimal place in the correct spot (one space from the right for every zero in the bottom number)

Example 1: Express $\frac{3}{4}$ as a Decimal

Step 1: We can multiply 4 by **25** to become 100

Step 2: Multiply top and bottom by 25:

$$\frac{3}{4} = \frac{75}{100}$$

$\times 25$

 $\times 25$

Step 3: Write down 75 with the decimal place 2 spaces from the right (because 100 has 2 zeros);

Answer = 0.75

Example 2: Express $\frac{3}{16}$ as a Decimal

Step 1: We have to multiply 16 by **625** to become 10,000

Step 2: Multiply top and bottom by 625:

$$\begin{array}{r} \times 625 \\ \hline 3 \\ 16 \end{array} = \frac{1,875}{10,000}$$

Step 3: Write down 1875 with the decimal place 4 spaces from the right (because 10,000 has 4 zeros);

Answer = 0.1875

Example 2: Express 1/3 as a Decimal

Step 1: There is no way to multiply 3 to become 10 or 100 or any power of 10, but we can calculate an **approximate** decimal by choosing to multiply by, say, 333

Step 2: Multiply top and bottom by 333:

$$\begin{array}{r} \times 333 \\ \hline 1 \\ 3 \end{array} = \frac{333}{999}$$

Step 3: Now, 999 is *nearly* 1,000, so let us write down 333 with the decimal place 3 spaces from the right (because 1,000 has 3 zeros):

Answer = 0.333 (accurate to only 3 decimal places !!)

here's more ...

- [Introduction to Fractions](#)
- [Introduction to Decimals](#)
- [Convert Decimals to Fractions](#)
- [Convert Fractions to Percents](#)
- [Equivalent Fractions](#)
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