

Converting a Decimal into a Fraction

by Sophia



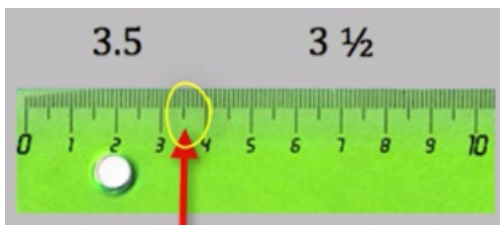
WHAT'S COVERED

This tutorial covers converting a decimal into a fraction, through the discussion of:

1. Numbers as Decimals and Fractions

Many of the numbers used in mathematics can be written as both a fraction and a decimal. These numbers are called rational numbers. Rational numbers have a fraction and a decimal form, which are equivalent. Converting between decimals and fractions is very useful when working with measurements, as well as everyday situations such as percentages.

➞ **EXAMPLE** The example below illustrates how you use decimals and fractions with measurement. If you look at this ruler, which is measuring in centimeters, you can see 3.5 centimeters marked on it. You can also think of 3.5 centimeters as a fraction. The tick mark is halfway between the 3 and the 4, which is 3 and $\frac{1}{2}$ centimeters.



2. Decimal Place Values

To convert a decimal to a fraction, you can use the concept of decimal place value. Place value refers to where a number is located in relation to the decimal point. In the diagram below, the number 0.1234 shows the 1 in the tenths place, the 2 in the hundredths place, the 3 in the thousandths place, and the 4 in the ten-thousandths place.



The fraction equivalent of a decimal is determined by the digits and their decimal place value.

Examples	Explanation
$0.267 = \frac{267}{1000}$	0.267 is equivalent to the fraction 267/1000, because the last digit, 7, is in the thousandths place.
$0.3 = \frac{3}{10}$	In the decimal 0.3, 3 is in the tenths spot, so the fraction equivalent is 3/10.
$0.51 = \frac{51}{100}$	0.51 has 1 in the hundredths spot, so the fraction equivalent is 51/100.
$0.223 = \frac{223}{1000}$	For 0.223, the 3 in the thousandths place, so the fraction equivalent is 223/1000.
$0.8231 = \frac{8231}{10000}$	For the decimal 0.8231, the 1 is in the ten-thousandths place, so the fraction equivalent is 8231/10000.



DID YOU KNOW

When converting decimals to fractions using decimal place value, your denominators are always a power of 10, which is a 1 followed by a number of zeros.

3. Simplifying Using Greatest Common Factors

Sometimes when you convert a decimal into a fraction, the resulting fraction will need some simplification. You can simplify the fraction by looking for the **greatest common factor** of the numerator and the denominator, or the largest integer that divides both the numerator and the denominator.

➞ **EXAMPLE** Suppose you want to convert the decimal 0.34 into a fraction. To determine the denominator of your fraction, look at the nonzero digit of the decimal that is farthest to the right. In this case, the 4 is in the hundredths place. Therefore, 0.34 as a fraction is 34/100.

$$0.34 = \frac{34}{100}$$

Now, you can simplify the fraction by finding the greatest common factor of the numerator and the denominator. The factors of 34 are 1, 2, 17, and 34. The factors of 100 are 1, 2, 4, 5, 10, 20, 25, 50, and 100. The common factors are 1 and 2, so the greatest, or largest, common factor is 2. The shared factors can be canceled out by dividing both the numerator and denominator by the greatest common factor. Therefore, when you simplify 34/100, you divide 34 by 2 and 100 by 2, which equals 17/50.

$$\frac{34}{100} = \frac{34 \div 2}{100 \div 2} = \frac{17}{50}$$



HINT

Any common factor can be used to reduce a fraction, but further simplification will be necessary. However, using the *greatest* common factor will always produce a fraction in simplest form. You will know that your fraction is in its simplest form because the greatest common factor of the numerator and denominator is 1.



TRY IT

Convert 1.205 to a fraction.

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The last digit, 5, is in the thousandths spot, so the fraction equivalent is 1205/1000. The greatest common factor of 1,205 and 1,000 is 5. Therefore, you can simplify by dividing both the numerator and denominator by 5, or canceling out the 5 in the numerator and in the denominator. Therefore, 1205/1000 becomes 241/200.

$$1.205 = \frac{1205}{1000} = \frac{1205 \div 5}{1000 \div 5} = \frac{241}{200}$$



TERM TO KNOW

Greatest Common Factor of a and b

The largest positive number that divides both a and b

4. Converting Fractions to Decimals with Calculators

You can use a calculator to convert your fraction back into a decimal to make sure that you have correctly converted your decimal into a fraction. All fractions are equivalent to the value of the numerator divided by the denominator.

➞ **EXAMPLE** The fraction 3/4 is the same as 3 divided by 4. In the calculator, you simply press 3, the division sign, 4, and then Enter.

$$\frac{3}{4} = 3 \div 4 = 0.75$$



TRY IT

If you recall from earlier, you converted 1.205 to the fraction 241/200. Moving backwards to check your answer, you know that 241/200 is the same as 241 divided by 200.

Using a calculator, convert 241/200 into a decimal.

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On a calculator, you simply press 241, the division sign, 200, and then Enter or the equal sign. You will see that the decimal equivalent is indeed 1.205.

$$\frac{241}{200} = 241 \div 200 = 1.205$$



SUMMARY

Today you learned that you can write rational **numbers as decimals and fractions**. You also learned that to convert a decimal to a fraction, you use **decimal place value** and the digits of the decimal form. Finally, you learned about **simplifying fractions by using greatest common factors** and that **fractions can be converted to a decimal using division on a calculator**.

Source: This work is adapted from Sophia author Colleen Atakpu.



TERMS TO KNOW

Greatest Common Factor of a and b

The largest positive number that divides both a and b.