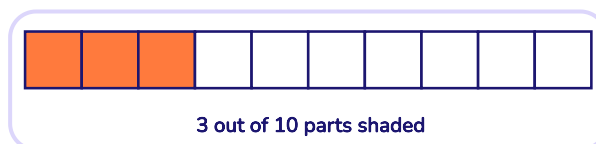


Decimal Fractions and Decimals: math lesson, Grade 4 – download the PDF

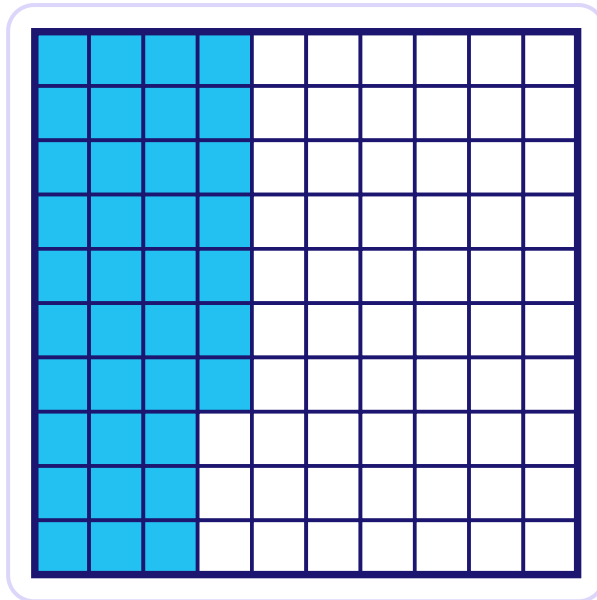
Have you ever paid with a dollar bill and received dimes and pennies as change? Then you have already used decimals! In this chapter you will see how fractions with denominators 10 and 100 can be written as decimals, how to add and compare them, and how to find them on a number line.

1. Tenths and hundredths

When you cut one whole into **10** equal parts, each part is one **tenth**. When you cut one whole into **100** equal parts, each part is one **hundredth**.



The strip above is cut into 10 equal parts and 3 of them are shaded. So $\frac{3}{10}$ of the strip is shaded. Now look at a grid with 100 small squares. Each small square is $\frac{1}{100}$ of the whole grid.



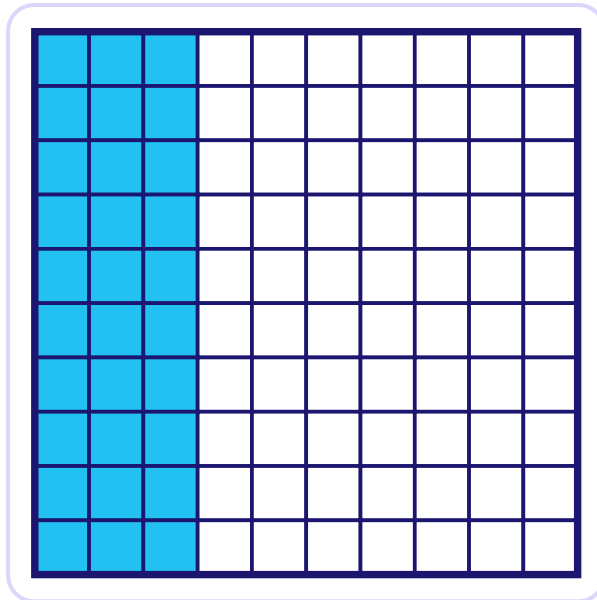
Here 37 squares out of 100 are shaded, so the shaded part is $\frac{37}{100}$, which we read as “thirty-seven hundredths”.

2. Fractions with denominators 10 and 100

D Definition

A fraction whose denominator is 10 or 100 is called a **decimal fraction**. Examples: $\frac{7}{10}$, $\frac{9}{100}$, $\frac{64}{100}$.

One tenth is the same as ten hundredths, because each tenth of the grid contains 10 small squares. The grid below shows 3 full columns, which is $\frac{3}{10}$ and also $\frac{30}{100}$.



P Equivalent fractions

To rename tenths as hundredths, multiply the numerator and the denominator by 10:

$$\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100}$$

3. Writing fractions as decimals

A **decimal point** separates the whole-number part from the part that is smaller than 1. The first digit after the point counts tenths, and the second digit counts hundredths.

Ones	Decimal point	Tenths	Hundredths
0	.	3	0
0	.	0	9
2	.	4	5

M**Method: from a fraction to a decimal**

1. If the denominator is 10, the numerator gives the tenths digit: $\frac{7}{10} = 0.7$.
2. If the denominator is 100, the numerator gives the last two digits: $\frac{9}{100} = 0.09$
and $\frac{64}{100} = 0.64$.
3. Do not forget the zero in the tenths place when the number is less than $\frac{10}{100}$.

E**Example 1**

Write $\frac{58}{100}$ and $\frac{6}{10}$ as decimals. We get $\frac{58}{100} = 0.58$ and $\frac{6}{10} = 0.6$. A mixed number such as $4\frac{7}{100}$ is written 4.07: 4 ones, 0 tenths and 7 hundredths.

**Watch out**

$\frac{9}{100}$ is 0.09, not 0.9. The 9 must sit in the hundredths place, so a zero is needed in the tenths place.

4. Adding fractions with denominators 10 and 100

You can add fractions only when the denominators match. To add a tenth fraction and a hundredth fraction, first rename the tenths as hundredths.

M**Method: adding tenths and hundredths**

1. Rename the fraction with denominator 10 as a fraction with denominator 100.
2. Add the numerators and keep the denominator 100.
3. Write the answer as a decimal if you want.

E**Example 2**

Add $\frac{3}{10} + \frac{24}{100}$. First, $\frac{3}{10} = \frac{30}{100}$. Then $\frac{30}{100} + \frac{24}{100} = \frac{54}{100} = 0.54$.

5. Comparing decimals to hundredths

To compare two decimals, compare their digits from left to right: first the ones, then the tenths, then the hundredths. If a number has fewer digits, add zeros at the end: 0.4 and 0.40 are equal because $\frac{4}{10} = \frac{40}{100}$.

E**Example 3**

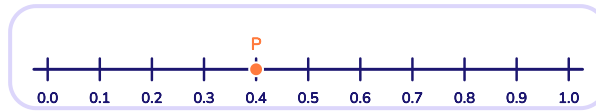
Compare 0.4 and 0.38. Write 0.4 as 0.40. Then compare 40 hundredths and 38 hundredths. Since 40 is greater than 38, we have **0.4 > 0.38**. Next, compare 1.07 and 1.7: the ones digits match, but 0 tenths is less than 7 tenths, so **1.07 < 1.7**.

**Watch out**

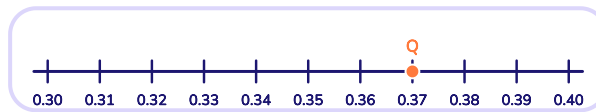
A longer decimal is not always a greater decimal. The number 0.38 has more digits than 0.4, but it is smaller.

6. Decimals on a number line

Between 0 and 1 we can mark 9 tenths. The point P below is at 4 tenths, so $P = 0.4$.



To find hundredths, zoom in on the space between two tenths and cut it into 10 equal steps. Between 0.3 and 0.4, each step is 0.01. The point Q is 7 steps after 0.3, so $Q = 0.37$.



! Zyro says

On my planet we zoom in on a number line like a telescope. Every time I zoom in, one tenth becomes ten tiny hundredths!

7. Money as decimals

A dollar is the whole. A dime is one tenth of a dollar, which is $\frac{1}{10} = 0.10$ dollar. A penny is one hundredth of a dollar, which is $\frac{1}{100} = 0.01$ dollar. A quarter is 25 hundredths of a dollar, so it is worth 0.25 dollar.

Coin	Value as a fraction	Value as a decimal
Penny	$\frac{1}{100}$ dollar	\$0.01
Dime	$\frac{10}{100}$ dollar	\$0.10
Quarter	$\frac{25}{100}$ dollar	\$0.25



Example 4

You have 2 dollars, 3 dimes and 6 pennies. The dimes give 0.30 and the pennies give 0.06, so the total is $2 + 0.30 + 0.06 = 2.36$. You have \$2.36.

Key takeaways

- One tenth is one of 10 equal parts, and one hundredth is one of 100 equal parts.
- $\frac{1}{10} = \frac{10}{100}$: to rename tenths as hundredths, multiply the top and the bottom by 10.
- The first digit after the decimal point is the tenths digit and the second is the hundredths digit.
- To add tenths and hundredths, first rename everything as hundredths.
- To compare decimals, compare digit by digit from the left, and add zeros if it helps.
- Money is a decimal: 1 dime is \$0.10 and 1 penny is \$0.01.



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