Lesson - Fractions and decimals: tenths and hundredths

Year: Year 4

Hello, I am Otto! Fractions and decimals are two ways of writing the same parts of a whole. You already know halves and quarters. In this chapter you learn about tenths and hundredths, how they are written with a decimal point, how to compare them and how they appear in money and measures.

Starter activity

A chocolate bar has 10 equal pieces. Ella eats 3 pieces. She has eaten 3 out of 10 pieces. We write this as the fraction $\frac{3}{10}$ and as the decimal 0.3. A pound coin can also be split: 100 pennies make £1, so one penny is one hundredth of a pound, written $\frac{1}{100}$ or £0.01. Fractions and decimals are everywhere!

Tenths

Definition: tenth

A **tenth** is one of ten equal parts of a whole. We write it as the fraction $\frac{1}{10}$ or as the decimal **0.1**. The dot in a decimal is called the **decimal point**. The digit just after the decimal point is the number of tenths.



The bar is split into 10 equal parts and 3 are shaded. The shaded part is $\frac{3}{10} = 0.3$.

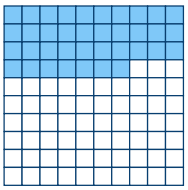
Key fact: tenths as fractions and decimals

- $\frac{1}{10} = 0.1$, $\frac{2}{10} = 0.2$, $\frac{3}{10} = 0.3$ and so on up to $\frac{9}{10} = 0.9$.
- $\frac{10}{10} = 1$ whole. $\frac{15}{10} = 1.5$, which is one whole and 5 tenths.
- Dividing by 10: $7 \div 10 = 0.7$ and $23 \div 10 = 2.3$.

Hundredths

Definition: hundredth

A **hundredth** is one of 100 equal parts of a whole. We write it as the fraction $\frac{1}{100}$ or as the decimal **0.01**. The second digit after the decimal point is the number of hundredths.



There are 100 small squares and 37 are shaded. So $^{37}/_{100}$ of the square is shaded. As a decimal this is **0.37**. It is made of 3 tenths and 7 hundredths.

Rule: dividing by 100

To divide a whole number by 100, move each digit two places to the right of the decimal point. For example 45 ÷ 100 = 0.45, 7 ÷ 100 = 0.07 and 253 ÷ 100 = 2.53.

Example 1

Write $^{6}/_{100}$ and $^{60}/_{100}$ as decimals. Are they equal?

$^{6}/_{100}$ = **0.06** (0 tenths and 6 hundredths). $^{60}/_{100}$ = **0.60**, which is 6 tenths, the same as 0.6. They are **not** equal: 0.06 is much smaller than 0.6.

Place value with decimals

Place value now continues to the right of the decimal point. Each column is ten times smaller than the column on its left. After the ones comes the tenths column, then the hundredths column.

Ones	.	Tenths	Hundredths
3	.	4	7

In 3.47 the digit 3 is worth 3 ones, the 4 is worth 4 tenths (0.4) and the 7 is worth 7 hundredths (0.07). So 3.47 = 3 + 0.4 + 0.07.

Method: partitioning a decimal

1. Write the whole number part and the decimal part separately.
2. Say the value of each digit: ones, tenths, hundredths.
3. Add the values together to check: 5.28 = 5 + 0.2 + 0.08.

Example 2

Partition 8.05 and say the value of each digit.

8.05 = 8 + 0.0 + 0.05. The 8 is worth 8 ones. The 0 in the tenths column is worth 0 tenths (it is a place holder). The 5 is worth 5 hundredths, 0.05. So **8.05 = 8 + 0.05**.

Equivalent fractions and decimals

Key fact: tenths and hundredths

- One tenth is the same as ten hundredths: $\frac{1}{10} = \frac{10}{100}$.
- So $\frac{3}{10} = \frac{30}{100}$ and 0.3 = 0.30.
- Writing an extra zero at the end of a decimal does not change its value: 0.5 = 0.50.

Example 3

Write $\frac{7}{10}$ as hundredths and as a decimal.

Multiply the top and the bottom by 10: $\frac{7}{10} = \frac{70}{100}$. As a decimal, $\frac{7}{10}$ = **0.7**, and $\frac{70}{100}$ = 0.70, which is the same.

Comparing and ordering decimals

Method: comparing decimals

1. Write the numbers one under the other with the decimal points lined up.
2. Compare the whole number parts first. The bigger whole number is the bigger decimal.
3. If the whole numbers are equal, compare the tenths, and then the hundredths.
4. Add zeros if it helps, so that every number has the same number of decimal places: 0.5 becomes 0.50.

Example 4

Put 0.6, 0.06, 0.65 and 0.5 in order, smallest first.

Write them all with two decimal places: 0.60, 0.06, 0.65 and 0.50. Compare tenths: 0.06 has 0 tenths (smallest); 0.50 has 5 tenths; 0.60 and 0.65 have 6 tenths and 65 is more than 60. Order: **0.06, 0.5, 0.6, 0.65**.

Watch out

Longer does not mean bigger with decimals! 0.35 is bigger than 0.3, but 0.35 is smaller than 0.4 even though 0.35 has more digits. Compare 0.35 and 0.40: 35 hundredths is less than 40 hundredths.

Rounding decimals

Rule: rounding to the nearest whole number

Look at the tenths digit. If it is 5 or more, round up to the next whole number. If it is 4 or less, keep the whole number part and drop the decimal part. So 3.4 rounds to 3, 3.5

rounds to 4 and 3.78 rounds to 4.

Example 5

Round 7.46, 2.5 and 9.09 to the nearest whole number.

7.46: the tenths digit is 4, so round down to **7**. 2.5: the tenths digit is 5, so round up to **3**. 9.09: the tenths digit is 0, so round down to **9**.

Decimals in money and measures

Money is the most common use of decimals. £3.45 means 3 pounds and 45 pence, which is 3 + 0.4 + 0.05 pounds. Measures also use decimals: 1.5 m means 1 metre and 5 tenths of a metre (50 cm), and 2.25 kg means 2 kg and 250 g. Always keep two decimal places for money, so write £4.50 and not £4.5.

Example 6

A ribbon is 2.7 m long. How many centimetres is that?

1 m = 100 cm, so 0.1 m = 10 cm. 2.7 m = 2 m + 7 tenths of a metre = 200 cm + 70 cm = **270 cm**.

Did you know?

The decimal point was first used in Europe about 400 years ago. In some countries, such as France and Germany, people write a comma instead of a point, so they write 3,5 for three and a half. In the UK we use the point and in a calculator display you also see a point.

Otto's tip

To compare decimals, give every number the same number of decimal places by adding zeros at the end. Then you can compare them like whole numbers: 0.5 = 0.50, so 0.5 is more than 0.45 because 50 is more than 45!