

Math Help Sheet: Dividing Decimal Numbers

To divide a decimal number by a whole number, leave the decimal where it is in the dividend and place the decimal directly above it in the quotient.

Example 1 – Divide 52.5 by 105

$$\begin{array}{r}
 \text{quotient} \\
 .5 \leftarrow \\
 \hline
 \text{divisor} \rightarrow 105 \overline{) 52.5} \leftarrow \text{dividend} \\
 \underline{525} \\
 0
 \end{array}$$

To divide by a decimal number, first make the divisor a whole number.

To do this in the example below, you need to move the decimal point in the divisor one place to the right. If you move the decimal point in the divisor one place to the right, then you must also move the decimal point in the dividend one place to the right. Next, place the decimal point in the quotient directly above where the decimal point now is in the dividend. Then proceed to divide as you would in any division problem.

Example 2 – Divide 52.5 by 10.5

$$\begin{array}{r}
 5. \\
 10.5 \overline{) 52.5} \\
 \underline{525} \\
 0
 \end{array}$$

If your divisor has two decimal places, move the decimal two places to the right in both the divisor and the dividend before you start to divide. If the divisor has three decimal places, move the decimal three places to the right in both, etc.

Example 3 – Divide 26.344 by 3.56

$$\begin{array}{r}
 7.4 \\
 3.56 \overline{) 26.344} \\
 \underline{2492} \\
 1424 \\
 \underline{1424} \\
 0
 \end{array}$$

The third type of problem you may encounter is dividing a whole number by a decimal number.

Again, you move the decimal in your divisor as many places to the right to make it a whole number.

But if you do that, you must also move the decimal in your dividend the same number of places to the right. So in the following problem, you need to add a zero after the decimal point in the dividend.

Example 4 – Divide 525 by 10.5

$$\begin{array}{r} 50. \\ 10.5 \overline{)525.0} \\ \underline{525} \\ 00 \\ \underline{00} \\ 0 \end{array}$$

Let's try another.

Example 5 – Divide 88 by .25

$$\begin{array}{r} 352. \\ .25 \overline{)88.00} \\ \underline{75} \\ 130 \\ \underline{125} \\ 50 \\ \underline{50} \\ 0 \end{array}$$

Here in order to make your divisor a whole number you need to move the decimal two places to the right. Then you must also move the decimal in the dividend two places to the right so you need to add two zeros to the dividend.

Why does moving the decimal in both the divisor and the dividend the same number of places give us the correct answer when we divide decimals?

You will remember that a fraction can be thought of as one quantity divided by another.

Thus $\frac{1}{2}$ is 1 divided by 2.

$\frac{34}{6}$ is 34 divided by 6.

You can think of 52.5 divided by 10.5 as the fraction $\frac{52.5}{10.5}$

When you studied fractions, you saw that multiplying the numerator and denominator of a fraction by the same number did not change the value of the fraction. When you move the decimal one place to the right you are multiplying by ten. So you are actually saying that

$$\frac{52.5}{10.5} = \frac{52.5 \times 10}{10.5 \times 10} = \frac{525}{105}$$

If you were to divide by a number like 23.46 you would need to move the decimal two places to the right to make the divisor a whole number. If you were to divide by a number with three decimal places, you would have to move the decimal three places to the right, etc. Remember, ask yourself, "How can I make the divisor a whole number?".

Try the following and then check your work with the solutions on the back of this page.

1. 2652 divided by 1.3
2. 66.88 divided by 0.352
3. 205.821 divided by 0.33
4. 653 divided by 1.1101
5. 5.95 divided by 17
6. 1 divided by 3

Extra Information: If the digits in the remainder repeat, then the digits at the end of our result will repeat. For example, 5 divided by 3 = 1.6666666666 . . . which can be written as $1.\overline{6}$. Note that bar over the 6, which indicates a repeating decimal.

Other Examples: 69 divided by 33 = $23.\overline{1}$ 5 divided by 11 = $23.\overline{1}$ 5.1 divided by 0.22 = $23.\overline{18}$

Answers:

1.
$$\begin{array}{r} 2040 \\ 13 \overline{)2652.0} \\ \underline{26} \\ 052 \\ \underline{52} \\ 00 \\ \underline{00} \\ 0 \end{array}$$

5.
$$\begin{array}{r} .35 \\ 17 \overline{)5.95} \\ \underline{51} \\ 85 \\ \underline{85} \\ 0 \end{array}$$

2.
$$\begin{array}{r} 190 \\ 0.352 \overline{)66.880} \\ \underline{352} \\ 3168 \\ \underline{3168} \\ 0 \end{array}$$

6. $1 \div 3 = 0.\bar{3}$

3.
$$\begin{array}{r} 623.7 \\ 0.33 \overline{)205.821} \\ \underline{198} \\ 78 \\ \underline{66} \\ 122 \\ \underline{99} \\ 231 \\ \underline{231} \\ 0 \end{array}$$

4.
$$\begin{array}{r} 588.23 \\ 1.1101 \overline{)653.000000} \\ \underline{55505} \\ 97950 \\ \underline{88808} \\ 91420 \\ \underline{88808} \\ 26120 \\ \underline{22202} \\ 39180 \\ \underline{33303} \\ 5877 \end{array}$$