

# Long Division with Decimals

It is very easy to use long division to divide a decimal by a whole number.

During the division process, divide as if there were no decimal point.

Then, simply put the decimal point in the quotient *in the same place* as it was in the dividend.

$$\begin{array}{r}
 05\overline{)93} \\
 \underline{35} \\
 65 \\
 \underline{-63} \\
 21 \\
 \underline{-21} \\
 0
 \end{array}$$

**Check:**

$$\begin{array}{r}
 5.93 \\
 \times \quad 7 \\
 \hline
 \end{array}$$

1. Divide. Check each division result with multiplication.

a.  $5 \overline{)5.30}$

b.  $3 \overline{)0.72}$

c.  $7 \overline{)6.23}$

d.  $6 \overline{)2.388}$

e.  $19 \overline{)23.94}$

f.  $23 \overline{)57.638}$

You are used to dividing *whole numbers* with long division, and sometimes getting a remainder. For example,  $24 \div 5 = 4 \text{ R}4$ .

If we add decimal zeros (.0 or .00 or .000) to the dividend, we don't change its value, but sometimes the quotient comes out even!

For example, if we use long division to divide 24.0 by 5, the quotient is exactly 4.8! Multiplying  $5 \times 4.8 = 24$  verifies this.

$$\begin{array}{r} 04.8 \\ 5 \overline{)24.0} \\ \underline{20} \phantom{0} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

**Check:**

$$\begin{array}{r} 4 \\ 4.8 \\ \times 5 \\ \hline 24.0 \end{array}$$

2. Divide in two ways: first by indicating a remainder, then by long division.  
Check your result with multiplication.

<p>a. <math>31 \div 4 = \underline{\quad} \text{ R} \underline{\quad}</math></p> <p><math>31.00 \div 4 = \underline{\hspace{2cm}}</math></p> $\begin{array}{r} \phantom{0} \\ 4 \overline{)31.00} \end{array}$ <p>Check:</p>	<p>b. <math>56 \div 5 = \underline{\quad} \text{ R} \underline{\quad}</math></p> <p><math>56.0 \div 5 = \underline{\hspace{2cm}}</math></p> <p>Check:</p>	<p>c. <math>15 \div 8 = \underline{\quad} \text{ R} \underline{\quad}</math></p> <p><math>15.000 \div 8 = \underline{\hspace{2cm}}</math></p> <p>Check:</p>
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3. Now you need both division and multiplication. Find the given parts of these quantities.

a. Find  $\frac{3}{4}$  of 0.130 kg.

b. Find  $\frac{3}{5}$  of 23 seconds.

Sometimes decimal division is not even. In that case, stop the division at some point, and *give the answer as a rounded decimal number*. Round to the place value just before the last decimal digit you found for the quotient. That way, the last digit will tell you whether to round up or down.

**Example:** Find  $2 \div 7$  to two decimal digits.

$$\begin{array}{r} 0.285 \\ 7 \overline{)2.000} \\ \underline{14} \phantom{0} \\ 60 \\ \underline{-56} \phantom{0} \\ 40 \\ \underline{-35} \\ 5 \end{array}$$

It is enough to find three decimal digits for the quotient, and then we can round to two decimal digits. The third decimal digit is 5, so we round up and  $2 \div 7 \approx 0.29$ .

**Example:** Find  $8 \div 9$  to three decimal digits.

$$\begin{array}{r} 0.8888 \\ 9 \overline{)8.0000} \\ \underline{72} \phantom{00} \\ 80 \\ \underline{-72} \phantom{0} \\ 80 \\ \underline{-72} \\ 80 \\ \underline{-72} \\ 8 \end{array}$$

We need to find *four* decimal digits for the quotient before we can round it to three decimal digits:  $8 \div 9 \approx 0.889$ .

4. Find

a.  $2 \div 9$  to two decimal digits;

b.  $1 \div 3$  to three decimal digits;

c.  $1 \div 6$  to three decimal digits.

### Fractions and division

Remember that the fraction line is *also* a division symbol. So  $\frac{1}{8}$  can mean both one-eighth (a fraction), and a division problem  $1 \div 8$ . This gives us a means of converting fractions to decimals!

5. Convert the following fractions into decimals using long division (use a notebook). If needed, round the decimal to three decimal digits.

a.  $\frac{5}{8} =$

b.  $\frac{6}{7} =$

c.  $\frac{7}{20} =$

6. a. Fill in the explanation on how to solve the problem, and find the price of one roll.

24 rolls and one loaf of rye bread cost \$10.70. If the bread costs \$2.30, find the cost of one roll.

First subtract \$\_\_\_\_\_ from \$\_\_\_\_\_. Then \_\_\_\_\_ that result by \_\_\_\_\_. One roll costs \$\_\_\_\_\_.

- b. Write a *single* expression to match the explanation above.

7. Seven muffins and one drink cost \$7.11. If the drink costs \$1.23, find the cost of one muffin.

8. Three packs of transistors and seven packs of capacitors cost a total of \$8.70. What is the price of one transistor pack, if one capacitor pack costs \$0.60?

9. Solve in the right order:  $2 \times (68.43 \div 3 + 2.9)$ .

10. Write a word problem that is solved by the calculations below.

a.  $(\$50 - \$26) \div 3 = \$8$

b.  $(\$100 - 25 \times \$1.40) \div 2 = \$32.50$