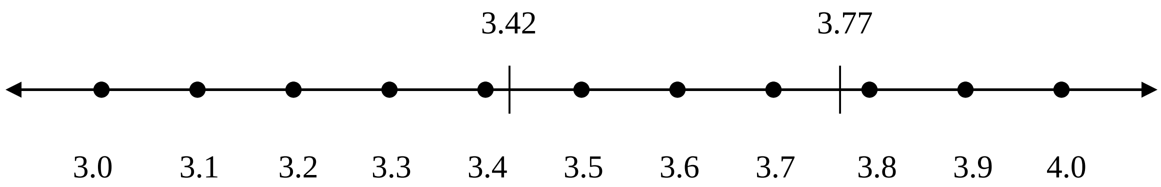
DECIMALS: ESTIMATION, ADDITION, AND SUBTRACTION

Rounding decimals helps give a quick estimate for an answer. Sometimes that's all that is needed to give an idea of how much of a quantity is needed. Rounding can be used to find a reasonable solution to a problem.

When adding and subtracting decimals, we line up the decimal points to keep the place values in line. We'll first practice adding and subtracting decimals using decimal fractions to help us understand the meaning of decimal computation and then we'll practice adding and subtracting decimals.

Rounding Decimals



Looking at a number line helps to round a decimal number. You can round 3.42 to 3.4 since it is located closer to 3.4 on the number line. You can round 3.77 to 3.8 since it is closer to 3.8 than 3.7 on the number line.

Follow these steps to round decimal numbers.

Round 3.42 to the nearest tenth.

1. **Locate the place you are rounding**. 3.42
2. **Look at the number to the right.** 3.42
3. If that number is 5 or more, round up to the next digit, *then drop the other digits to the right*.

   If the number is less than 5, then leave the place as is*, and drop the other digits*.

   Since 2 is less than ***5***, the **4 stays the same** and the rounded number is **3.4**

Round 3.77 to the nearest tenth.

1. Locate the place you are rounding. 3.77
2. Look at the number to the right. 3.77
3. Round. **3.8**

Round 24.625 to the nearest hundredth.

1. Locate the place you are rounding. 24.625
2. Look at the number to the right 24.625
3. Round. **24.63**

Finding a Reasonable Solution

Estimate a reasonable solution for 4.23 × 5.8

$4 \times 6 \approx 24$

Round to the nearest whole to keep it simple.

By the rules:
4.23 rounds to 4 because 2 is less than 5.

5.8 rounds to 6 because 8 is more than 5.

$5 \times 5 \approx 25$

Another way...
Break the rules but justify why.
Rationalize that since 4.23 is more than 4 and 5.8 is less than 6, round 4.23 up to 5, and 5.8 down to 5 to compensate.

The actual answer for 4.23 × 5.8 = 24.434.

Both estimates are close.

Adding and Subtracting Decimals Using Decimal Fractions

Why do you line up the decimal points?

13.6 + 7.5 = ?

Write both as mixed numbers.

$$\begin{array}{r} 13\frac{6}{10} \\ +\,7\frac{5}{10} \\ \hline 20\frac{11}{10} = 21\frac{1}{10} = 21.1 \end{array}$$

$$\begin{array}{r} {}^{1\;1} \\ \mathbf{13.6} \\ \mathbf{+\;\;7.5} \\ \hline \mathbf{21.1} \end{array}$$

Tenths must be added to tenths, ones to ones and tens to tens to get the same as the fraction answer. Lining up the decimal point puts all the place values in line.

Look at another decimal problem through decimal fractions.

18.33 + 9.2 = ?

$$\begin{array}{rcr} 18\frac{33}{100} & = & 18\frac{33}{100} \\ +\,9\frac{2}{10} & = & 9\frac{20}{100} \\ \hline & & 27\frac{53}{100} \end{array}$$

$$\begin{array}{r} {}^{1} \\ \mathbf{18.33} \\ \mathbf{+\;\;9.20} \\ \hline \mathbf{27.53} \end{array}$$

Lining up the decimal points keeps the place values in line. 7.5 equals 7.50, however the 0 isn't necessary if you keep the decimal points in line.

Look at subtraction.

25. 2 – 6.5 = ?

$$\begin{array}{rcr} 25\frac{2}{10} & = & 24\frac{12}{10} \\ -6\frac{5}{10} & = & 6\frac{5}{10} \\ \hline & & 18\frac{7}{10} \end{array}$$

$$\begin{array}{r} {}^{1\;14\;\;} \\ \mathbf{\cancel{2}\cancel{5}.{}^{1}2} \\ \mathbf{-\;\;6.5} \\ \hline \mathbf{18.7} \end{array}$$

Lining up the decimal points keeps the place values lined up and borrowing is applied.

Add and Subtract Decimals

To add and subtract decimals, be sure to line up the decimal points so that the place values will also line up – tenths with tenths, hundredths with hundredths, and so on. Decimals may be expressed in equivalent fractions which help write the word name.

Example 1: 7.2 = $7\frac{2}{10}$ = 7 and 2 tenths

Example 2: 3.13 = $3\frac{13}{100}$ = 3 and 13 hundredths

Example 3: 52.844 = $52\frac{844}{1000}$ = 52 and 844 thousandths

Add 8.3 + 17.82

$$\begin{array}{r} \scriptstyle 1 \\ 8.3 \\ +\underline{17.82} \\ 26.12 \end{array}$$

Other ways to express this answer are:

$26\frac{12}{100}$ or

26 and 12 hundredths

Subtract 5.3 – 3.74

$$\begin{array}{r} \scriptstyle 4\ \ 12\ 10 \\ \cancel{5}.\cancel{3}\cancel{0} \\ -\ \underline{3.74} \\ 1.56 \end{array}$$

Other ways to express this answer are:

$1\frac{56}{100}$ or

1 and 56 hundredths

Subtract 12 -5.35

$$\begin{array}{r} \scriptstyle 0\,11\ \ 9\ 10 \\ \cancel{1}\cancel{2}.\cancel{0}\cancel{0} \\ -\ \underline{5.35} \\ 6.65 \end{array}$$

Other ways to express this answer are:

$6\frac{65}{100}$ or

6 and 65 hundredths

Check through estimation.

1. 8 + 18 = 26	Actual Answer is 26.12.	Estimate is very close.
2. 5 – 4 = 1	Actual Answer is 1.56.	Estimate is close.
3. 12 – 5 = 7	Actual Answer is 6.65.	Estimate is close.