Adding and Subtracting Decimal Numbers

Important Ideas:

1. When adding or subtracting decimal numbers you must be careful to keep like place values aligned.

2. Place values can be correctly aligned by lining up the decimal points.

3. Whole numbers have a decimal point at the end of the number even though we do not usually write it.

4. It is sometimes necessary to insert zeros as place holders when adding or subtracting decimals.

5. Adding zeros to the end of a decimal number does not change its value.

To add decimal numbers

1. Arrange the numbers vertically with the decimal points lined up. (As addition is commutative the order in which the numbers are arranged does not matter).

2. Insert zeros so that each number has the same number of decimal places. This means that each number will have the same number of digits after the decimal point.

3. Add the digits as if adding whole numbers.

We will now work through three examples.

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Example 1:   Add: 45.089 + 34.72

The denominators are different so we must find the Least Common Denominator (LCD).

Arrange the numbers vertically
keeping the decimal points lined up.

$$\begin{array}{r} 45.089 \\ +\ \underline{34.72} \end{array}$$

Insert a zero in the thousandths place
under the "9" and add.

$$\begin{array}{r} {}^{1} \\ 45.089 \\ +\ \underline{34.720} \\ 79.809 \end{array}$$

Note that we had to carry over to the tenths place.

Example 2:   Add: 5.4 + 7 + 0.785

Arrange the numbers vertically
keeping the decimal points lined up.

$$\begin{array}{r} 5.4 \\ 7 \\ +\ \underline{0.785} \end{array}$$

Place a decimal point after the whole number 7,
insert zeros so that each number has the same
number of decimal places and then add.

$$\begin{array}{r} {}^{1} \\ 5.400 \\ 7.000 \\ +\ \underline{0.785} \\ 13.185 \end{array}$$

Note that we had to carry over to the ones place.

Example 3:   Add: 4.7651 + 10.963 + 0.579 + 89.07

Arrange the numbers vertically   2.7651
keeping the decimal points lined up.   +   10.963
                                                                    0.579
                                                                  89.07

                                                        1 2 2 1
Insert a zero so that each decimal has the   2.7651
Same number of decimal places and then add.   10.9630
                                                                    0.5790
                                              +   89.0700
                                                               103.3771

Note that we had to carry over to the hundredths place, the tenths place, the ones place and the tens place, and the hundreds.

To subtract decimal numbers.

1.   Arrange the number vertically keeping the decimal points lined up. (As subtraction is not commutative the order in which the numbers are arranged is very important).

2.   Insert zeros so that each number has the same number of decimal places. This means that each number will have the same number of digits after the decimal point.

3.   Subtract the numbers as if subtracting whole numbers.

We will now work through three examples.

Example 4:   Subtract: 34.075 - 29.892

Arrange the numbers vertically   34.075
keeping the decimal points lined up.   − <u>29.892</u>

There are the same number of decimal places after the decimal point. It is not necessary to insert zeros as placeholders.

Subtract the numbers as if subtracting whole numbers.

$$
\begin{array}{r}
^{2\ 13\ 9} \\
\cancel{3}\,\cancel{4}.\cancel{0}\,7\,5 \\
-\ \ 2\,9.8\,9\,2 \\
\hline
4.1\,8\,3
\end{array}
$$

Notice that we had to regroup and "borrow" from the tenths, the ones and the tens.

Example 5:   Subtract: 75.27 – 36.984

Arrange the numbers vertically   75.27
keeping the decimal points lined up.   − <u>36.984</u>

Insert a zero after the "7" so that there are the
same number of decimal places after.   75.270
                                               − <u>36.984</u>

Subtract the numbers as if subtracting whole numbers.

$$
\begin{array}{r}
^{6\ \ 14\ \ 11\ 16} \\
\cancel{7}\,\cancel{5}.\cancel{2}\,\cancel{7}\,0 \\
-\ \ 3\,6.9\,8\,4 \\
\hline
3\,8.2\,8\,6
\end{array}
$$

Note that we had to regroup and "borrow" from the hundredths, tenths, ones and tens.

Example 6:   Subtract: 8 – 0.034

Arrange the numbers vertically   8
keeping the decimal points lined up.   – <u>0.034</u>

Insert the decimal point and three   8.000
zeros as placeholders.   – <u>0.034</u>

Subtract as if subtracting whole numbers.

$$
\begin{array}{r}
\overset{7\ \ 9\ \ 9\ \ 10}{\cancel{8}.\cancel{0}\cancel{0}0} \\
-\ \ 0.034 \\
\hline
7.966
\end{array}
$$

Note that we had to regroup and "borrow" from the ones, the tenths and the hundredths.

Practice Problems

1.   456.09 + 15.078   2.   76.01 + 13.078

3.   5.2 + 12 + 34.06   4.   0.034 + 3 + 1.29

5.   438.1 + 0.078 + 23.95   6.   15.785 – 12.92

7.   13.01 – 8.321   8.   7.2 – 0.863

9.   437 – 56.97   10.   12 – 0.0567

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Answers to Practice Problems

1.   471.168

2.   89.088

3.   51.26

4.   4.324

5.   462.128

6.   2.865

7.   4.689

8.   6.337

9.   380.03

10.   11.9433

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