**Objective:**

This handout will help students perform the four basic arithmetic operations (addition, subtraction, multiplication and division) on decimal numbers. It also covers techniques for rounding decimal numbers. Decimal place value is an important math concept. Money and other measurements, such as distance, time and age are based on decimal place value.

### Decimal Place Value Chart

<table>
<thead>
<tr>
<th>Hundred</th>
<th>Ten</th>
<th>One</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thousands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

82,109.609 is read eighty-two thousand, one hundred nine AND six hundred nine thousandths.

**Adding and Subtracting**

1) Arrange the numbers vertically, being sure to line up the decimal points in the problem and the answer. Add zeros if necessary to get an equal number of decimal places.

2) Begin with the far right column and add or subtract. Be sure to regroup ("borrow" or "carry"). Complete one column at a time. When adding, if the sum is greater than 9, write the one's digit below and "carry" the ten's digit. Write it to the left of the column you are working in, above the top number. For subtraction, begin with the column on the right. If the digit at the top of the column is less than the digit on the bottom, "borrow". Take ten from the place value to the left. Indicate above the column that it is now one less. Place a "1" in front of the original digit on the right to indicate that it is ten more. Complete this process for each place value to the left.
Example 1: Addition

\[
\begin{array}{c}
\text{Add} \\
92.81 + 5.3 \\
\downarrow \\
92.81 \\
+ 5.30 \\
\downarrow \\
.11 \\
\end{array}
\Rightarrow
\begin{array}{c}
\text{Add} \\
\frac{1}{2} \text{.} 81 \\
\downarrow \\
92.81 \\
+ 5.30 \\
\downarrow \\
8.11 \\
\end{array}
\Rightarrow
\begin{array}{c}
\text{Add} \\
92.81 \\
\downarrow \\
92.81 \\
+ 5.30 \\
\downarrow \\
98.11 \leftarrow \text{answer}
\end{array}
\]

note: since 8 + 3 = 11 we had to “carry” the 1

Example 2: Subtraction

\[
\begin{array}{c}
\text{Subtract} \\
12.39 - 0.605 \\
\downarrow \\
12.390 \\
- 0.605 \\
\downarrow \\
.85 \\
\end{array}
\Rightarrow
\begin{array}{c}
\text{Subtract} \\
12.390 \\
\downarrow \\
12.390 \\
- 0.605 \\
\downarrow \\
.785 \\
\end{array}
\Rightarrow
\begin{array}{c}
\text{Subtract} \\
12.390 \\
\downarrow \\
12.390 \\
- 0.605 \\
\downarrow \\
11.785 \leftarrow \text{answer}
\end{array}
\]

note: since 3 is less than 6 we had to “borrow”

Try these exercises:

1) \(98.3 + 959.21\) 
2) \(67.03 + 183\) 
3) \(2308 + 57.99 + 106.3\) 
4) \(25.67 - 12.7\) 
5) \(1,357.08 - 109.3\) 
6) \(288.1 - 0.059\) 
7) \(93.67 - 12.7\) 
8) \(0.59 - 0.28\) 
9) Ken wanted to put a wooden fence around the garden behind his mother’s house. He measured 18.4 feet for one side, 20.7 feet for the second side, and 8.25 feet for the third side. What length of material will he need altogether?

10) If Dan buys a 58.67 cm piece of molding and uses 9.8 cm for a project, how much molding is left for the next project?

Answers:

1) 1057.51  
2) 250.03  
3) 2472.29  
4) 12.97  
5) 1247.78  
6) 288.041  
7) 80.97  
8) 0.31  
9) 47.35 feet  
10) 48.87 cm
**Multiplying**  (see the [Whole Numbers](#) module for a complete explanation of multiplication)

1) Arrange the numbers vertically. It is not necessary to line up the decimal points.

2) Ignore the decimal points when multiplying. Beginning on the bottom right, multiply each successive place value on the bottom by each digit in the top number. Start with the digits on the right and continue working all the way to the left.

3) Count the number of digits to the right of the decimal points in both numbers being multiplied. Add together. This will be the total number of decimal places in the answer.

4) Beginning on the far right side in the answer, count off the same number of place values, moving from the right to the left, until you reach the total in #3. Place the decimal point here.

**Example 3: Multiplication**

\[
\begin{array}{c}
1.62 \\
\times 2.9 \\
\hline
14.58 \\
3.24 \\
\hline
4.698
\end{array}
\]

\[\text{answer (count 3 decimal place values)}\]

**Dividing**  (see the [Whole Numbers](#) module for a complete explanation of division)

\[
\text{quotient} \\
\text{divisor} \downarrow \text{dividend}
\]

1) Move the decimal point of the divisor all the way to the right to make it a whole number. Then move the decimal point of the dividend to the right the same number of place values. Add zeroes if there aren’t enough digits.

2) Divide, being sure to keep the digits lined up. The decimal point in the quotient will go directly above the decimal point in the dividend.

To change any fractional number into a decimal, divide the denominator into the numerator.

\[
\frac{\text{numerator}}{\text{denominator}} = \text{denominator} \downarrow \text{numerator} \leftarrow \text{decimal point}
\]
Example 4: Division

\[
\begin{array}{c|c}
235.8 \div & \leftarrow \text{answer} \\
\hline
0.25 & 58.950 \\
50 & \hline
89 & 89 \\
-75 & 145 \\
125 & -125 \\
200 & 200 \\
-200 & \\
\end{array}
\]

\[58.95 \div 0.25\]

Rounding Decimals  (see the Whole Numbers module for a complete explanation of rounding)

Try these exercises:

11) \(12.8 \times 52\)
12) \(8.93 \times 0.49\)
13) \(156.3 \times 4.93\)
14) \(6.87 \div 3\)
15) \(0.584 \div 7.3\)
16) \(19.17 + 28.4\)
17) Lumber costs $3.76 per linear foot. If Sherry found she needed 34.1 linear feet, how much did the lumber cost? (round to the nearest cent or hundredths place)
18) John’s total bill was $84. If each item cost $5.25, how many items did John buy?
19) Round 456.203 to the tenths place.
20) Round 325.108 to the nearest hundredths.
21) \(3.52 \div 87.02\)  (round to the nearest thousandths place)
22) \(106.3 \div 5.7\)  (round to the nearest whole number)
23) Write \(\frac{53}{5}\) as a decimal.

Answers:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>665.6</td>
<td>15</td>
<td>0.08</td>
<td>19</td>
</tr>
<tr>
<td>12</td>
<td>4.3757</td>
<td>16</td>
<td>0.675</td>
<td>20</td>
</tr>
<tr>
<td>13</td>
<td>770.559</td>
<td>17</td>
<td>$128.22</td>
<td>21</td>
</tr>
<tr>
<td>14</td>
<td>2.29</td>
<td>18</td>
<td>16 items</td>
<td>22</td>
</tr>
</tbody>
</table>
Note: Review the Signed Numbers module before attempting the remaining problems.

24) \(-1.5 + 4.6\)  
25) \(-54.2 + (-3.78)\)

26) The phone company charges $0.42 for the first minute and $0.28 for each additional minute. What would a 10 minute phone call cost?

27) \(-1.9 + (-9.6) + 8.8\)  
29) \(87.2 – 193.08\)

28) \(-4.98 \div 32.5\) (round to the tenths place)

30) Juan had $3252.60 in his bank account. If he made two withdrawals of $158.22 and $35.75, then deposited $503.13, what did he have in his account after these transactions?

31) \(-6.802 \times 15.7\)  
32) \(-8.5 \times (-3.804)\)

33) A sound system is bought for $150 down and payments of $56.25 each month for 2 years. What is the total cost of the sound system?

34) A plane is flying at 2015.3 feet. It descends 25.04 feet and then climbs 128.7 feet. What is the pilot’s final altitude?

35) A computer costs $868.84. A customer made a down payment of $100 dollars and agreed to pay the rest in 12 equal installments. How much would each monthly installment be?

Answers:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>24)</td>
<td>3.1</td>
<td>28)</td>
<td>-0.2</td>
</tr>
<tr>
<td>25)</td>
<td>-57.98</td>
<td>29)</td>
<td>-105.88</td>
</tr>
<tr>
<td>26)</td>
<td>$2.94</td>
<td>30)</td>
<td>$3561.76</td>
</tr>
<tr>
<td>27)</td>
<td>-2.7</td>
<td>31)</td>
<td>-106.7914</td>
</tr>
<tr>
<td>32)</td>
<td>32.334</td>
<td>33)</td>
<td>$1500</td>
</tr>
<tr>
<td>34)</td>
<td>35)</td>
<td>$2118.96 feet</td>
<td>$64.07</td>
</tr>
</tbody>
</table>