**Objective:**

This handout will help students use shortcuts to perform basic arithmetic operations.

**Multiplying Decimals by Powers of 10 - 10, 100, and 1,000**

- To multiply a decimal by 10, copy the digits from the decimal number and move the decimal point *one place* to the RIGHT.

- To multiply a decimal by 100, copy the digits from the decimal number and move the decimal point *two places* to the RIGHT.

- To multiply a decimal by 1,000, copy the digits from the decimal number and move the decimal point *three places* to the RIGHT.

**Dividing Decimals by Powers of 10 - 10, 100, and 1000**

- To divide a decimal by 10, copy the digits from the decimal number and move the decimal point *one place* to the LEFT.

- To divide a decimal by 100, copy the digits from the decimal number and move the decimal point *two places* to the LEFT.

- To divide a decimal by 1,000, copy the digits from the decimal number and move the decimal point *three places* to the LEFT.

**Example 1: Multiplication by 10, 100, 1,000**

\[
\begin{align*}
0.23 \times 10 &= 2.3 \\
0.23 \times 100 &= 23 \\
0.23 \times 1000 &= 230
\end{align*}
\]

**Example 2: Division by 10, 100, 1,000**

\[
\begin{align*}
0.23 \div 10 &= 0.023 \\
0.23 \div 100 &= 0.0023 \\
0.23 \div 1000 &= 0.00023
\end{align*}
\]

Try these exercises:

1) \( 9.83 \times 10 \)  
3) \( 0.2308 \times 1000 \)  
5) \( 1,357.08 \div 100 \)

2) \( 67.03 \times 100 \)  
4) \( 25.67 \div 10 \)  
6) \( 0.059 \div 1000 \)
Multiplying Whole Numbers by Multiples of 10, 100, 1,000

Example 3: Notice how the zero’s are simply “tacked on”.

\[
\begin{array}{ccc}
341 & 13 & 23 \\
x 20 & x 300 & x 4,000 \\
6,820 & 3,900 & 92,000 \\
\end{array}
\]

Changing Decimals to Percents

Use the directional cues from the Karate Kid movie … WAX ON (Right).
To put “on” a percent, multiply by 100 or simply move the decimal point 2 places to the right.

Example 4: Changing Decimals to Percents

0.345 = 34.5%  
2.56 = 256%  
0.1 = 10%

Changing Percents to Decimals

Use the directional cues from the Karate Kid movie … WAX OFF (Left).
To take off a percent, divide by 100, or simply move the decimal point 2 places to the left.

Example 5: Changing Percents to Decimals

267% = 2.67  
100% = 1  
0.3% = .003  
65% = 0.65

Try these exercises:

Change the following decimals to percents. Change percents to decimals.

7) 0.125  
9) 4  
11) 47%

8) 0.2  
10) 37.5%  
12) 0.6%
Subtracting Mixed Numbers with Borrowing:

When subtracting mixed numbers, use the LCD of the fractions to build equivalent fractions. If the fraction at the top of the column is less than the fraction at the bottom of the column, borrow one WHOLE from the whole number part. Now, here is the short cut! At the top of the column with the equivalent fraction, simply add the denominator to the numerator. This sum, written over the LCD, is the new fraction and it will be large enough for you to perform the subtraction.

Example 6:

\[
\begin{align*}
13 \quad \frac{1}{4} & \quad \Rightarrow \\
- \quad 5 \quad \frac{7}{12} & \\
\hline
\frac{3}{12} & \\
\end{align*}
\]

Using the LCD, write equivalent fractions.

Since \(\frac{3}{12}\) is smaller than \(\frac{7}{12}\), borrow from the whole number part of the mixed number.

\[
\begin{align*}
\frac{3}{12} & \quad \Rightarrow \\
\frac{15}{12} & \\
- \quad 5 \quad \frac{7}{12} & \\
\hline
\frac{8}{12} & \\
\end{align*}
\]

Add the denominator, 12, to the numerator, 3 \(\Rightarrow\) 12 + 3 = 15

Be sure to simplify (reduce) the fractional part. Answer = \(\frac{7}{3}\)

Try these exercises:

13) \(\frac{7}{6} - 2\frac{1}{4}\)  
14) \(\frac{8}{9} - 4\frac{5}{6}\)  
15) \(\frac{8}{2} - 5\frac{2}{3}\)  
16) \(-9 - \frac{3}{8}\)
Solving Linear Equations: Change Sides / Change Signs

When solving linear equations, the goal is to get the variable (the letter) on one side of the equal sign and the constant (the number) on the other side. If you have to move either the variable or the constant to the other side of the equal sign, then you can apply a short cut. Simply change the sign when you change sides!

Example 7:

\[ x + 5 = 9 \]
\[ x = 9 - 5 \]
\[ x = 4 \]

Try these exercises:

Solve for each variable.

17) \( y - 8 = -9 \)
18) \( -7 + y = 13 \)
19) \( 4(x + 3) = 36 \)
20) \( 8(x-2) - 5(x+4) = 20x + x \)

Answers:

13) \( \frac{11}{12} \)
14) \( \frac{5}{18} \)
15) \( \frac{2}{6} \)
16) \( \frac{5}{8} \)

17) \( y = -9 + 8 = -1 \)
18) \( y = 13 + 7 = 20 \)
19) \( 4x + 12 = 36 \)
\( 4x = 36 - 12 \)
\( 4x = 24 \)
\( x = 6 \)
Use the Distributive Property
Change sides / Change Signs
Combine like terms
Divide both sides by the coefficient of x (which is 4)

20) \( 8x - 16 - 5x - 20 = 20x + x \)
\( 3x - 36 = 21x \)
\( 3x - 21x = 36 \)
\( -18x = 36 \)
\( x = -2 \)
Use the Distributive Property
Combine like terms
Change sides / Change Signs for both x and constant
Combine like terms
Divide both sides by the coefficient of x (which is -18)