

Decimal and Fraction Review Sheet

Decimals

-Addition

To add 2 decimals, such as 37.25946 and 3.5142573 we write them one over the other with the decimal point lined up like this

$$\begin{array}{r} 37.25946 \\ +3.5142573 \\ \hline \end{array}$$

If one of the number has more tail digits then the other we put zeros on the end of the shorter number like this

$$\begin{array}{r} 37.2594600 \\ +3.5142573 \\ \hline \end{array}$$

Now we start at the farthest right and add down. The decimal is just brought right down under the bar exactly where it is at.

$$\begin{array}{r} 37.2594600 \\ +3.5142573 \\ \hline 40.7737173 \end{array}$$

If there are more than 2 just do the same with all of them

Example: $0.521 + 27.5123 + 2.6$

$$\begin{array}{r} 0.5210 \\ 27.5123 \\ +2.6000 \\ \hline 30.6333 \end{array}$$

-Subtraction

Subtraction is like addition but we can only work with 2 decimal numbers at a time. Consider $5.712 - 10.315$ We set it up like before (remember to line up the decimal point)

$$\begin{array}{r} 5.712 \\ -10.315 \\ \hline \end{array}$$

Now with subtraction the bigger number needs to be on top. If it already is leave it as is and subtract. If the bigger number is on bottom switch the 2 numbers and we have to put a negative on your answer.

Since 10.342 is a larger number than 5.712 we need to flip them. What we have so far.

$$\begin{array}{r} 10.315 \\ -5.712 \\ \hline - \end{array}$$

Now subtract like normal.

$$\begin{array}{r} 10.315 \\ -5.712 \\ \hline -4.603 \end{array}$$

-Multiplication

When multiplying 2 decimals numbers together we write them down one over the other not worrying about lining up the decimals like we did in addition and subtraction. Consider 5.2×4.13 write it as

$$\begin{array}{r} 5.2 \\ \times 4.13 \\ \hline \end{array}$$

Now multiply as if the decimal was not there.

$$\begin{array}{r} 5.2 \\ \times 4.13 \\ \hline 156 \\ 1520 \\ +20800 \\ \hline 21476 \end{array}$$

Now count how many decimal places were in the original numbers. There was 1 in 5.2 and 2 in 4.13 giving us a total of 3 decimal places. Now from the answer that you got put the decimal the same number of places from the right as you have just counted.

So 21476 becomes 21.476 for the answer.

-Division

You divide decimals as you would 2 whole numbers

Example: $11.73 \div 2.3$ or could be written as $\frac{11.73}{2.3}$

Set up the division as long division. The first or top part of the division goes on the inside and the last or bottom on the outside.

$$2.3 \overline{)11.73}$$

Now we move the decimal point on the outside number to the left until that number becomes a whole number. We then move the decimal point for the inside number the same amount to the left. We get

$$23 \overline{)117.3}$$

The decimal point for the answer goes right above the decimal point of the inside number. Then you act like it is not there and long divide like normal.

$$\begin{array}{r} 2.1 \\ 23 \overline{)117.3} \\ \underline{-115} \\ 23 \\ \underline{-23} \\ 0 \end{array}$$

Fractions

-Addition and Subtraction

To add or subtract multiple fractions together they all must have the same denominator. To do this we figure out what we need to multiply the bottom

of each fraction to get it to the same number. What we multiply the bottom number we must also multiply that to the top. This is called a common denominator.

Example: $\frac{5}{7} + \frac{3}{10} - \frac{1}{4}$

In this example a common denominator can be 140, 280, . . . , there are many. An easy way to find a common denominator is to just multiply all the denominators together $7 \times 10 \times 4 = 280$. Another is to factor each denominator

$$\begin{aligned} 7 &= 7 \times 1 \\ 10 &= 2 \times 5 \\ 4 &= 2 \times 2 \end{aligned}$$

If a number appears in more than once in the different factors use it only once. In our example we could write $7 \times 2 \times 2 \times 2 \times 5 = 280$ but since a 2 appears in both the factors of 10 and 4 we use it once. Since there is two 2's in the factors of 4 we have to have two 2's. We get in the end:

$$7 \times 2 \times 2 \times 5 = 140$$

Now we ask what do we multiply a single fraction by to get the common denominator and multiply to the top and bottom.

$$\frac{5(\underline{20})}{7(\underline{20})} + \frac{3(\underline{14})}{10(\underline{14})} - \frac{1(\underline{35})}{4(\underline{35})}$$

Now simplify and then add and subtract the tops together.

$$\frac{100}{140} + \frac{42}{140} - \frac{35}{140} = \frac{100 + 42 - 35}{140} = \frac{107}{140}$$

-Multiplication

To multiply 2 or more fractions together you just multiply the tops together and multiply the bottoms together.

$$\frac{7}{5} \times \frac{2}{3} \times \frac{3}{4} \times \frac{1}{4} = \frac{7 \times 2 \times 3 \times 1}{5 \times 3 \times 4 \times 4} = \frac{42}{180}$$

Division

When dividing by a fraction it is the same as multiplying by the reciprocal of the fraction (or thinking about it as flipping the fraction). If $\frac{7}{5}$ is your fraction the reciprocal is $\frac{5}{7}$

Example:

$$\frac{7}{5} \div \frac{2}{3} = \frac{7}{5} \times \frac{3}{2} = \frac{21}{10}$$

Simplifying fractions

To simplify a fraction you find numbers that divide both the top and bottom and reduce them out.

Example:

Simplify $\frac{90}{660}$

Factor the top and the bottom getting

$$\frac{3 \times 3 \times 10}{22 \times 3 \times 10} = \frac{3}{22}$$

Converting fractions to decimals

To convert fractions to decimals you divide the top number by the bottom number by doing long division. You will need to put a decimal after the

number on the inside.

Example: Convert $\frac{8}{11} = 11\overline{)8.}$

$$\begin{array}{r}
 0.7272 \\
 11\overline{)8.0000} \\
 \underline{-(77)} \\
 30 \\
 \underline{-(22)} \\
 80 \\
 \underline{-(77)} \\
 30 \\
 \underline{-(22)} \\
 7
 \end{array}$$

Notice that if we kept going we would just get 72 repeated forever so we can stop and say that $\frac{8}{11} = 0.\overline{72}$ where the over line signals that those numbers over lined keep on repeating.

Converting decimals to fractions

To convert a decimal to a fraction we first split it into the whole number part added to the decimal part

Example:

$$3.7025 = 3 + .7025$$

Then we work with the decimal part. We put the decimal part in the numerator of a fraction with out the decimal and in the denominator we put a 1 followed by the same number of zeros as decimal places the original number. So far we have

$$3 + \frac{7025}{10000}$$

Any leading zeros we can remove because they do not change the value.

$$3 + \frac{752}{10000}$$

You can either simplify the fraction now and then add or add then simplify (using the techniques described before).

$$3 + \frac{752}{10000} = 3 + \frac{47}{625} = \frac{1875}{625} + \frac{47}{625} = \frac{1922}{625}$$

or

$$3 + \frac{752}{10000} = \frac{30000}{10000} + \frac{752}{10000} = \frac{30752}{10000} = \frac{1922}{625}$$