Accuplacer Arithmetic Study Guide

I. Terms

Numerator: which tells how many parts you have (the number on top) → 3

Denominator: which tells how many parts in the whole (the number on the bottom) → 4

Example:

\[
\frac{3}{4} \quad \text{3 parts have a dot out of 4}
\]

Proper fraction: the top number is less than the bottom number.

Example:

\[
\frac{1}{3}, \frac{7}{10}, \frac{9}{19}
\]

Improper fraction: the top number is equal to or is larger than the bottom number.

Example:

\[
\frac{3}{2}, \frac{9}{8}
\]

Mixed Number: a whole number is written next to a proper fraction.

Example:

\[
1 \frac{3}{4}, 2 \frac{2}{5}, 1 \frac{1}{2}
\]

Common Denominator: is a number that can be divided evenly by all of the denominators in the problem

Example: The common denominator for these fractions will be 12.

\[
\frac{3}{4} \rightarrow 12 \quad \frac{9}{12} \\
\frac{2}{3} \rightarrow 12 \quad \frac{8}{12} \\
\frac{1}{2} \rightarrow 12 \quad \frac{6}{12}
\]

Whole Number: is a number with no fraction, decimal or negative parts

Example: 1, 2, 3, 4, 945, 8224

Divisor (factor): is the number that you are dividing by

Dividend: is the number being divided

Example: 5 is the divisor, 15 is the dividend

\[
(3 \text{ ways to write division}) \quad \frac{15}{5} \quad 5 \bigg| 15
\]

Variable: a letter used for an unknown number, e.g. \(x\) or \(y\)

Equation: a mathematical way showing that two things are the same

Term: a number, variable or combination in an equation

Product: an answer from multiplication

Sum: an answer from addition

Difference: an answer from subtraction

Quotient: an answer from division

Example: \(5x + 2 = 17\)

Terms
II. Fractions

A. Reducing Fractions to Lowest Terms
   \textit{Step 1}: Find a number that goes evenly into the numerator and the denominator of the fraction.
   
   Example: The number that will go in evenly is 8
   \[
   \frac{48}{64} = \frac{6}{8}
   \]
   
   \textit{Step 2}: Check to see whether another number goes evenly into both the numerator and denominator. Stop when there are no more numbers that can go into the fraction.
   
   Example: The fraction can be reduced further by dividing it by 2
   \[
   \frac{6}{8} = \frac{3}{4}
   \]

B. Changing Mixed Numbers to Improper Fractions
   \textit{Step 1}: Multiply the denominator by the whole number.
   
   Example: Change \(3\frac{2}{4}\) to an improper fraction
   \[
   2 \times 4 = 8
   \]
   
   \textit{Step 2}: Add the result to the numerator
   \[
   8 + 3 = 11
   \]
   
   \textit{Step 3}: Place the total over the denominator.
   \[
   \frac{11}{4}
   \]

C. Adding and Subtracting Fractions with Different Denominators (Bottom Numbers)
   \textit{Example 1}: \(\frac{3}{4} + \frac{2}{3} = \)
   
   \[
   \frac{3 \times 3}{4 \times 3} = \frac{9}{12}
   \]
   
   \[
   \frac{2 \times 4}{3 \times 4} = \frac{8}{12}
   \]
   
   \[
   \frac{9 + 8}{12} = \frac{17}{12} = 1 \frac{5}{12} \quad \text{*}
   \]

   \textit{Example 2}: \(\frac{3}{4} - \frac{3}{16} = \)
   
   \[
   \frac{3 \times 4}{4 \times 4} = \frac{12}{16}
   \]
   
   \[
   \frac{3 \times 1}{1 \times 1} = \frac{3}{16}
   \]
   
   \[
   \frac{12 - 3}{16} = \frac{9}{16}
   \]
   
   \text{*Remember to change improper fractions to a mixed number.}

D. Multiplying Fractions
   \textit{Step 1}: Multiply the numerators across.
   
   \[
   \frac{3 \times 5}{4 \times 6} = \frac{15}{24}
   \]
   
   \textit{Step 2}: Then multiply the denominators across.
   
   \[
   \frac{15 \div 3}{24 \div 3} = \frac{5}{8}
   \]
E. Multiplying Fractions with Mixed Numbers

**Step 1:** Change every mixed fraction to an improper fraction. 
\[ \frac{2}{3} \times \frac{7}{5} = \]
\[ \frac{2}{3} = \frac{8}{3} \quad \frac{7}{5} = \frac{7}{5} \]

**Step 2:** Then multiply across 
\[ \frac{8 \times 7}{3 \times 5} = \frac{56}{15} \]

**Step 3:** Then change the improper fraction to a mixed number in lowest terms. 
\[ \frac{56}{15} = 3 \frac{11}{15} \]

F. Dividing Fractions

The fraction that is right of the division sign will need to be turned upside down by writing the numerator in the denominator and the denominator in the numerator. Then follow the rules for multiplying fractions.

Example: 
\[ \frac{1}{4} \div \frac{1}{2} = \]
\[ \frac{1}{4} \times \frac{2}{1} = \frac{2}{4} \quad \text{Simplify} \quad \frac{2}{4} \div \frac{2}{1} = \frac{1}{2} \]

**Practice:**
1) Change \( \frac{1}{6} \) to an improper fraction. 2) Change \( \frac{42}{16} \) to a mixed number.

3) \( \frac{5}{3} + \frac{1}{2} \)
4) \( \frac{5}{2} + \frac{3}{3} \)
5) \( \frac{9}{13} - \frac{1}{2} \)
6) \( \frac{10}{8} - \frac{3}{7} \)

7) \( \frac{1}{7} \times \frac{5}{9} = \)
8) \( \frac{3}{7} \times \frac{7}{9} = \)

9) \( \frac{6}{11} \div 14 = \)
10) \( \frac{4}{5} \div \frac{5}{6} = \)

III. Decimals

A. Adding and Subtracting Decimals

Example – Add: \( 28.5 + 44.47 + 307.6 \)  
Example – Subtract: \( 380.53 - 75 \)

28.50  
44.47  
+3075.60  
--  
3148.57

Step 1: Line up the decimal points.

Step 2: Then add or subtract
B. Multiplying Decimals
Example: Multiply $1.89 \times 5.03 =$

\[
\begin{array}{c}
1.89 \\
\times 5.03 \\
567 \\
94500 \\
\hline
9.5067
\end{array}
\]

Step 1: Multiply the decimals as you would do with whole numbers.

Step 2: Then count the number of spaces of each factor being multiplied. Decimal places are the number of spaces to the right of the decimal point. There are 2 in the top factor and 2 in the bottom factor, so the decimal is placed 4 spaces from the right.

Step 3: Show the total number of places in your answer.

C. Dividing a Decimal by a Whole Number
Place the decimal point directly above its position in the problem. Then divide the same way as you divide whole numbers.

Example: \[73 \div 2.701 = \]

\[
\begin{array}{c}
-219 \\
\hline
511 \\
-511 \\
\hline
0
\end{array}
\]

D. Dividing Decimal by a Decimal Number

Example: \[4.374 \div 0.03 = \]

\[
\begin{array}{c}
0.03 \overline{)4.374} \\
\hline
3 \overline{)437.4} \\
\hline
145.8 \\
3 \overline{)437.4} \\
\hline
3 \\
13 \\
12 \\
\hline
17 \\
15 \\
\hline
24 \\
24 \\
\hline
0
\end{array}
\]

Step 1: Move the decimal point of the divisor as far right as you can go. – 2 spaces in this example.

Step 2: Then move the decimal point in the dividend the same number of places as the divisor.

Step 3: Place the decimal point above its position in the problem. Then divide the same way as divide whole numbers.
Practice:

11) \[ \frac{18.1 \times 0.04}{0.97 \times 5.6} \]
12) \[ 123 + 2.6 + 9.04 = \]
13) \[ 83.0097 + 124.9 + 9.043 = \]
14) \[ 0.07 - 0.002 = \]
15) \[ 0.97 \times 5.6 = \]
16) \[ 96 - 0.3992 = \]
17) \[ 4 \sqrt{27.36} \]
18) \[ 0.2601 \div 9 = \]
19) \[ 7.055 \div 0.83 = \]
20) \[ 2.03 \div 4.466 = \]

IV. Percents

Percents are used to describe a part of something. Percents are used to figure out sales or the amount of interest someone will pay on a loan. When converting a percent to its fraction form, it will always have a denominator of 100.

A. Changing Decimal to Percents or Percents to Decimals

The important key is where to move the decimal point.

If changing from a decimal to percent, move the decimal point 2 places to the right and add a percent sign.

Example: \[ 0.35 = 35\% \]
\[ 0.8 = 80\% \]

To change from percent to decimal, need to move the decimal point 2 places to the left and drop the percent sign.

Example: \[ 30\% = 0.3 \]
\[ 0.9\% = 0.009 \]

B. Converting Fractions to Percent Form

Divide the bottom number of the fraction into the top number and move the point 2 places to the right.

Example: \[ \frac{3}{4} \]
\[ \frac{.75}{3.00} = 0.75 \] = 75\%

- or -

Multiply the fraction by 100%

Example: \[ \frac{3}{4} \]
\[ \frac{25}{100\%} = 75\% = 75\% \]
C. **Converting Percents to Fraction Form**

Write the percent as a fraction with 100 as the denominator. Then reduce the fraction to the lowest terms.

Example: 85%

\[
\frac{85}{100} \div \frac{5}{5} = \frac{17}{20}
\]

D. **Finding the Percent of a Number**

Example: What is 25% of $6,500? There are 2 ways to solve this problem

1) Change the percent to a decimal and multiply.

\[ n = 25\% \times 6500 \]

\[ n = 0.25 \times 6500 \]

\[ n = 1625 \]

2) Change the percent to a fraction and multiply.

\[ n = \frac{1}{4} (6500) \]

\[ n = \frac{6500}{4} \]

\[ n = 1625 \]

E. **Finding What Percent One Number is of Another**

There are key words to remember that will help you solve the problem it is asking you.

The word “of” in the sentence means to multiply

The word “is” means equal to.

The word “what” is the number you are trying to find which is represented by a letter.

Example: 9 is what percent of 45

\[ \frac{9}{45} \times 45 = a \]

**Step 1:** Divide both sides of the equation by same number to get the variable alone

\[ \frac{9}{45} = a \]

**Step 2:** Reduce the fraction

\[ \frac{9}{45} \div \frac{9}{9} = a \]

\[ \frac{1}{5} = a \]

\[ 0.20 = a \]

\[ 20\% = a \]

Therefore, 20\% of 45 is 9.
F. **Finding a Number When a Percent of It is Given**

Example: 20% of what number is 16?

\[ 20\% \times a = 16 \]

\[ \frac{20}{100} a = 16 \]

**Step 1:** Change the percent to a fraction form

\[ \frac{1}{5} a = \frac{16}{1} \]

**Step 2:** Simplify the fraction

\[ a = 1 \times \frac{16 \times 5}{5} \]

\[ a = 80 \]

Therefore, 20% of 80 is 16.

**Practice:**

Write the following in percent form.

21) 0.12  
22) \( \frac{6}{8} \)  
23) \( \frac{2}{5} \)  
24) 0.233  
25) 1.15

26) What is 11% of $3,000?  
27) 60 is what percent of 12,000?  
28) 28 is 40% of what number?

**Answers**

1) \( \frac{25}{6} \)  
2) \( \frac{5}{8} \)  
3) \( \frac{4}{15} \)  
4) \( \frac{1}{6} \)  
5) \( \frac{9}{26} \)

6) \( \frac{25}{56} \)  
7) \( \frac{47}{63} \)  
8) \( \frac{11}{21} \)  
9) \( \frac{3}{77} \)  
10) \( \frac{114}{175} \)

11) 0.724  
12) 5.432  
13) 134.64  
14) 216.9527  
15) 0.068

16) 95.6008  
17) 6.84  
18) 0.0289  
19) 8.5  
20) 2.2

21) 12%  
22) 75%  
23) 40%  
24) 23.3%  
25) 115%

26) $330  
27) 0.5%  
28) 70