Accuplacer Arithmetic Study Guide

Section One: Terms

Numerator: The number on top of a fraction which tells how many parts you have.

Denominator: The number on the bottom of a fraction which tells how many parts are in the whole.

> Example: A circle is divided into four sections. Three of the four sections have a dot inside them. This can be represented by the fraction "three over four". Three would be the numerator and four would be the denominator.

Proper fraction: A fraction in which the top number is less than the bottom number.

> Example one: One over three.
>
> Example two: Seven over ten.
>
> Example three: Nine over nineteen.

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

> Example one: Three over two.
>
> Example two: Nine over four.
>
> Example three: Eight over eight.

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

> Example one: One and three over four.
>
> Example two: Two and two over five.
>
> Example three: Ten and one over two.

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

> Example: Consider the following three fractions.
>
> Three over four.
>
> Two over three.
>
> One over two.

The common denominator for these fractions will be twelve. Twelve is also the least common denominator.

Whole Number: A number with no fraction, decimal or negative parts.

> Examples include, one, two, three, four, nine hundred forty five, and eight thousand two hundred twenty four.

Divisor (factor): The number that you are dividing by.

Dividend: the number being divided.

Example: In the fraction, fifteen over five, five is the divisor, fifteen is the dividend

There are three ways to write division.

Example one: Division can be written as a fraction.

Example two: Division can be written with a long division symbol.

Example three: Division can be written with a small division symbol that sits between the dividend and the divisor.

Variable: a letter used for an unknown number. For example, 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: In the equation, five X plus two equals seventeen, the variable is the letter X, the terms are five X, two and seventeen. The equation represents a sum because of the addition symbol.

Section Two: Fractions

Part A. Reducing Fractions to Lowest Terms

Step One: Find a number that goes evenly into the numerator and the denominator of the fraction.

Example: Consider the following fraction.

Forty eight over sixty four.

A number that will go in evenly into forty eight and sixty four is eight.

Divide both forty eight and sixty four by eight. The result is six over eight.

Step Two: Check to see whether another number goes evenly into the new numerator and denominator. Stop when there are no more numbers that can go into the fraction.

Example: The fraction six over eight can be reduced further by dividing the numerator and denominator by two. The result is three over four.

Part B. Changing Mixed Numbers to Improper Fractions

Step One: Multiply the denominator by the whole number.

Example: Consider the following fraction.

Two and three over four.

The denominator is four and the whole number is two. Two times four is eight.

Step Two: Add the result to the numerator.

The numerator is three. Eight plus three is eleven.

Step Three: Place the total over the denominator. The denominator is four, so the improper fraction is eleven over four.

Part C. Adding and Subtracting Fractions with Different Denominators (Bottom Numbers)

Example One: Three over four plus two over three.

Step One: Find the common denominator for all fractions. One way to do this is by multiplying the two denominators together. Four times three is twelve, so the common denominator can be twelve.

Multiply both numbers on the first fraction by the bottom number of the second fraction.

Three over four times three over three is nine over twelve. This does not change the value of the fraction.

Multiply both numbers on the second fraction by the bottom number of the first fraction.

Two over three times four over four is eight over twelve.

Step Two: Add or subtract the fractions.

Nine over twelve plus eight over twelve equals seventeen over twelve.

Remember to change improper fractions to a mixed number.

Seventeen over twelve can be converted into the mixed number one and five twelfths.

Part D. Multiplying Fractions

Consider the example three over four times five over six.

Step One: Multiply the numerators.

Three times five is fifteen.

Step Two: Multiply the denominators.

Four times six is twenty four.

The product is fifteen over twenty four.

Make sure the product is in lowest terms.

Three goes into both fifteen and twenty four. Divide the numerator and denominator by three. This reduces the fraction to five over eight.

Part E. Multiplying Fractions with Mixed Numbers

Consider the example two and one over three times one and two over five.

Step One: Change every mixed fraction to an improper fraction.

Two and two over three is eight over three.

One and two over five is seven over five.

Step Two: Then multiply across.

Eight times seven is fifty six and three times five is fifteen. The fraction is fifty six over fifteen.

Step Three: Then change the improper fraction to a mixed number in lowest terms.

Fifty six over fifteen is three and eleven over fifteen.

Part 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: One over four divided by one over two.

Using the rules for dividing fractions, the problem becomes one over four times two over one.

One over four times two over one is two over four.

Simplify two over four by dividing the numerator and denominator by two to get the answer of one over two.

Practice:

Question one.

Change the mixed number four and one over six to an improper fraction.

Answer one.

The answer is twenty five over six.

Question two.

Change the improper fraction forty two over sixteen to a mixed number.

Answer two.

The answer is two and five over eight.

Question three.

Five and three over five plus two and two over three.

Answer three.

The answer is eight and four over fifteen.

Question four.

Five and one over two plus three and two over three.

Answer four.

The answer is nine and one over six.

Question five.

Nine and eleven over thirteen minus two and one over two.

Answer five.

The answer is seven and nine over twenty six.

Question six.

Ten and seven over eight minus two and three over seven.

Answer six.

The answer is eight and twenty five over fifty six.

Question seven.

Three and one over seven times five over nine.

Answer seven.

The answer is one and forty seven over sixty three.

Question eight.

Three and three over seven times two and seven over nine.

Answer eight.

The answer is nine and eleven over twenty one.

Question nine.

Six over eleven divided by fourteen.

Answer nine.

The answer is three over seventy seven.

Question ten.

Three and four over five divided by five and five over six.

Answer ten.

The answer is one hundred fourteen over one hundred seventy five.

Section Three: Decimals

Part A. Adding and Subtracting Decimals

Example – Add: Twenty eight point five plus forty four point four seven plus three thousand seventy five point six.

Step One: Stack the numbers vertically so that the decimal points line up. Write additional zeroes to fill in missing place values.

> Example: Twenty eight point five becomes twenty eight point five zero. Underneath that number is forty four point four seven. Underneath that number is three thousand one hundred seventy five point six zero.

Step Two: Then add or subtract starting with the numbers in the smallest place value moving to the numbers in the largest place value.

> Example: Twenty eight point five zero plus forty four point four seven plus three thousand seventy five point six zero is three thousand forty eight point five seven.

Example – Subtract: Three hundred eighty point five three minus seventy five.

Step One: Rewrite the problem as three hundred eighty point five three minus seventy five point zero zero.

Step Two: Subtract to get the answer of three hundred five point five three.

Part B. Multiplying Decimals

> Example: Multiply one point eight nine times five point zero three.

Step One: Multiply the decimals as you would do with whole numbers. Ignore the decimals for this step.

> Example: One point eight nine times five point zero three is similar to multiplying one hundred eighty nine times five hundred three, which is ninety five thousand sixty seven.

Step Two: Then count the number of decimals places of each factor being multiplied. Decimal places are the number of digits to the right of the decimal point.

> Example: For one point eight nine, there are two digits to the right of the decimal point.
>
> For five point zero three, there are two digits to the right of the decimal point.
>
> Considering the two numbers, there is a total of four decimal places, so in the answer, a decimal is placed four spaces from the right of the number.

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

> Example: Ninety five thousand sixty seven becomes nine point five zero six seven.

Part 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: Two point seven zero one divided by seventy three.

Write the number two point seven zero one under the long division symbol and seventy three outside of the long division symbol.

Place the decimal point directly above its position on top of the long division symbol.

Divide the problem as if it were the whole numbers two thousand seven hundred one divided by seventy three.

The answer is zero point zero three seven.

Part D. Dividing Decimal by a Decimal Number

Example: Four point three seven four divided by zero point zero three.

Note: the dividend is the number four point three seven four and the divisor is zero point zero three.

Step One: Write the problem using the long division symbol. Move the decimal point of the divisor as far right as you can go.

Example. The decimal point can be move two spaces to the right in the number zero point zero three. The number now become zero zero three or just three.

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

Example. The decimal point is moved two spaces to the right so four point three seven four becomes four hundred thirty seven point four.

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

Example. After moving the decimals described in Step one and Step two, the problem is now four hundred thirty seven point four divided by three which is one hundred forty five point eight.

Practice.

Question eleven.

Eighteen point one times zero point zero four.

Answer eleven.

The answer is zero point seven two four.

Question twelve.

Zero point nine seven times five point six.

Answer twelve.

The answer is five point four three two.

Question thirteen.

One hundred twenty three plus two point six plus nine point zero four.

Answer thirteen.

The answer is one hundred thirty four point six four.

Question fourteen.

Eight three point zero zero nine seven plus one hundred twenty four point nine plus nine point zero four three.

Answer fourteen.

The answer is two hundred sixteen point nine five two seven.

Question fifteen.

Zero point zero seven minus zero point zero zero two.

Answer fifteen.

The answer is zero point zero six eight.

Question sixteen.

Ninety six minus zero point three nine nine two.

Answer sixteen.

The answer is ninety five point six zero zero eight.

Question seventeen.

Twenty seven point three six divided by four.

Answer seventeen.

The answer is six point eight four.

Question eighteen.

Zero point two six zero one divided by nine.

Answer eighteen.

The answer is zero point zero two eight nine.

Question nineteen.

Seven point zero five five divided by zero point eight three.

Answer nineteen.

The answer is eight point five.

Question twenty.

Four point four six six divided by two point zero three.

Answer twenty.

The answer is two point two.

Section Four: Percentages

Percentages are used to describe a part of something. Percentages 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 one hundred.

Part A. Changing Decimal to Percentages or Percentages to Decimals

The important key is where to move the decimal point.

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

Example one: Zero point three five is thirty five percent

Example two: Zero point eight is eighty percent.

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

Example one: Thirty percent is the decimal zero point three.

Example two: Zero point nine percent is the decimal zero point zero zero nine.

Part B. Converting Fractions to Percent Form

Option number one: Divide the bottom number of the fraction into the top number and move the point two places to the right.

Example: Convert three over four to a percent.

Divide three by four to get the decimal zero point seven five.

Move the decimal two places to the right to get seventy five percent.

Option number two: Multiply the fraction by percent

Example: Multiply the fraction three over four by one hundred percent over one, which is three hundred percent over four. This simplifies to seventy five percent over one, which is seventy five percent.

Part C. Converting Percentages to Fraction Form

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

Example: Write eighty five percent as a fraction.

First, write eighty five percent as eighty five over one hundred.

Reduce the fraction by dividing the numerator and denominator by five, which is seventeen over twenty.

Part D. Finding the Percent of a Number

Example: What is twenty five percent of six thousand five hundred dollars?

There are two ways to solve this problem

Option number one: Change the percent to a decimal and multiply.

Example: Rewrite Twenty five percent times six thousand five hundred dollars as zero point two five times six thousand five hundred.

Multiply to get one thousand six hundred twenty five dollars.

Option number two: Change the percent to a fraction and multiply.

Example: Rewrite Twenty five percent times six thousand five hundred dollars as one over four times six thousand five hundred.

Multiply to get six thousand five hundred over four, which reduces to one thousand six hundred twenty five dollars.

Part 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: Nine is what percent of forty five?

Use the keywords to write the equation of nine equals A times forty five.

Note: The variable A is being multiplied by forty five, so the equation can be rewritten as nine equals forty five times A

Step one. Divide both sides of the equation by the same number to get the variable alone.

Example. For the equation nine equals forty five times A, divide both sides of the equation by forty five.

This results in the equation nine over forty five equals A.

Step two. Reduce the fraction.

Example. In the fraction nine over forty five, divide the numerator and denominator by nine, which is one over five.

Step three. Change the fraction into a decimal.

Example. The fraction one over five is the decimal zero point two zero.

Step four. Change the decimal into a percent.

Example. The decimal zero point two zero is twenty percent.

Therefore, twenty percent of forty five is nine.

Part F. Finding a Number When a Percent of It is provided.

Example: Twenty percent of what number is sixteen?

Use the keywords to write the equation of twenty percent times *A* equals sixteen.

Step one. Change the percent to a fraction form.

Example: Twenty percent is the fraction twenty over one hundred.

The equation is now twenty over one hundred times *A* equals sixteen.

Step two. Simplify the fraction.

Example: Twenty over one hundred is simplified to one over five.

The equation is now one over five times *A* equals sixteen.

Step three. Multiply both sides of the equation by the number in the denominator of the fraction to remove the fraction and get the variable alone.

Example. For the equation one over five times *A* equals sixteen, multiply both sides by five to remove the fraction.

So, A equals sixteen times five which is eighty.

Therefore, twenty percent of eighty is sixteen.

Practice:

Write questions twenty one through twenty five in percent form.

Question twenty one.

Zero point one two.

Answer twenty one.

The answer is twelve percent.

Question twenty two.

Six over eight.

Answer twenty two.

The answer is seventy five percent.

Question twenty three.

Two over five.

Answer twenty three.

The answer is forty percent.

Question twenty four.

Zero point two three three

Answer twenty four.

The answer is twenty three point three percent.

Question twenty five.

One point one five.

Answer twenty five.

The answer is one hundred fifteen percent.

Question twenty six.

What is eleven percent of three thousand dollars?

Answer twenty six.

The answer is three hundred thirty dollars.

Question twenty seven.

Sixty is what percent of twelve thousand?

Answer twenty seven.

The answer is zero point five percent.

Question twenty eight.

Twenty eight is forty percent of what number?

Answer twenty eight.

The answer is seventy.