MINUTE
MATHS
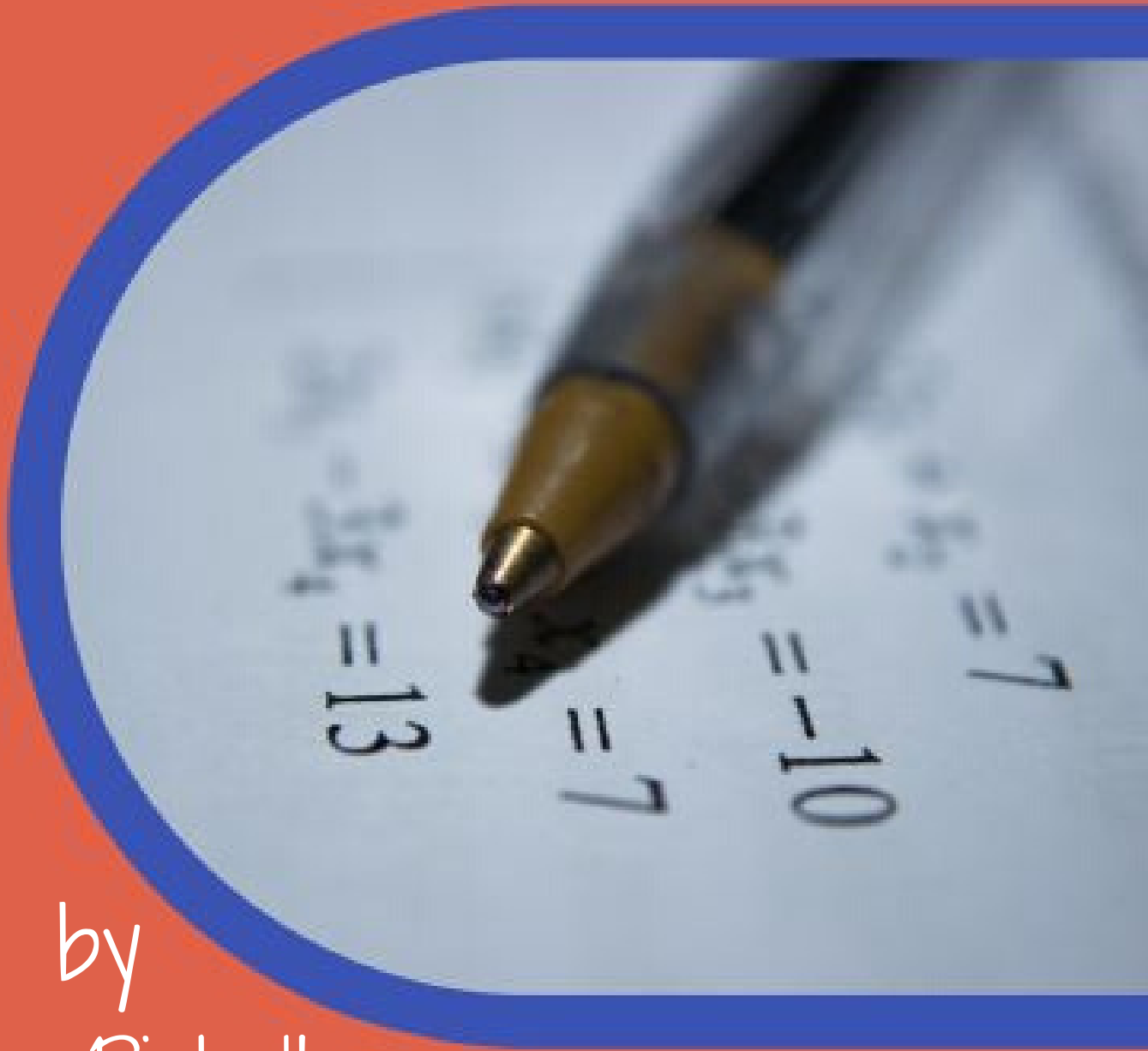
Algebra
Tips, Tricks, & Shortcuts

by

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Algebra Basics – Tips, Tricks & Shortcuts

Every student, for every degree, must take at least one Algebra class. I bet you didn't know Algebra is one of the most failed courses in college.

I'm here to help that NOT be your story. These tips, tricks, and shortcuts will equip you to be confident and successful in your Algebra class.

Algebra is a series of basic arithmetic functions. If you can add or subtract, you can do any algebra problem.

Find the parenthesis and do the math inside first. This will simplify the problem and make it much easier to solve.

Always work from the left to the right.
If there are exponents, simplify them before anything else.

Next, do the multiplication and/or division. Remember that you still need to work from left to right.

After you've done everything else, do the subtraction and/or addition. Still left to right.

Algebra problems are much easier to solve when you know the formulas and rules. If you memorize key algebra formulas, you will be able to do the work quicker.

If you know the division rules and how to solve problems using the order of operations, you can work your algebra problems stress-free.
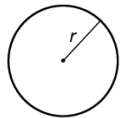
What Algebra formulas should you memorize?

There are some frequently occurring formulas for doing algebra problems. Memorize them and they'll not only help you with Algebra but with other real-world problems. Learn the formulas, as well as what the letters and symbols mean in this table.
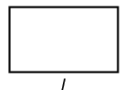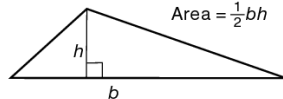
Pre-Algebra Reference Sheet

Circle

Area = πr^2
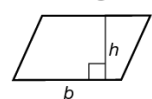Circumference = $2\pi r$
Circumference = πd

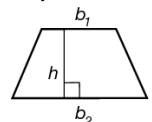**Rectangle**

Area = lw
Perimeter = $2l + 2w$
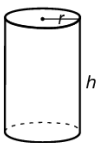
Triangle

Area = $\frac{1}{2}bh$
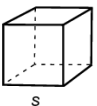
Parallelogram

Area = bh

Trapezoid
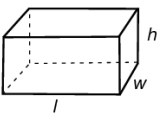
Area = $\frac{1}{2}h(b_1 + b_2)$

Cylinder

Volume = $\pi r^2 h$
Surface Area = $2\pi r^2 + 2\pi rh$

Cube

Volume = s^3
Surface Area = $6s^2$

Rectangular Prism

Volume = lwh
Surface Area = $2wl + 2lh + 2wh$

Definitions

MEAN:	The sum of a set of numbers divided by the number of elements in the set.
MEDIAN:	The middle number or average of the two middle numbers in a collection of data when the data are arranged in order.
MODE:	The number or numbers that occur most often in a collection of data.
RANGE:	The difference between the greatest and the least numbers in a collection of data.
REFLECTION OR FLIP:	A mirror image of a figure across a line of symmetry.
TRANSLATION OR SLIDE:	A change in position of a figure. All points in the figure move in the same direction for the same distance.
ROTATION OR TURN:	Turning a figure clockwise or counterclockwise about a point.

DISTANCE TRAVELED: distance = rate $\times$ time

Customary Conversions

8 ounces = 1 cup
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
8 pints = 1 gallon
3 teaspoons = 1 tablespoon
16 tablespoons = 1 cup
16 ounces = 1 pint
16 ounces = 1 pound
5280 feet = 1 mile

Metric Conversions

kilo-	hecto-	deka-	UNIT	deci-	centi-	milli-
k	h	da	meter (m) liter (l) gram (g)	d	c	m

Exponent Rules At A Glance

x and y are nonzero real numbers, and m and n are any integers.

1) Product Rule *(Multiplication)*
$$(x^m)(x^n) = x^{m+n}$$

2) Quotient Rule *(Division)*
$$\frac{x^m}{x^n} = x^{m-n}$$

3) Power Rule *(raising a power to a power)*
$$(x^m)^n = x^{m \cdot n}$$

4) Zero Rule
$$x^0 = 1$$

5) Negative Exponents
$$x^{-n} = \frac{1}{x^n} \quad OR \quad \frac{1}{x^{-n}} = x^n$$

6) Power of a Product Rule
$$(xy)^m = x^m y^m$$

7) Power of a Quotient Rule
$$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$$

8) Rule of 1
$$x^1 = x$$

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What are the Rules of Division?

In algebra, knowing the division rules will help you solve problems quicker. You will use this to factor algebraic expressions by finding and "pulling out" the greatest common factors. These also help you to reduce algebraic fractions easily.

- **Divisible by 2**: Any number ending in 0, 2, 4, 6 or 8
- **Divisible by 3**: Any number where the sum of the digits is divisible by 3
- **Divisible by 4**: Any number where the last two digits form a number divisible by 4
- **Divisible by 5**: Any number ending in 0 or 5
- **Divisible by 6**: Any number divisible by both 2 and 3
- **Divisible by 8**: Any number where the last three digits form a number divisible by 8
- **Divisible by 9**: Any number where the sum of the digits is divisible by 9
- **Divisible by 10**: Any number ending in 0
- **Divisible by 12**: Any number where the last two digits form a number divisible by 4 and the sum of the digits is divisible by 3

Rules for Integers

Addition:

If the signs are the same, add the number and keep the sign.

If the signs are different, subtract the numbers and keep the sign of the number with the largest absolute value.

Subtraction:

Keep – Change – Change

<u>Keep</u> the first number the same

<u>Change</u> the subtraction sign to addition

<u>Change</u> the sign of second number to its opposite sign

Multiplication and Division:

If the signs are the same, the answer is positive

If the signs are different, the answer is negative

The Order of Operations in Algebra

You must follow the Order of Operations correctly in order to solve algebra problems correctly.

Remember Please Excuse My Dear Aunt Sally?

It is a pnemonic for Parentheses – Exponents – Multiply (or) Divide – Add (or) Subtract.

This helps you remember in what order to work your problems.

1st: Calculate anything within a grouping or parentheses

2nd: Calculate powers and roots

3rd: Perform all multiplication and division from left to right

4th: Perform addition and subtraction from left to right

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Here's an example: $24 \div 3 + 11 - 3^2 * 2$

Look for Parenthesis first. Since there are none, we can move to exponents and roots.

3^2 is next. That equals 9.

So $24 \div 3 + 11 - 9 * 2$

Next, we do multiplication and division from left to right.

$24 \div 3 = 8$ and $9 * 2 = 18$

Substituting, we have $8 + 11 - 18$

Lastly, we add and subtract from left to right
$8 + 11 = 19$

Subtract: $19 - 18$ and you have 1

Combining Like Terms

Like terms are two or more terms that contain the same variable <u>AND</u> have the same exponents.

Example: 3x, 8x, 9x are like terms.
2y, 9y, 10y are like terms.

3x, 3y are **<u>NOT</u>** like terms because they do NOT have the same variable!

Golden Rule for Solving Equations

Solving equations is a huge part of Algebra. If you master how to solve them, you will have the majority of the skills required to pass your class.

The Golden Rule is - Whatever You Do To One Side of the Equation, You Must Do to the Other Side!

Here is a step-by-step guide for solving them.

1. Does your equation have fractions?
a. Yes – then multiply each term on both sides of the equation by the denominator
b. No – Go to Step 2

2. Does your equation involve the distributive property?
a. Yes – Rewrite the equation without the parenthesis
b. No – Go to Step 3

3. Do you have like terms on either side of the equation?
a. Yes – Simplify the equation by combining the like terms on each side. Don't forget the sign in front of each term belongs to that term
b. No – Go to Step 4

4. Are there variables on both sides of the equation?

a. Yes – perform opposite operations in order to get the variables on one side and all the constants on the other side. Then jump to Step 6.

b. No – Go to Step 5

5. Now you should have a two-step equation left to solve. If not, then go check the previous steps again.

6. Use addition or subtraction to move all of the constants to the opposite side of the variables
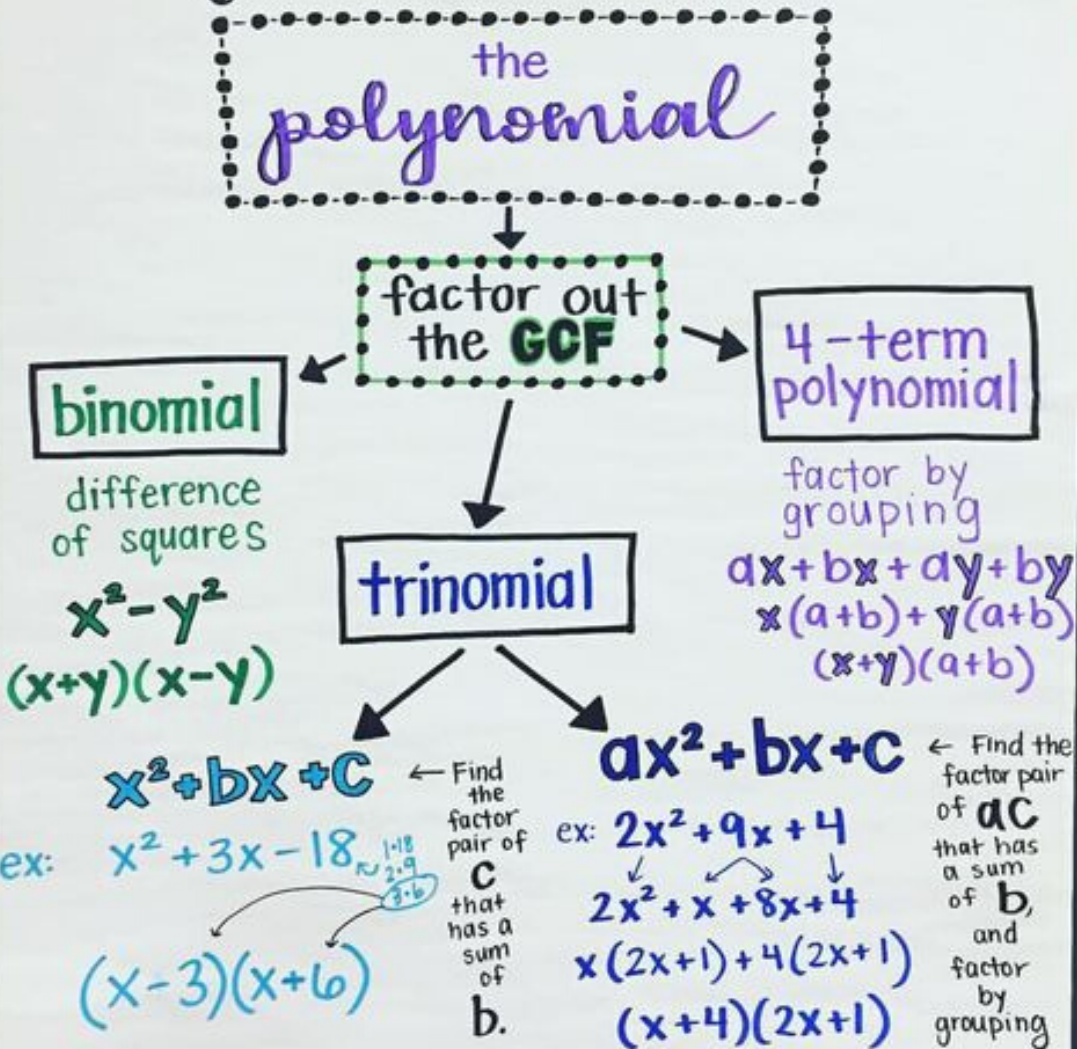
7. Multiply or divide to remove the coefficient from the variable side of the equation.

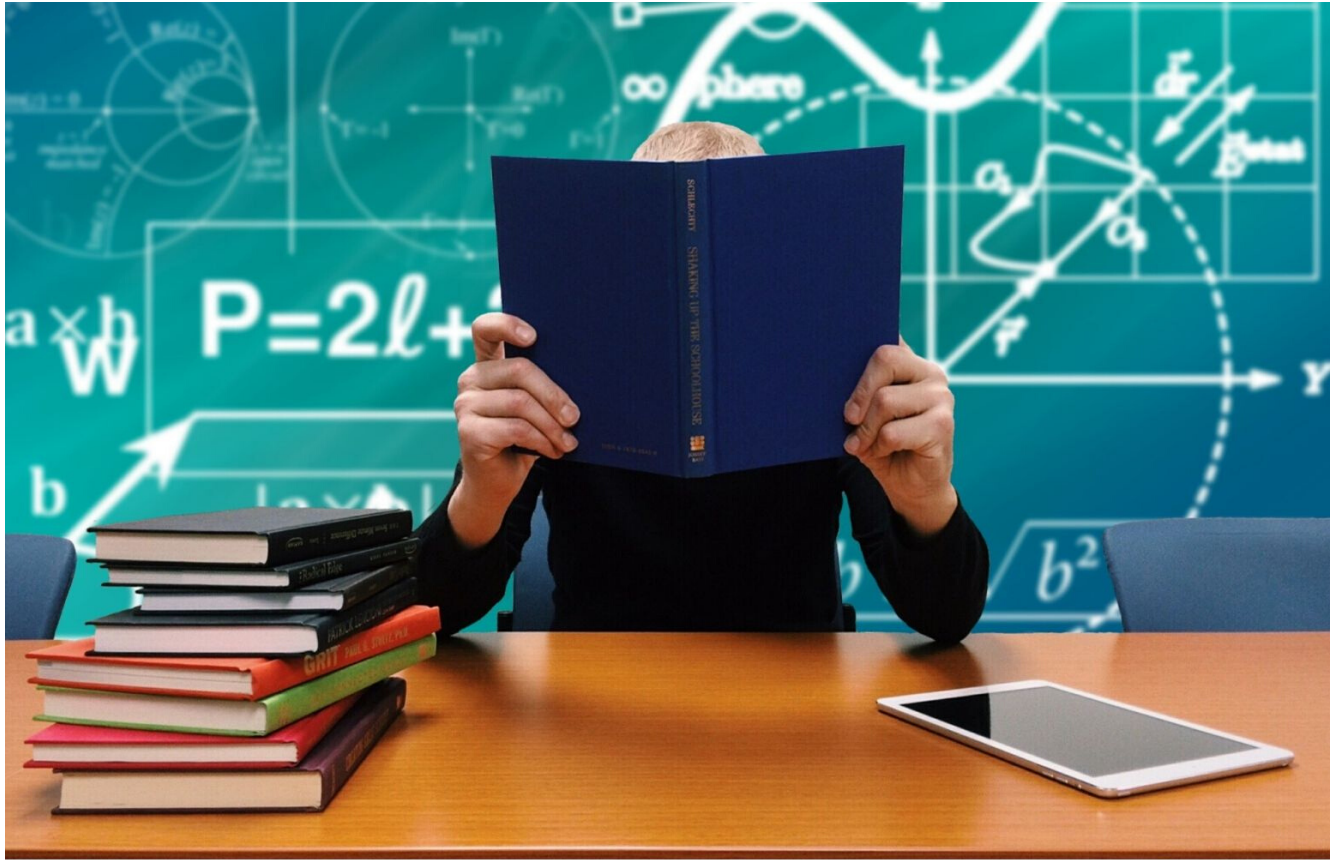8. Check your answer by substituting it back into the original equation.

You are Finished!

FACTORING flow chart

the **polynomial**

factor out the **GCF**

binomial

difference of squares

$x^2 - y^2$

$(x+y)(x-y)$

trinomial

$x^2 + bx + c$ ← Find the factor pair of **c** that has a sum of **b**.

ex: $x^2 + 3x - 18$

$(x-3)(x+6)$

4-term polynomial

factor by grouping

$ax + bx + ay + by$

$x(a+b) + y(a+b)$

$(x+y)(a+b)$

$ax^2 + bx + c$ ← Find the factor pair of **ac** that has a sum of **b**, and factor by grouping

ex: $2x^2 + 9x + 4$

$2x^2 + x + 8x + 4$

$x(2x+1) + 4(2x+1)$

$(x+4)(2x+1)$

3 Secrets to a Successful Algebra Final Exam

Use A Chunking Strategy

Break larger amounts of info into smaller units

Identify similarities in the patterns

Organize the information

Group information into manageable units

Study material EVERYDAY

Write it down

Speak it out loud

Read it

Listen to a recording of it.

Listen to Instrumental Music while studying

Your brain doesn't need additional information to process while trying to put the math into your long term memory.

Algebra is an involved and methodical process. But with these Tips, Tricks, and Shortcuts, we will help you untangle and break down the process into manageable, doable steps and pieces.

If you can do basic math, you do Algebra. You must know that you can.

You must believe that you're capable. You must know that you can be successful.

Good luck moving forward!

The Algebra Survival Kit is where you can get <u>EVERYTHING</u> you need to Pass your algebra Class

Algebra Survival Kit

Everything You Need To Pass Your Algebra Class

by
Arlissa Pinkelton
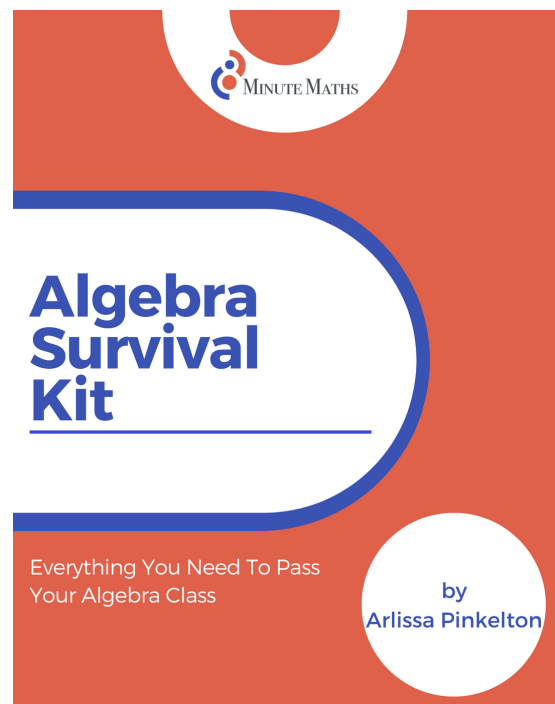
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