

THE A+ GUIDE

Practical Steps to Excel in Mathematics

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Introduction

It's not that I'm smart. It's just that I stay with problems longer

- Albert Einstein

Mathematics etymologically evolved from the ancient Greek word of "Mathema" which translates to "that which is learned". Carl Friedrich Gauss who is described as the Prince of Mathematicians defined it to be the Queen of the sciences. In fact, until around 1700, Mathematics was more commonly used to mean astrology or sometimes astronomy. Everything points to it being a field for **people who like to think** and express themselves. People who like to look into how things work, find out why it worked and keep a tab on the continuous wheel of how that thing happens. This is in line with the definition of Mathematics in terms of logic by Benjamin Pierce (1870) where he said that mathematics is "**the science that draws necessary conclusions**".

Mathematics is around us. Mathematics is in everything. Mathematics is the dosage a doctor prescribes. Without mathematics, doctors wouldn't have been able to prescribe drugs because these drugs are regulated by laws of numbers. If a doctor says, "take two tablets only", you don't dare to take ten. That transaction you completed was made possible to a large extent by

mathematics. The computer game you play, the cloth you wear and those earphones you use are all products of mathematics.

Having established this, how is Mathematics like? Well, it's fun!

You just have to make it fun. Look at the numbers as a part of a puzzle that needs to be cracked. Look at them as two ends of a coin that are related closely upon ponder but without understanding leaves the onlooker in wonder. When you imagine the numbers like homeless floating objects while calculating, floating the whole time just so they'll land at their home when you arrive at your final answer, mathematics is sure to be fun. When you see mathematics as a juggle between numbers and formulas, mathematics is sure to be fun. When you picture mathematics as a dance routine, the music being the formulas and laws such that a different music brings about a different dance routine, mathematics is sure to be fun! When you picture you being in the moment, personifying the problem, explaining the problem and thereafter, put it on paper, mathematics is sure to be fun!

So, can mathematics be easy? Yes!

Like it is said above, just think of it as your dance routine. Think of it as something you can tap your feet and move your body to. A step to failure in mathematics is seeing it as a monster, a hydraulic headed monster that doesn't give himself away no matter how hard you try to tame her. This alone will instill fear in the mind. And mathematics isn't something to be scared of! It's just numbers!

What are the steps, practical steps to follow that'll almost guarantee success in mathematics? Or rather what is it that needs to be done to be a success in the field of mathematics?

The answer to this is what this book is about. It seeks to explain in detail the step-by-step approach to excelling in mathematics, telling what it is that is needed to be done along the line and what isn't. It will come in handy for students who are finding mathematics puzzling and for teachers who have students that find mathematics mystifying. To Excel in Mathematics, all you have to do is to **keep reading**. Pay attention in class, it is normal, but read this! Read this and all those figures floating in your head will come down. Read this and fall in love, with mathematics!

Practical Steps to Excel in Mathematics

Mathematics being a cyclic sequence of using processes and formulas to arrive at an answer requires a little bit of extra energy and focus when compared to other fields. It requires **a steady head**, **a clean mind**, and **a strong commitment** or desire to see the end of a mathematical problem. It would be deceiving to say that mathematics is loved by all. Sadly, not everyone is impressed or drawn to the exercise of fixing numbers in letters and letters in formulas.

To excel in mathematics, there is a need for a student to design practical steps and aid materials that'll help their sojourn to be successful. **Passion** for a thing **cannot be complete** except the executor of that thing sees a **tangible value** in what they are doing. Hence, the first thing to do is to understand the importance it holds and the amount of influence it yields in our daily life. There is a number attached to everything; either as a label or as a count. Understanding this will reinvigorate the student to put in more efforts because they understand the importance of what they've learned. This will help underpin an "**it's worth it**" in the mind of the student when things such as stress start to take its toll. This step is a very important one. After this is done, the student should prepare their minds for study. When the mind is in tune with what is expected, nothing comes as a surprise afterward.

Mathematics desires and requires dedication of time and energy. As Albert Einstein once said, "**it's not that I'm smart. It's just that I stay with problems longer**". This is time and dedication being referred to here. Dedication of energy starts with thinking. Thinking critically and pondering.

Again, Albert Einstein once said, "**If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about the solutions.**" Nothing could be more apt. These two are basics, fundamentals when it comes to learning mathematics. Here, in the curated list below are practical steps that'll help a student to excel in mathematics.

Step 1

Before coming into the class, divorce anything or detach yourself of anything that will require your attention in class. Anything that will require your mind to drift away when the lesson is in session should be discarded. A night to the class, pick up your notes and review. Make yourself ready and in character with numbers before going in. Make a mental note of areas that would require extra attention in class. While in class, it is absolutely necessary to pay attention to the magic happening in class. Mathematics is a field that moves

from a stage to the other and most times, these stages are preludes to the next. What this means is that missing a stage is akin to missing the other. This explains why total attention and concentration is needed while the lessons are ongoing. Follow the flow, stage by stage, number by number, formula by formula and become the mathematics itself!

Step 2

Acquaint and familiarize yourself with mathematical terms and expressions. Different fields have words specific and peculiar to their operations and mathematics is no different. Understanding the terms in mathematics will put students at ease. It will aid their understanding and quicken their learning process as they wouldn't need to ask questions that don't hold strong grounds. Acquainting yourself of what is needed makes the class livelier in the sense that there wouldn't be any obstacle to the flow of the class and its progression.

Step 3

Like it was said earlier, you need to *be mentally prepared* before undertaking any learning adventure; mathematics very much inclusive. Another aspect to be very practical about is the aspect of what the mathematics problem needs in terms of resources materials. Everything that'll contribute in one way or the

other to the success of the student shouldn't be toyed with. Calculators, charts, books et al should be provided. For the calculators, it is essential that the students understand what the calculator is meant to do. Simply put, understand the calculator's language. Analyze whatever result it comes out with. An example is when the teacher asks a class to square the negative two. Many students will type in -2*2 which will result to -4. This isn't correct. The real input is (-2)*2 = 4. It is very evident that a wrong input will give the wrong numbers and ultimately damage the entire mathematical process. Students should get as practical with their calculators as possible, fiddle with it and spend time around it to the point where they're conversant with its terrain and are quickly able to spot when the calculator makes a mistake. Mathematics has rules like every other thing. Students should as much as possible, to the highest degree possible, master these laws.

A very easy example is the laws of divisibility where if the sum of a given set of numbers equals a number that is divisible by 3, then that number is divisible by 3. Sounds confusing right? Take the example of 31,212/3. This operation looks a bit long and troubling. Before the operation is set in motion, a student should, first of all, know if the number 31212 is divisible by 3. Per the law quoted above, you add the number of numbers in a given set of numbers, i.e., 3+1+2+1+2= 9. 9 is a number that is divisible by 3. By this, we know that 31,212 is divisible by 3. It is divisible without a remainder.

These laws can be bypassed with the aid of calculators at times but the essence of knowing these laws is to be a real mathematician. It sharpens the brain and keeps a student mathematically aware and conscious. Try to master key mathematical concepts. Master and don't try to memorize. Mastering equips the students with tools for solving similar questions and problems in the future.

Step 4

Do all your homework. It's like an often repeated cliché. Mathematics is a field that needs **constant practice**. It is a field that requires, as it has been stated earlier, **selflessness** and **dedication**. The thought of sitting down every night to do homework might seem or look torturing but if you want to master the art of understanding, interpreting and solving mathematical problems, doing homework is very essential. It is, in fact, totally necessary. Practice in mathematics leads to perfection. Practice opens the brain to the reality of the peculiar nature of a specific question and how the interpretation got from the solving of that problem can or should be applied to other problems with similar patterns. Attempt similar exercises to the one done in class.

Homework is sometimes not given in school. This shouldn't stop the student from doing homework. Assign homework to yourself even if you aren't given from school. Use online mathematics learning aids or textbook or anything you're comfortable with to guide you through your math problems on a weekly or even daily basis.

Step 5

An environment is very influential in our lives. Environment sometimes explains the actions and behaviors of some people. It explains why people act in the way they do. An environment like every other thing on earth can be exploited for good and for what not. A student of mathematics can or should use the environment to their own advantage by creating a tranquil environment that'll aid their learning; an environment that helps them to think and dissipate energy on understanding and solving problems, an environment that is devoid of noise, rancor, and things that draws attention. An environment that'll easily pass for a sanctuary where the student comes to stay to learn, practice and understand mathematics. An environment is subject to the individual's preference. Some students like or even prefer to study with their earpieces blowing out tunes of their favorite music. Some

even play background music while studying as it aids relaxation and helps to smoothen their study. Students should find and understand what works for them, what environment works for them and build on it. While doing that, just make sure you're not too comfortable that you drift into slumber when the music comes on. You're learning. Not resting.

Step 6

Have a clearly defined goal. Define what it is you will like to know at a particular moment. Try to structure your learning to follow this pattern. It can be after one session or any other time frame that best suits the student. Before coming to do homework or an exercise, make a mental representation of what you expect to know at the end of it. Know the number of exercises you'll need to crack before you arrive at a terminus. Have this knack of always wanting to hit a peak using the time available. Use this as a systematic step into mastery of mathematics.

Step 7

The reason why you're called a student is that you come to a place to learn. A place designed for dissemination of knowledge, formally or informally. Bar some very exceptionally gifted people, mathematics as a subject is studied with the aid of a tutor or teacher. The first thing to do when you meet a teacher is to find what you like about him/ her and why you like it. **Students that resent their teachers always have difficulty passing that subject or even understanding its basics.** Students should make efforts to establish a good student-teacher relationship with their teachers. While it is true that not all teachers are nice or rather, it's almost impossible to like every teacher, it's better for the students to find the positives that radiate around the teacher and focus on that. Liking the teacher saves students the stress of all this.

After liking the teacher, the natural thing to be done next is to fight, hard, never to miss a class. Try to attend all the lessons, classes, and tutorials. The reason for this isn't farfetched. What you learn or are to learn is taught in class. If you don't attend class or aren't regular in attendance, what is it that you'll learn? Nothing! So, try hard. Strive hard and don't miss a class!

Step 8

Learning is subjective. It is very much built on the individual peculiarity, accommodating their characteristics and still making enough space for them to have a change of behavior afterward. Different people have different things that work for them while learning. As it has been stated earlier, some learners are very personal with their learning. They go to lengths to create an environment in the image of what they interpret ideal to look like just so that when they come to sit and study, their learning will be smooth with no impediments. Learners should sit and have a firm understanding of what it is that works for them. Learners should consider having a friend in class, an in-house study buddy of a sort. Their kind of relationship should be symbiotic such that both parts of the relationship are gaining. Study buddies are friends/colleagues who join you to study. Have one or two of these buddies help you solidify your stand in your journey to mathematical success. It is no brainier to state that these buddies you choose should be people who are studious and have the same learning objectives as you. That way, both of you can design a study pattern that will bring the best out of your brains. Exploit the possibility of "be-buddying" a person that is good in mathematics. You'll be the one to benefit more in the long run.

Step 9

Mathematics is a field where there are lots of jumps and stutters. It is a field where learners can go wrong after taking the first two steps right. There's is a lot of powered starts and like a deflated balloon, a lazy dive downwards. These things shouldn't deter the learner from learning. Mistakes are meant to be made. What is abnormal is when the mistakes of the same nature and sequence are made repeatedly. One of the methods to excel in mathematics is by identifying where the mistake(s) was made ab initio. Understand why the mistake happened. Critically examine every mistake you've made. Seek solutions to what led to the mistake in the first place and when you do, make a note of what to do to avoid the mistake repeating itself. *Analyze your mistakes as quickly as you make them.* **Understand your mistakes as quickly as you** *correct them.*

Step 10

Mathematics is a field that is somewhat complex. The interlinking numbers and the formulas will at first frighten anyone. This is something that is understandable. However, as time passes by and the learner begins to acquaint himself with the various numbers, it becomes very normal. What looked like magic a while ago now looks like what can be easily munched with so much relish and satisfaction. In the course of acquainting, getting to know the mathematics, one might meet obstacles that come in forms that aren't understood by the learner. The learner is advised to seek help as soon as these obstacles appear. They should seek help as much as they need it. They should seek help from those who are familiar with such obstacles and know how to tackle them. They should seek help as fast as possible as this obstacle if left to grow will metamorphose into something bigger than it was. It is essential that

they know that no one person knows it all. Seeking for help when you need it doesn't diminish or make you less intelligent. In fact, on the contrary, it shows your wisdom; wisdom to recognize when and where help needed can easily diffuse an already growing problem. Students of mathematics should know this. They should ask questions and make sure they are answered. They shouldn't swallow these questions without seeking out answers. It'll be counterproductive as the years roll by.

Step 11

Resource materials for mathematics are everywhere. Thousands of textbooks have been written, manuscripts and published, e-books, PDF and a host of numerous offline and online sources. Having read this book to this point, the learner would've understood that formulas are important in mathematics. The same applies to the terms that are peculiar to it.

How about having your own book? A mathematical reference material where you'll write down formulas and other things that needs time to be understood?

A learner should put this into consideration. Your own book, a personal glossary will do more help than what a textbook or any book will. This is because it came from your hands and what came from your hands can be

easily understood by you. After you've marked out a book to be your glossary, make sure you keep it safe every time.

Step 12

Mathematics is sequential. It starts from the very simple to the simple and moves to the point where the work is more of thinking than working and writing. There are basic things that need to be mastered by a learner before they proceed to the next stage. Basics like the multiplication table, formulas of basic three-dimensional shapes, names of 3-dimensional shapes, types of angles, sums of angles in a triangle, formulas for areas, perimeters, speed, volume, velocity, capacity amongst many other basics.

Algebra is particularly essential as it will help the learner to know how to solve equations, how to plot graphs and a host of other things. It will lay a good foundation for the learner and help their gradual progression from the stage of ease to the stage of mastery. A learner can employ the use of learning aids like charts, cardboards etc. where these things are written. He/ she continuously look and work with it and gets used to it as the day turns. A learner shouldn't bottle answers he/she has to a problem for the fear of failure or public ridicule. This is especially so in a classroom environment. Students are asked questions and some of them, rather than say what it is they feel to be the answer and get corrected when they're wrong, decide to bottle the answer and keep quiet. It doesn't help in any way. A student that makes a mistake and gets corrected won't repeat that mistake. Learners should be actively involved in classroom activity. They should answer and ask questions as quickly as they come.

Another way students can get used to basics in mathematics and even more technical things is when they apply mathematical teachings to real-life situations. Think of mathematics as something that can be easily deconstructed to suit your personal bias. Apply mathematical terms to real life happenings and try to calculate, in places possible, the numbers around it.

Step 13

Mathematics is all about practice, practice, and even more practice. There aren't shortcuts to understanding. A learner must be willing to subject himself/herself to the rigors of constantly practicing an exercise. This is a very easy way of improving in mathematics. Practice what you've learned. Stay in tune with what you've learned in class by doing and practicing exercises in the examples solved in class. Learners should try to cultivate the habit of reading or trying to understand the next lesson even before it happens after reviewing and understanding past tests and examples. When it does eventually happen, they'll be in a better position in class, maybe even better than every other person for the sole reason that they've encountered such questions before. Textbooks for mathematics have a page behind that chronicles, chapter by chapter, exercises by exercises, the answers to questions asked in the textbook.

Avoid, as much as possible, the use of calculators to cross-check answers from equations. It breeds an innate dependency on the presence of answers such that, in a long run, the student starts to seek validation in the presence of already solved equations. In cases where answers are absent, the student suffers from something that can easily be termed a crisis of confidence; a state where the ability to do a given task isn't utilized fully because of doubts in the ability to do the right thing without seeking validation from another.

Step 14

You'll fail in mathematics. That is how it is. You might get to the point where everything looks grey and gloomy and not the usual black and white. You might feel the urge to bring everything down because a problem is proving too hard a nut to crack. This is normal. Don't fall down and make yourself comfortable lying down. Instead, when you fall or when you make these mistakes, correct yourself, and move on. Don't give up. Don't feel that you are

a loser. Tighten all that needs to be tightened and confront it with every might available. No one person made it from the very first attempt. Successes are the result of repeated failure. Failing doesn't in any makes you bad. Instead, it should be seen as a challenge to better the previous score. Moreover, mathematics in itself is a challenge. It's like a puzzle that dangles in the face of the solver, urging, nudging and mocking him/her into coming at it with the best of what they've got. If you pick up the gauntlet and solve the question to correction, it mellows down. The opposite is the case if you give up. Don't allow a momentary loss of confidence and correctness deny you a lifetime of fulfillment in mathematics.

Step 15

Solve math because you want to. It is important that students have an interest in mathematics before they go into the field. This is because mathematics is meant to be enjoyed. It is to be done with so much relish and enjoyment that those who aren't mathematicians will be tempted to hop in the bus just to have a taste of what the ride feels like. Learners of mathematics should solve problems with a smile on their faces. They should try to erase any negative thoughts harbored initially before coming to solve the problem. It'll improve their concentration and very much their efficiency.

Conclusion

Mathematics is a fun field. It nudges the brain into working, trying to decipher the relationship between a number and the next, a letter and the next and a formula with a given situation. Ask those around, mathematics is just like life. I mean, juggling those numbers and trying hard to outwit words and problems in print is something lively.

Like it has been established, we wouldn't be anywhere without mathematics. You wouldn't even be able to read this without mathematics. Due to its sometimes tricky nature, mathematics is sometimes misunderstood by some. This work has put out a step by step, practical approach for excelling in mathematics. It considers what drives every individual and brings out different ways and methods of addressing such drives with the ultimate aim of being a success in mathematics. Going through the above steps is akin to setting an alarm for a to-do list; you can hardly go wrong.

The beauty of mathematics is in the processes as Albert Einstein once said, "Pure mathematics is in its way, a poetry of logical ideas". It starts with a bit of roughness but ends in goodness. Carlos Caleb Colton was spot on when he said, "The study of math, like the Nile, begins in minuteness and but ends in magnificence."

Always remember the words of Einstein.

It's not that I'm smart. It's just that I stay with problems longer

- Albert Einstein

How long will you stay with that math problem?