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Dyscalculia is a learning disorder that affects a person’s ability to understand number-based information and math. People who have dyscalculia struggle with numbers and math because their brains don’t process math-related concepts like the brains of people without this disorder. However, their struggles don’t mean they’re less intelligent or less capable than people who don’t have dyscalculia.The symptoms of this disorder usually appear in childhood, especially when children learn how to do basic math. However, many adults have dyscalculia and don’t know it. People who have dyscalculia often face mental health issues when they have to do math, such as anxiety, depression and other difficult feelings.There’s also a form of dyscalculia that appears later in life. This form, acquired dyscalculia, can happen at any age. This usually happens for other reasons like a medical condition (see more about this under the Causes and Symptoms section below).What is the difference between dyslexia and dyscalculia?Dyslexia and dyscalculia are both learning disorders, but they have key differences. In the most general terms, these two break down as follows:Dyscalculia: This learning disorder affects a person’s ability to do math.Dyslexia: This learning disorder affects a person’s ability to read.While they’re different, the two conditions fall under the same diagnosis, “Specific learning disorder,” in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). It’s also possible for people to have both dyscalculia and dyslexia.Who does dyscalculia affect?Dyscalculia can happen to anyone, but it’s common for it first to draw attention when children are in their first few years of elementary school (between ages 6 and 9).How common is dyscalculia?Dyscalculia is uncommon but widespread. Experts estimate it affects between 3% and 7% of people worldwide.How does dyscalculia affect my brain?People who have dyscalculia are neurodivergent. Neurodiversity is a term that describes how no two people have the same brain, and everyone’s brain forms and develops in a completely unique way. For people with dyscalculia, that means their brain works differently from the brain of someone who doesn’t have disorders or conditions that affect how their brain works.Solving a math problem like “2+2=?” might seem simple, but it takes several different skills — and the areas of the brain that manage them — working together to do it. Some of those include:Visual processing: Your eyes see the entirety of the math problem and send the components back to your brain for processing.Short-term memory: You use your short-term memory to hold onto the specifics of the math problem as you work on it. For example, the number amounts, the symbols and the order in which they appear.Language: You use this part of your brain to translate the symbols in the math problem into what those symbols mean. That’s how you know what the plus sign, equal sign and question mark mean in this context.Long-term memory: You access this kind of memory to remember the process of how to solve a math problem. In this case, your brain identifies that this is an addition problem based on the plus sign and the equals sign.Understanding of quantities and amounts: Your brain translates the symbol “2” into the understanding that it represents a specific amount or quantity. Children usually learn this principle by giving them examples like fruits or animals.Calculation: This process unites all of the above, helping you solve that 2+2=4.For a neurotypical person, the above processes all work as expected. Depending on how severe their case is, people with dyscalculia may struggle with certain parts of the process. It was a typical Monday morning in my calculus class. I was halfway through a lesson on derivatives when I noticed one of my students staring blankly at the board. “What’s a denominator again?” they asked. I froze for a moment. How could I expect them to understand derivatives—one of the most complex topics in calculus—when they weren’t solid on fractions? This was the moment I realized that no amount of creative teaching could overcome one simple truth: if students don’t have a solid foundation in basic math, they won’t succeed in advanced subjects. And I’m not alone in this struggle. Teachers everywhere are facing the same challenge: we’re trying to teach calculus to students who are still trying to master the fundamentals. Teaching calculus without basic math skills is like trying to build a house without a foundation—it just doesn’t work. Before students can even begin to grasp complex concepts like limits, integrals, or derivatives, they need to have a solid understanding of basic arithmetic, algebra, and geometry. Yet, more and more students are coming into advanced classes without these foundational skills. Teachers across the country are noticing the same issue. As one teacher put it: “In every subject, there has to be some foundational knowledge.” Without mastering basic operations—like fractions, percentages, and basic algebra—students simply can’t keep up with higher-level math. It’s not about moving fast; it’s about ensuring students are ready for what’s ahead. In today’s world, where everything can be Googled, memorization often feels outdated. But ask any math teacher, and they’ll tell you that memorization is still key—especially in subjects like calculus. When students don’t have key formulas or multiplication tables memorized, they’re stuck at the most basic step, unable to move forward. Several teachers echoed this sentiment in the comments, with one stating, “Memorization is a valuable skill.” And they’re right. Memorizing core math facts—like the multiplication tables or basic formulas—gives students the quick recall they need to tackle more complex problems. Without this skill, students spend valuable time trying to solve basic equations when they should be focusing on understanding higher-level concepts. When we talk about memory training, we’re not just talking about rote memorization for the sake of it. We’re talking about training the brain to recall and apply information quickly, which is a crucial skill in math. One teacher commented, “Memory training is definitely needed.” This is especially true when students are expected to solve complex calculus problems, where speed and accuracy are essential. Simple classroom exercises—like regular practice quizzes or flashcards—can reinforce these foundational skills. Over time, students can build up their memory “muscles,” allowing them to apply what they’ve learned without hesitation. This is particularly important when students are faced with multi-step problems, where a single gap in knowledge can throw off the entire solution. One of the biggest frustrations for teachers is the growing skill gap between what students are expected to know and what they actually understand. As one teacher expressed in the comments, “This!!!! So much this right now!!!” It’s a common scenario: students are enrolled in calculus classes but still need help with basic algebra or geometry. Teachers feel like they’re stuck reteaching foundational concepts while also trying to move forward with advanced topics. This skill gap isn’t the fault of the students—it’s a systemic issue. Students are often pushed into advanced courses before they’re ready, leading to frustration for both teachers and students. By focusing more on foundational skills early on, we can set students up for success instead of setting them up for struggle. Aunt and nephew do homework together. Women explain kid writes in notebook. Schoolboy studying at home. Family relationships, primary education, childhood It’s no secret that curriculums are packed. Teachers are expected to cover a lot of material in a short amount of time, leaving little room for review or reinforcement. But as one teacher noted, “I need to have my students practice more basic skills.” This need for practice is becoming more and more evident, as students who rush through early math concepts struggle when they hit higher-level math. We need to give students the time to fully master foundational skills before moving them onto more complex topics. This means spending more time on basic math—ensuring students have a strong grasp of concepts like fractions, percentages, and algebraic expressions—before introducing calculus or other advanced subjects. Rushing students through these basics only sets them up for failure later on. Ask any adult what they remember most from school, and they’ll likely mention something they had to memorize. As one teacher said, “The things I remember most from school are the ones I had to memorize.” This shows the long-term value of memorization and foundational learning. The skills students master early on stay with them throughout their academic career—and beyond. When students have a strong foundation in basic math, they’re better equipped to handle more complex problems later on. Not only do these skills support success in higher-level math classes, but they also provide students with the critical thinking and problem-solving abilities they’ll use in everyday life. The solution isn’t just about giving students more time to learn; it’s about adjusting the curriculum to ensure that foundational skills are a priority. Teachers are calling for these adjustments. As one teacher put it, “Been saying this for 20 years. Right on.” We need to shift our focus back to the basics. By spending more time reinforcing essential skills, students can build the confidence and knowledge they need to succeed in more advanced subjects. This doesn’t mean eliminating advanced courses like calculus—it means ensuring that students are ready for them by the time they enroll. A strong foundation is the key to long-term academic success. Teaching calculus to students who haven’t mastered basic math is like trying to teach someone to run before they’ve learned to walk. It’s frustrating for both teachers and students, and it’s a problem that can’t be ignored. By shifting our focus back to foundational skills—through memorization, memory training, and curriculum adjustments—we can help students build the strong foundation they need to succeed. Let’s give our students the tools they need to thrive, both in calculus and in life. After all, every great mathematician started with the basics—and so should our students. Reddit and its partners use cookies and similar technologies to provide you with a better experience. By accepting all cookies, you agree to our use of cookies to deliver and maintain our services and site, improve the quality of Reddit, personalize Reddit content and advertising, and measure the effectiveness of advertising. By rejecting non-essential cookies, Reddit may still use certain cookies to ensure the proper functionality of our platform. For more information, please see our Cookie Notice and our Privacy Policy. Math is one of the most difficult subjects for most people to master. Calculus tends to be one of the most difficult math subjects for many students, whether the students are taking calculus in high school or college. Many reasons can pinpoint why calculus is one of the more difficult math subjects for most people. This isn’t a list of excuses, but this list of why calculus is so hard can help you try to figure out why you’re struggling and what to do about it. Why Is Calculus So Hard? 1. One Of The Highest Levels The first reason why calculus is so hard for so many people is because it’s one of the highest levels of math that most people will take in their studies. It can be viewed as a midpoint for those who are moving on to higher math courses but it still can be difficult for someone good at math. Calculus doesn’t just require a calculator, paper, and pen. It also requires critical thinking skills and understanding the concepts rather than just plugging in a value. 2. Struggled With Earlier Math Calculus is hard for many people because they struggled with earlier math classes. Whether it was basic adding and subtracting or algebra, having difficulties earlier can set a poor foundation for success in calculus. Calculus is a mixture of algebra, trigonometry, geometry, arithmetic, and pre-calculus. Earlier math courses should successfully prepare a student for calculus, especially when introducing the language around calculus. Go back and practice some questions from an algebra or trigonometry workbook to help strengthen your foundation. 3. Not Enough Time Another reason why calculus is so hard is that there’s not enough time to practice. To master calculus or even just get by, students must find time to practice. Just as a soccer player would have to run drills over and over to perfect a technique, students need to go through study guides and practice questions, equations, and graphing repeatedly. Read More: Why Is Organic Chemistry So Hard? (9 Reasons Why)4. Too Much Tech A fourth reason why calculus is so hard is that there’s so much tech involved with it. Earlier math courses helped students get acquainted with calculators that do much of the math for them; however, once they’re in calculus, it can be difficult and even a distraction. Using a calculator can also deter a student from showing their work. If a student doesn’t show their work, even while practicing, it will be hard to go back and study. Showing work is essential to the process of calculus. Take the games off the calculator and start using it appropriately. 5. A Lot Of Material Calculus is also hard because the student is that there’s a lot of material when it comes to calculus. As a prerequisite, students should take pre-calculus to help give them the foundations for calculus. Calculus isn’t just solving equations; there’s logic and other concepts to look at when taking a calculus course. Another problem is that there’s a vast jump from each calculus level, and it’s no wonder students feel like they missed something between levels. 6. If You Don’t Use It, You Lose It Another reason why calculus is so hard is because if you don’t use it, you lose it. Calculus needs to be practiced regularly to succeed. The skill loss can occur from just returning to school after a few years or even during summer break. If a student is going into a higher-level calculus course, they should try to practice a few equations a week to prepare for it. If they’re just returning to school after a few years of not doing math, they should consider a refresher course and utilize their professor’s office hours. 7. Algebra Is Hard The seventh reason that calculus is so hard is that it uses algebra. Algebra is one of the hardest subjects in math for people. Read More: Why Are Books So Expensive? (11 Reasons Why)Whether looking at the variables, finding out what ‘x’ is, or assigning them a value, algebra is hard. Many people will even say “calculus is easy, it’s the algebra that’s hard.” If a student is struggling with calculus because of algebra, they should continue practicing equations and learn to utilize their calculators to help them. 8. Ineffective Teaching Let’s try not to blame others for why something is difficult, but calculus may also be hard for many people because they just don’t have a good teacher or one who has a teaching style that meshes with their mind. Before registering for a calculus course, students should research their professors to see if they are the right one to learn efficiently. If a student can’t research their professors or they don’t have much say in who their instructor will be, they should become comfortable with utilizing online tools, teaching assistants, study groups, and hiring a tutor. 9. It’s Not Your Major Another reason why calculus is so hard is that it’s not your major. Even though calculus is the highest math most people will complete, it’s still required for many majors. Calculus is required whether a student is going to school for business or medicine. Everyone’s mind thinks differently and has different strengths. To overcome this, students can do what they can to try to apply the concepts in calculus they’re learning to their strengths. Some colleges and universities also offer math classes for non-math majors. Different universities will also require a different amount of calculus for the same major. One university might require just calculus I for an economics major, whereas another university can require up to calculus III. 10. Bad Reputation Calculus is also hard for many students because it has a bad reputation for being so hard. Students can hear from former students that calculus is the hardest math they’ll ever take if they’re not a math major. Read More: Why Is College So Stressful? (11 Reasons Why)This precedent will shift the brain to negativity if the student thinks like that. The same can go for learning about calculus professors. Give it a fair chance, and try not to judge an equation by its variables. 11. Mental Blocks The final reason that calculus is so hard is that students have mental blocks. Self-esteem can be a huge determiner of how successful someone is in any course they take. If students go into their calculus class with the idea that they’re bad at math or struggled with calculus II, so calculus III is just going to be that much worse, then it will be harder. Further, calculus isn’t as concrete as most other forms of math. It requires intuition and trust, knowing that a limit doesn’t exist rather than constantly trying to challenge your answer with proofs. There are even numbers that don’t exist in calculus (imaginary numbers)! This could be a severe mental block in calculus. Review old materials and help yourself feel confident. Look at your strengths in math rather than your weaknesses. To learn more, you can also read our posts on why organic chemistry is so hard, why high school is so hard, and why college is so hard. Conclusion Even though you’ve gone through this list and found exactly why calculus is so hard, you shouldn’t use it as an excuse to stop studying calculus. Whether it’s just a road bump in your major and you just need to pass it for your degree, or you need it to go into higher-level math, calculus should just be viewed as a challenge. Reddit and its partners use cookies and similar technologies to provide you with a better experience. By accepting all cookies, you agree to our use of cookies to deliver and maintain our services and site, improve the quality of Reddit, personalize Reddit content and advertising, and measure the effectiveness of advertising. By rejecting non-essential cookies, Reddit may still use certain cookies to ensure the proper functionality of our platform. For more information, please see our Cookie Notice and our Privacy Policy. Calculus is one of the most challenging subjects for college students. It involves understanding derivatives and solving integrals, which can be quite a source of anxiety for students. So why is it so difficult? Let's examine what makes calculus so challenging for most students, identify the common issues they face, and consider how tutors can help with academic support. We'll also include some tips for getting the most out of your college calculus class and how to make studying calculus more manageable. The best Calculus tutors availableLet's goWhat Is Calculus, Why Is It So Important, and Why Is It So Challenging? If hearing calculus has already made you nervous, we'll start by simply explaining what it is. Calculus is the branch of mathematics that studies change over time. It focuses on rates of change (derivatives) and cumulative quantities (integrals). Students will come across calculus in various STEM (science, technology, engineering, and math) programs like physics, engineering, economics, and biology. Understanding calculus is important. It can open doors for a better understanding of the world mathematically. For example, you can use it to predict population growth and analyze physical motion. It's usually a stepping stone for more advanced math courses. Still, it often feels like such a leap from any math you've studied thus far that students can feel overwhelmed. So why do so many students find calculus daunting and why is it so important? Let's have a look at the reasons. Calculus Builds on Previous Math Courses Calculus is a step from all the math you'll have studied. It builds upon core concepts from algebra, trigonometry, and geometry. Calculus requires a solid understanding of these areas of math and many other core mathematical concepts for you to understand it. Any student who struggled in any way with any of these is likely to find calculus challenging. While students might continue to pass their math classes in high school, they'll likely end up with knowledge gaps in their math education. These gaps can be circumvented in certain areas, especially where students can excel in everything else to get a passing grade, but they may be essential components of calculus. Students who have a weak or less-than-perfect understanding of polynomial expressions, quadratic equations, or trigonometric functions can face worse problems later on. Remember that tutors can always help with gaps or lacunae, especially in math and calculus. Make sure that you're up-to-date with the math you studied in high school before starting college calculus. | Photo by Laura Rivera The abstract ideas and concepts featured in a calculus class are also problematic for students. Many of the concepts in calculus are intangible and difficult to visualize. A limit, for example, describes how a function behaves as it approaches a certain value, which provides a new way of abstract thinking for students. Students need to think conceptually and deal with infinitesimal changes, which can be tricky to grasp initially. Then, you need to understand the reasoning behind these abstract concepts, which is more than simply memorizing formulas like you may have done in math classes beforehand. Weak Fundamentals in Math Students who lack strong math fundamentals, particularly in algebra, trigonometry, and pre-calculus, will likely struggle in calculus. For example, students will need a strong foundation and understanding of concepts like logarithms, sine, cosine, and tangent to solve calculus problems. A student who isn't particularly strong in these areas will find calculus particularly difficult. As mentioned earlier, any gaps in your knowledge can lead to problems in later math classes, especially calculus. It's always worthwhile preparing for your calculus class by brushing up on these areas of math. The best Calculus tutors availableLet's goComplex Formulas and Techniques College calculus classes introduce students to various formulas and techniques, including the power, product, and chain rules for derivatives. These formulas include multiple variables and operations, and students typically need help memorizing and applying them correctly at first. Calculus problems often include multiple steps with different mathematical operations. Students need to recognize which method is used in certain problems and know both when and how to use these techniques. Students in college calculus classes may feel overwhelmed by the sheer number of formulas, steps, and rules they need to follow. Be sure to ask for additional help from professors or private calculus tutors for key concepts like Rolle's Theorem, the Mean Value Theorem, and integration techniques. If you thought that using letters for numbers in algebra was unique, just wait until you see the plethora of Greek letters used in calculus. | Photo by Antoine Dautry Time-Intensive Calculus Courses College calculus courses ask a lot of their students. It would be best if you regularly practiced and studied calculus to stay on top of what you'll learn in class. Calculus involves memorization, but you also need to read and understand calculus, regularly referring to your notes from class to internalize the material. Right from your first calculus class, you should review all your notes and study until you've understood everything. Even if your professor starts the course at a manageable pace, getting into this habit is a good idea for when the requirements start ramping up. If you aren't regularly brushing up on your notes from class, it can be very easy to start falling behind. If you have to go back over things you should have studied in earlier classes when your schedule is busier, you'll likely struggle with more classes than just calculus. 12 hoursstudying calculus every week! Over-reliance on Calculators Calculators are helpful, and we're not here to say that you can't ever use them. However, there are a few pitfalls to overusing calculators, especially in a college calculus class. Students who use calculators too much will start struggling to memorize some of the more essential math skills they need for calculus, such as memorizing special angles in trigonometry or recognizing the shapes of curves when graphing. Many professors expect their students to solve problems by hand in a college calculus class without using calculators for basic math functions. Master these skills, and you'll avoid the trap of becoming dependent on your calculator and succeed in your calculus class. Not every math problem needs to be solved with your calculator. Get used to doing problems without it! | Photo by Clayton Robbins Calculus is hugely important because it has many practical applications. You can use calculus to understand and model real-world phenomena. Calculus can be used for population growth, chemical reactions, computer science algorithms, and even video game design. Students interested in a career in engineering, economics, physics, or computer science will quickly realize that calculus isn't an entirely abstract subject; they can use much of what they learn, which can help them when studying it. Engineering is just one of the many areas where calculus can come in handy. | Photo by ThisisEngineering Here are just some of the areas where calculus is best used. Engineering: In civil engineering, differential equations model stress and strain on materials. Integral calculus computes the areas and volumes of the forces acting on structures. Economics: The maximum and minimum values of functions are used in economics to calculate marginal costs and marginal revenue and predict market trends. Physics: Calculus is used to model the motion of objects, and Newton's laws of motion, for example, are based on calculus. Biology and Medicine: Calculus can be used to model population growth, the spread of infectious diseases, the outcome of vaccination campaigns, etc. Computer Science: Computer scientists use calculus to design algorithms, model networks, and solve problems with data and artificial intelligence. Here's a great video showing calculus being applied. Calculus has a lot of useful applications. Learn Calculus with Superprof Don't get us wrong—calculus is a challenging subject. Still, you can master it with the right mindset, work towards internalizing the necessary foundational knowledge, and regularly practice and study. It is normal to feel lost or overwhelmed by abstract concepts, deadlines, and all the new math you must tackle. Luckily for you, there are plenty of incredibly talented and qualified math tutors out there who can help you. On the Superprof website, you can search for tutors for math or even calculus specifically. Beyond calculus, students can also work with tutors to become better students, focusing on organization, study skills, and transferrable skills that will help them in every one of their classes. Finding a tutor is easy. Search for what you want to learn and where you'd like to learn it. There are often plenty of academic tutors in college towns, but you can also learn online from tutors worldwide. Online tutoring is typically cheaper as the tutors don't have travel costs to worry about. A tutor elsewhere, especially in a different time zone, could be useful for students with busy schedules. With many of the tutors on Superprof offering the first session for free, we recommend trying a few tutors before you choose the right one for you and your academic goals. Whether it's brushing up on the math you need for calculus, getting help with calculus itself, or becoming a better student, you'll find the right tutor on Superprof. Search for one today! A lot of students seem to make it through high school and well into college with the idea that school is supposed to be easy, and that having to work hard, or being confused at times, or struggling with some topics means that something has gone wrong. This is nonsense. Struggling with material is a normal part of learning. Indeed, it's an essential part of learning, because everyone eventually hits a point where they struggle, and learning how to deal with is an important skill. Relatedly, you almost certainly don't understand the concepts of calc 1. That's not a criticism; it's basically impossible to fully understand the concepts of calculus 1 when you've just taken it. Learning math is a cyclical process, where you learn concepts, use them as a basis to learn additional concepts, and then return to the old concepts and learn more about them in light of what you now know. I bring this up because one thing you should expect while you learn calc 2 is to have to revisit things you think you were done with and realize new things about them. To answer your second question, we have no information about your chances of working at a university later. No information. Neither the fact that you breezed through calc 1, nor the fact that you're struggling a bit more in calc 2, is a particularly strong indicator, especially since calc BC is very unlike the sort of math professors do. At age 33, I received a bachelor’s degree in Physics. But I wasn’t always good at math… As a matter of fact, I was comically bad at it. In high school, I failed Calculus three times, which led me to believe I just didn’t have the brains for it. If I went back in time and told my younger self that I’d end up obtaining a Bachelor of Arts Degree in Physics with a minor in mathematics – I’d probably think my future self was scamming or smoking something. I finally passed Calculus my fourth time taking it. With hindsight and wisdom, I have a better understanding of why Calculus was hard, and why it’s probably hard for you. Here’s what I learned… You have a poor mindset about calculus If you shudder at the thought of calc, it’s a fear response you likely learned from a bad math class experience a long time ago. Maybe it was the hardest class you took in high school, or worse, you ducked it all together and instead went with an easier course load. You’re not alone either way. An estimated 17% of people in the United States have math trauma.1 This refers to the debilitating difficulty and brain shutdown that many people experience when encountering math. It makes people avoid math and experience feelings of frustration and defeat. I always thought that math skills were genetic… Either you were born with the skill or not. Many people even believe that certain cultures are predisposed to being good at math. This limited mindset is a slippery slope since math courses only get more challenging. Adding and subtracting leads to algebra. Algebra is followed by geometry, trigonometry, and calculus courses. I didn’t see a change until I believed I could learn calculus. I would have failed on my fourth, fifth, and sixth times as well if I hadn’t buckled down and dedicated myself to learning the concepts of calculus. Calculus uses conceptual ideas People struggle with calculus because they don’t grasp the concepts. In short, calculus is the study of infinitesimal changes. The original name is actually “The calculus of infinitesimals.” After taking calculus for the fourth time, a lightbulb went off, because I learned the “why” behind the subject. In a broad sense, calculus is the math we use to measure things that are changing. Other forms of mathematics and arithmetic are straightforward. Calculus deals with more abstract concepts. Before you can comfortably delve into the abstract, you need to master the concepts. Learning and drilling calculus functions build your skill set so that calculus becomes less intimidating. In my post, “How to Learn Calculus (even if you’re bad at math)” I explain core concepts, such as derivatives, integrals, and limits. Whether you’re taking a class or learning from a workbook, commit every function and theorem to memory right away. Functions refer to problems that explore the relationship between two variables. Theorems are operations that prove or disprove statements. Here are some core concepts you’ll want to learn and drill: Rolle’s Theorem Mean Value Theorem Trapezoidal Rule First, Second, and Third Order Derivatives The Squeeze Theorem Antidifferentiation of a Composite Function The Disk Method Explore these concepts with practice problems until you understand them in practice, not just theory. The idea that anyone is predisposed to understanding high-level math is a misconception. You’re only going to internalize these concepts by putting in time on task. Prepare to dedicate at least 12 hours a week to your calculus studies. Newton read, wrote, and studied 18 hours a day, 7 days a week.2 Geniuses are made, not born, so never shy away from the work. Your fundamentals are weak Perhaps the biggest reason that people struggle with calculus is that they haven’t mastered the prerequisites. When I was a pro boxer, it would have been nice to come out the gate throwing combinations like Roy Jones Jr. or exhibiting the footwork of Sugar Ray Robinson. But before that, I had to learn to tuck my chin, “answer the phone” keeping my power hand close to my jaw, and pump out a piston-like jab to measure distance and collect data from my opponent. What you don’t learn early can hurt you later. The same applies to calculus. Before you can jump into differentation and integration to calculate rates of change and complex area and volume equations, you need to master the fundamentals… Algebra. Trigonometry. Geometry. For Algebra, make sure you understand things like: Polynomial expressions – i.e. (x+15)(7x−12) Quadratic equations – $11x^2 + 6x - 1 = 0$ Logarithms – $bx = a \Leftrightarrow \log_b a = x$ Trigonometry skills that are essential to calculus include: An understanding of sine, cosign, and tangent Graphing trigonometric functions Solving for triangular angles Some Geometry skills that you need for calculus include: Computing the area of shapes like rectangles, circles, trapezoids, and triangles Graphic and writing out equations Learning and drawing lines of symmetry Find out what areas you’re weak in and become a sponge figuring it out. Many mathematicians before you have developed systems and methods to make learning easier for them. As mathematician Paul Halmos said, mathematics is not a spectator sport. These are skills that you gain passively or just by listening to someone talk about them. Solve problems and break them down step by step to know the method and reason. Use the Feynman Technique My understanding of calculus really took off when I began using the Feynman Technique. This technique was created by Richard Feynman, a Nobel-winning physicist, and can be used to learn and understand practically anything… On a sheet of paper, write out in plain detail what you’re trying to learn Write point by point each step of the concept like you’re teaching it to someone else Go back and simplify the steps in easy-to-understand language, and use analogies and mnemonic devices to help you commit them to memory Use your newfound understanding to put the concepts to use until you’re fully competent Simply put, learning calculus is a long-term commitment. The reason it’s so hard for many people is that they’re not willing to fully commit. Cramming can get you results in the short term, but mastering calculus or any other skill always involves consistent effort over time.3 Thankfully, we live in a time in which there are solutions for any problem you want to solve. You can master calculus in a more straightforward path than I did, while also getting over your past fears and misconceptions about high-level math. Register for this precalculus course on Udemy to take immediate steps toward learning calculus. From there, the rest is up to you. I was a terrible math student in high school who wrote off mathematics. I eventually overcame my difficulties and went on to earn a B.A. Physics with a minor in math I pieced together the best works on the internet to teach myself Spanish as an adult *I didn’t start boxing until the very old age of 22, yet I went on to win a national championship, get a high-paying amateur sponsorship, and get signed by Roc Nation Sports as a profession. I’ve used this method to progress in mentally and physically demanding domains. While the specifics may differ, I believe that the general methods for learning are the same in all domains. This free e-book breaks down the most important techniques I’ve used for learning. Get the free book now References Source: theievoice.com Algebra is a broad field of mathematics that deals with symbols and rules about how they interact and how you can manipulate them. Having math skills – no matter how basic they are – is of immense importance regardless of one’s career choice and the field of work. Dealing with numbers is something we all do on a daily basis, irrespective of how simple those calculations are. It is very common for students to have troubles with math, especially with algebra. Some people experience anxiety whenever it is even mentioned. They develop severe aversion and they believe that they are unable to properly perform mathematical operations simply because they “suck at algebra”. What are the possible reasons that many of us have struggled with this subject at school? I’m sure there are many, but I would like to address six of them that I believe are more common and relevant. If you were that kid in school who needed help with math, or you still are an adult who has a hard time dealing with algebra, these reasons might be the explanation you have been searching for. If you are looking for solutions, then visit this site for the answers you might need. 1. They lack a solid foundation Source: towardsdatascience.com Gaining a good grasp of the basic principles of algebra is very important for the students. If they fail to do that, and only move on further with the material, understanding more complex concepts of mathematics later on becomes increasingly more difficult. The basis will be weak, shaky and will crumble down under the weight of more complicated theories and stipulations. Here, the role of the teacher is to break down these elementary notions, explain the connections, the interactions, the results, and preferably, the possible applications, so as the students advance through the material, they will build upon that foundation. 2. Dyscalculia Source: biofeedback-neurofeedback-therapy.com Dyscalculia is a form of learning disability in which one has a problem with number-related concepts and as we know, algebra is full of those: formulas, computations, equations… They have trouble understanding numbers, how to work with them, and even learning mathematical facts. They don’t seem to have developed mathematical reasoning, and this doesn’t really improve with practice – they still don’t develop this skill unless they get special attention with regular practice and patience. Even if these students perform very well in classes, math isn’t one of those classes. 3. Bad teachers Source: courant.com Let’s be honest: not every teacher is a good one, and their methods are sometimes insufficient. This can lead to inconsistencies in the students’ learning process and leave many gaps in their knowledge. As those gaps accumulate, linking all the concepts and using them in order to come up with a solution becomes increasingly more challenging. Often, teachers are dismissive of students who have trouble learning, labeling them as “bad at math”, so those students drift even further away and feel even more resentment towards this subject. They get left behind because their teachers are biased and dismiss them from the very beginning. True, not everyone can be a mathematical genius; for some it is much more difficult, and for others, it comes more naturally. However, it is an ability that can certainly be developed and worked on, especially at an early age, so teachers have a tremendous role in guiding and enabling that development. 4. Not doing homework Source: nbcnews.com As we have all heard it before; practice makes it perfect. Even if you excel at algebra, if you are not diligent and you don’t do your homework, you will be missing out on important practice that can enhance your proficiency. This is especially true if you are not particularly talented at algebra; you might be discouraged and frustrated, and therefore, to be tempted to skip doing your homework to save yourself the suffering, but let me assure you that it would be an enormous mistake. By constantly working on math problems, you will be training your mind to generate solutions and think in a certain manner. This will also help you identify your weaknesses are and point towards what kinds of issues you should focus on, as well as what kinds of questions will help you clarify the knowledge you want to conquer. Try your best with the homework, no matter how hard it is for you. If after all your efforts you still fail to finish it, ask your teacher about it, discuss it with your fellow students, or try to find some tutor who can clarify some things for you. 5. Wrong approach to the concept of algebra Source: blog.tabtor.com Many agree that the way that algebra is being taught is not grounded in reality and is very unintuitive and restrictive. Just a bunch of rules one is supposed to follow so that a final result will appear, without gaining a deeper understanding of how these constructs work and how they are managed, or even used for in everyday life. It is wrapped in mystery, plain memorizing of numbers and formulas with no connections to any practical problems. There is a philosophy to it rather just some “magic” which provides us with the solution at the end of the equation. If we manage to overcome this, we will bring math closer to aiding us in our daily challenges. 6. Outdated educational systems Source: linkedin.com It seems like most educational systems have not been updated to suit the needs of the students and help them deal with contemporary arithmetic challenges that have roots in the daily advances. It has been said that “modern problems require modern solutions”, but very often, that is not the case how algebra is taught. Old approaches might be holding students down from learning this subject. Newer tactics are required in order to make the learning process easier and equip them to tackle their modern-day problems. That way, they will be more motivated to overcome the negative feelings towards algebra and stimulate them to immerse themselves deeper in the vast expanses of the world of numbers and symbols that constitutes this area of mathematics. One of the most common questions I get from math students is how hard is calculus? The word itself sounds a bit scary and unfamiliar, so it is natural to have concerns about the level of difficulty! If you are here reading this, the odds are you are a math student that is about to study calculus. My goal is to share everything you need to know about this wonderful math topic so that you know just what you are getting yourself into! As a teacher with many years of high school math teaching experience, I have helped thousands of students understand calculus. This means I have heard many, many different opinions about how hard calculus is. I also have a lot of experience helping students prepare their mathematical mindset so that they can be as successful as possible in their studies of calculus! But, just how hard is calculus really? Well, let’s dig in so that you can find out for yourself! If you ask anyone just how hard is calculus, the odds are you are going to get a different answer depending on who you ask. But why is this? Isn’t math supposed to always have just one right answer? As it turns out, there are a few reasons why people have different opinions on how hard calculus is. Let’s dig into these so you can understand why this question can be hard to answer! Like all math subjects (and non-math subjects!), the difficulty and depth of what you study will vary depending on a few factors. This includes the course and level you are studying at, and where in the world you are studying calculus! It goes without saying that calculus at the high school level will be much less challenging than a college level subject or AP calculus courses. More specifically, a course that focuses on integral calculus or multivariable calculus will be much more demanding than a course focusing solely on differential calculus. Many university or college business programs require students to study business calculus. This is a much lighter course than, say, a course focusing on partial differential equations (sounds scary, right!?). In addition, the calculus subject matter that you study will depend on where you are located in the world. In some locations, the concepts covered in advanced level calculus would be covered in regular calculus courses elsewhere. A course like Calculus II covers material that I have seen some students only begin to explore in college calculus. The variability in what is covered can make it difficult to come up with one single answer that explains just how hard calculus is. Regardless of the calculus course you are studying, or where in the world you are studying it, one thing is for sure: how hard you find calculus will depend heavily on whether or not you have solid foundations! In my experience as a teacher, students who struggle with basic algebra, linear relations, trigonometric functions, and have weak problem-solving skills tend to find calculus one of the most difficult subjects. This is because many foundational concepts of calculus depend heavily on these topics and skills. So take a look at your math experiences as far back as middle school and up to the 10th grade to find clues about your readiness for calculus. If you have weak foundations in math, does this mean that you are doomed to fail calculus? Of course not! There is always something you can do to brush up on your foundations. Consider using Math By The Pixel’s video resources or taking a few online courses to help you fill in any gaps in your understanding! Having said that, foundations aren’t everything! If you have been around Math By The Pixel for a while, you will know that I am a strong believer in using a growth mindset in mathematics. When I was a classroom teacher, I was known for showing my weakest math students how they could improve by changing the way they see challenges. The mindset you have about math, failure, and your own ability to do anything you put your mind to will all impact how hard math is to you as a learner. Have you ever considered what your mathematical mindset is? Take a moment to think about your relationship with math. Do you put in the hard work even when things get tough? Or, do new concepts and complex concepts cause you to shy away from the challenge? Do you give up at the first sign of failure when you don’t receive a passing score? In simple terms, the work ethic you have will determine whether you think calculus truly is the hardest class there is, or just another obstacle that you know you are capable of conquering. In general, many of my students have found calculus to be the hardest class they study in their high school classes. There are some exceptions to this, but many students agree that calculus is a challenge. So just why is calculus so hard? There are a few reasons most students and teachers will agree on. If you are asking why is calculus is so hard, there are a few reasons you could be struggling with the topic. But the most common reason is that you may have gaps in your prerequisite knowledge. As I mentioned above, having solid foundations is essential to find success in any calculus class. To develop a very strong understanding of calculus, students need to understand the topics that it is built off of. In calculus, many of the mathematics topics from middle school are built upon and explored in much more detail. So if students lack a strong background in these areas, it makes sense that they will struggle when it comes to building upon them. For example, applying the first derivative test requires knowledge of factoring trinomials, a concept introduced earlier in studies of algebra. A gap in factoring knowledge would mean that using the first derivative test would be a struggle. Even a relatively simple concept such as rate of change can present a challenge to students who are tasked with extending this understanding to differential calculus and the first principles definition, for example. Gaps in prerequisite knowledge is one of the most common reasons why students struggle with the new material covered in high school calculus. As far as math classes go, calculus provides many opportunities for critical thinking and making connections between new concepts and the real world. Many students are not used to the depth of critical thinking that calculus requires, which can present a challenge. The subject of calculus also requires much more abstract thinking than many math students are accustomed to. The new concepts that are studied in high school calculus are often very abstract and hard to visualize. This can discourage students who are new to this level of thinking. For example, the entire concept of an infinite series is so new and unfamiliar to many students that they struggle to visualize it in any meaningful way. And that is without even considering something complex like the divergence test for series! Calculus is famous for using complicated looking formulas. Take a look at the first principles definition of the derivative for example! There are so many new symbols that students can become quickly overwhelmed. There are also so many rules that make it difficult to know when to apply a specific strategy over another. For example, knowing when to apply the chain rule vs the product rule is a common source of confusion I have seen in my own classes that I have taught. There are also many different ways to arrive at an answer, which only further adds to the confusion. Depending on the type of problem you are solving, you could see a solution that ends up taking up more than a single page! This is actually quite common in integral calculus problems where complex substitutions are required. The sheer length of a solution can be enough to scare off many math students. For me, this is what makes calculus my favorite math subject! Despite calculus being a very applicable branch of mathematics, real-life applications of calculus don’t always feel familiar to students when they first encounter them. Practice problems that involve word problems and real world scenarios are common sources of confusion for many calculus students. A quote from one of my former students summarizes my thoughts about how hard calculus is rather nicely. He said: “for me, calculus was the most difficult math course because it was a major change in the way I thought about math.” This quote is true in every way. Calculus requires you to build upon strong foundations in a new way. It also challenges students to apply more abstract thinking for the first time. And lastly, calculus requires students to persist in the face of challenging new material and more advanced mathematics than anything they have seen before. When I am asked how hard calculus really is, I always tell my students that calculus is a ‘mature’ math subject. This means that you should be comfortable with and aware of your math skills. You should also be able to adjust your work ethic depending on how you are feeling about the new concepts that you are learning. It is not a course that you can usually achieve a passing score in with little effort. If you find that calculus is hard, don’t forget to use the resources you have to help you! I would not have excelled in my senior year without the help of my study groups. Having the support of a good teacher and strong study groups will help you persevere through calculus’ most difficult challenges. Check out this list of the best books to learn calculus for more support, and take some time to review this ultimate guide to calculus word problems. You can also watch the calculus playlist on the Math By The Pixel YouTube channel if you are looking for more in depth instruction. Remember, with the right attitude, you get to control how hard calculus is! Did you find this breakdown of calculus helpful? Share this post with a friend and subscribe to Math By The Pixel on YouTube for more helpful calculus content! A lot of students seem to make it through high school and well into college with the idea that school is supposed to be easy, and that having to work hard, or being confused at times, or struggling with some topics means that something has gone wrong. This is nonsense. Struggling with material is a normal part of learning. Indeed, it's an essential part of learning, because everyone eventually hits a point where they struggle, and learning how to deal with is an important skill. Relatedly, you almost certainly don