

## Mr Diakoff's FAQs

### 1. Why do we have to learn this? When am I going to use this in real life?

These are actually complicated questions, and the answer is different for different people. Let's start with the observation that as a student at a college prep school, you are expected to complete a course of study that will prepare you to be successful in college. It is universally agreed that one of the essential components of that curriculum is math, in particular algebra and geometry. So in the short to medium term, you need to learn math because your college prospects (both in terms of admissions and success once you are in college) depend to some extent upon how well you learn math. This is true even if you do not plan on pursuing a math or science related field of study once you are in college. Colleges tend to look at success in math as an indication of an ability to think clearly and handle complex ideas, which is why math grades and math standardized test scores are looked at closely by college admissions officials (see question #4 for more about this). Of course, if you are going into any field that involves math, it is important to get a solid foundation in high school so that you can handle the rigors of college math.

As for the second question, students can mean this in two different ways (When will I use math in general? or When will I use this particular idea that we are learning today?). In the general sense, of course, it depends on what you will be doing with your life once you are out of school. Some adults use math every day, while many others never use any of the math that they learned in high school (or grade school, for that matter). Again, though, you are at a college prep school, which means that even if you in particular are not going to be using much math as an adult, there is a good chance that someone in your math class will be. As your teacher, I don't know which of you will or will not be using math as an adult, but I do have an obligation to teach math to those who will need to know it later. One other thing to keep in mind is that your interests and aptitudes can develop and change over time. Many people who couldn't imagine doing anything with math or science as adults end up doing work in those fields, so don't be so sure right now that you will never use math later on in life. As for any specific math concept that we are learning on a particular day, I may or may not know of a direct real life application for it. If I do, I will try to explain what that would be; if I don't, I will try to resist the urge to make something up. The book generally does a good job explaining how specific concepts are used. But even if there is no direct application for an idea that we learn, that doesn't mean that the idea is without value; it is still a part of the system (algebra, statistics, etc) as a whole, and those systems have proven to be extremely valuable for countless real world applications.

### 2. What can I do to be successful in this class? Where can I go to get help for math?

There are a few basic things you can do to improve your chances of being successful in this class. First, you should pay attention in class and take good notes. If there is anything (or anyone) that is preventing you from giving your full attention to the class, talk to me about it and we will try to deal with it. Second, you should do all of the homework as it is assigned. In addition to doing the homework, you should study your notes every night and also read the book for extra examples of the problems that we are working on.

If you are having trouble in math, you should take steps immediately to get help before you get too far behind to be able to catch up. For help with the homework in algebra, you can go to the hotmath website for worked out solutions to the odd problems. Don't be afraid to ask questions in class. Students are often fearful to ask questions for a variety of reasons, but if you feel that way, you need to put those feelings aside. Ultimately, you are the one responsible for your success in school, and if you need to ask questions in order to be successful, then you shouldn't hesitate. You should also make time to see me after school for help if necessary, in particular before quizzes and tests. We do have some tutoring available at school; for more information about that, see Mr Spellman. Some students also find it helpful to get an outside tutor for math. I would never tell anyone that they must get a tutor (they can be expensive), but if you do, it would be helpful for your tutor to be in contact with me via email so that we can communicate about what you need to focus on in your sessions with the tutor.

**3. Do you offer any extra credit?**

All of the math teachers (including myself) offer some extra credit for the CAML tests. Besides that, however, I do not offer any other extra credit. The problem with extra credit is that it artificially inflates grades, which has several negative consequences (see question #4 for more on that). I do not believe a student who is getting a C should get a B (or a C+, for that matter) just because she did more work than is required for the class. Your grade in the class is not intended to measure the volume of work that you have done, but rather the quality of work that you have done.

**4. Why are the grades in this class so low? Why don't you just give everyone an A?**

I get asked some variation of this question not only by students, but also parents, counselors, and administrators from time to time. The first thing to consider here is the purpose of grades. Grades serve several functions, but their primary purpose is to indicate how well a student has mastered the content of the class. It is very important that a student's grade is an accurate reflection of her level of mastery. Why? The most immediate reason is that grades are used for recommendation and placement into future math classes. For example, students who get a B or better in algebra 2 are recommended for precalculus. The math department has found that this is a good criterion for determining who will be successful in precalculus. What would happen if my grades were significantly higher across the board? More students would be recommended for precalculus, including many who are not qualified and would not be successful in the class. So what if I inflated the grades but only permitted students with A's to take precalculus? Then I would get many phone calls from parents, complaining that their daughter has a B in algebra 2 but has not been recommended for precalculus. The same is true in statistics as it concerns recommendations for AP statistics. I would not be doing a student any favor by giving her a grade that is too high and setting her up to fail at the next level.

Your math grades are not just used for recommendations at IH, but are also used by colleges to help determine admission. Colleges rely on high school teachers to give accurate grades so that they can make the best choices among the many applications that they get. (Why do colleges care so much about math grades? Math grades in particular give a good indication of a

student's ability to think logically, understand patterns, follow procedures and algorithms, and operate at an abstract conceptual level. These are all skills that are important in any advanced field of study, even those that are not quantitative.) So, if a student has math grades that are inflated, that might contribute to that student getting into a school at which she would not otherwise have been admitted. For many students, this sounds like a good result, but in fact it is a bad result for everyone concerned. For the student, it is not good to be admitted at a school that is too difficult for her. It would be better for her to go to a school at which she can be successful. For the college, it is bad to admit a student who doesn't end up completing her degree, as that spot might have been given to someone who would have. For the parents, it is a bad result for obvious financial reasons. The process of college admission is similar to trying on shoes: the goal for everyone involved is to make sure that the person admitted is a good fit. Is it an accomplishment to buy a pair of shoes that are two sizes too big for your feet? Of course not. And yet so many students, parents, counselors, etc consider it to be a worthwhile goal for a student to be accepted at very rigorous schools that the student is not capable of succeeding at. This is a problem that is bigger than any one class, but as far as it depends on me, I will not contribute to it by giving grades that do not accurately reflect a student's demonstrated level of mastery in my class.

**5. Is your class harder/easier than Ms Trujillo's/Ms Hutson's class?**

This is always a concern for students whenever the same course is being taught by two or more teachers. A few observations: first, my class is almost certainly different than Ms Trujillo's and Ms Hutson's class. Each teacher brings his/her own experience, communication style, ideas about what topics should be emphasized, etc. Having said that, I think it's also true that our classes are probably more similar than classes in other disciplines that are taught by different teachers. From talking with teachers in other subjects at IH, I get the impression that the same class can vary a great deal in terms of content and difficulty level depending on who is teaching it. In algebra, on the other hand, we cover all of the same sections of the book, and give quizzes, tests, and final exams that are very similar. As for whether one teacher is more difficult than another, I would just say that over the years there have been algebra students that have had a better time learning math from Ms Trujillo than me, and other algebra students that have had a better time learning from me than from her. However, I can say with confidence that all of the math teachers at IH are very competent, and that if you apply yourself and do the work, you should be able to learn from any of them. A few other things to keep in mind: first, it is important that you not use your teacher as an excuse for not being successful. Ultimately, your grade and level of mastery in a class is going to depend much more on your effort and ability than on your teacher. Second, in your life, you're going to have many teachers, bosses, supervisors, etc. There may be some of them that you don't feel like you are connecting with very well. But, a big part of life is figuring out what your teacher/boss/supervisor wants, and then figuring out how to give him/her that. If you have a teacher (me or someone else) that you don't like very much, try to treat the situation as an opportunity to practice this valuable life skill.

**6. What do I have to do in order to be recommended for precalculus?**

The requirement to be recommended for precalculus is a B or better for both semesters of algebra 2. Precalculus recommendations are usually made about halfway through second semester, so your first semester grade and your current second semester grade will be used to determine recommendations at that time. If you are not recommended to precalculus initially, you can petition to be admitted into the class. In that case, a determination will usually be made at the end of the semester.

**7. What do you learn in statistics and probability?**

Statistics is the study of data: how to collect, organize, and interpret data from the world around us. Probability is the study of random behavior and the rules that govern that behavior. Topics covered in statistics and probability include how to take a poll that will accurately reflect a population (and why presidential polls are tough to get right), how to design experiments that will allow us to compare different treatments (Advil vs Tylenol, etc), different ways to represent data graphically (especially using our TI-83 calculators), different distributions that are important in statistics (how are things like height, shoe size, and intelligence distributed in a population?), correlation (what is the relationship between SAT scores and performance in college?), probability rules (how do dice and roulette wheels behave in the long run?), and statistical inference (what can we determine about a population based upon data that we gather from a sample?).

**8. What do you learn in game theory?**

Game theory is the study of the mathematics behind conflict and cooperation situations. There are many situations in the course of human (and animal) interaction in which two or more individuals make decisions that have consequences (rewards or penalties) for the decision makers. Examples include military strategy (how many and what kind of forces to commit to a certain area of the battlefield), business strategy (how much to charge for a certain product based upon what a competitor might do), biology (how aggressive and passive animals in a population interact with each other), arms races (how do nations decide how many resources to commit to building aggressive and defensive weapons), card games like poker (how much (or whether) to bet based upon the available information), and many others. What all of these situations have in common is that the players (decision makers) in the system can attempt to find a strategy that will be effective based upon what they expect their opponent to do. In game theory we will explore how to analyze situations through the prism of game theory and try to figure out which strategies would work best for the players involved.

**9. What do you learn in discrete math topics?**

DMT is a collection of practical mathematical applications that don't fit into a typical algebra/geometry class. Topics covered include voting theory (how to decide the winner of an election where voters rank the candidates first through last; how to determine the power of individuals when some control more votes than others), fair division (how to fairly divide up something like an island among several people, how to divide up an inheritance fairly, how to

fairly apportion members to a body like the House of Representatives), circuits and paths (how the mail carrier can find the most efficient way to travel a route, how to travel to 5 cities and return home covering the least distance, how to link up cities in a phone network efficiently), scheduling problems (how to organize a big job (like building a house) into many small jobs (paint, put up walls, etc) and schedule those jobs efficiently), and fractal patterns (self-replicating patterns like snowflakes).

**10. Why do you like math? What is your favorite type of math?**

Math was always my favorite subject in school. I like the goal-oriented approach of mathematics: you start with a problem, you figure out a way to solve the problem, and you get a solution. Of course, not all types of math are like this; some problems in statistics and game theory do not have exact answers, and that is interesting too (in a different way). I also like the way that math can clarify and provide sometimes surprising insights into situations (voting theory math in DMT is a good example of this). As for my favorite type of math, I am particularly interested in the mathematics of gambling, which includes elements from game theory, statistics, and probability.