MATH?
HELP!

How to find interactive, online math in
Algebra, Geometry & Trigonometry
for TEENS & ADULTS

By Craig Hane, Ph.D.

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Dr. Del's Photo by: Expressions by Lisa Gupton

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Preface

Parents of a child who is struggling with middle or high school level mathematics. This book is for you.

Adults who missed out on math and now realize how valuable it would be for them and who want to learn it on their own. This book is for you.

In this book I pose and answer ten questions. Two are questions that a parent or adult might ask. Eight are questions for the student.

As an adult or parent you need to be sure the student understands the answers to the eight student questions. Obviously, you need to understand them also.

Then as a parent or adult you need to take appropriate actions which I explain in some detail. If you are rich and money is no object then you might choose one set of actions.

However, if time and money are constrained, I tell you about a new program I have developed that will solve your problem in a very affordable way, often better than much more expensive alternatives.

You will fully understand it when you understand the ten questions and their answers.

My goal is for your child, or you, to become what I call "matherate", which is the counterpart of becoming literate, only in mathematics.

Mathematics is becoming more and more valuable and relevant in our modern technology driven society and economy.

Becoming matherate will open up many doors of opportunity in a plethora of fields. It will improve your life on many levels.

If you are a homeschool parent/teacher I wrote another book for you that I recommend. You may see it at: www.CraigHane.com/getgreatmathed/

If you are a high school teacher or administrator or a mathematics educator I wrote another book for you which discusses our math education system in depth and would be better for you. You may see it at: www.TriadMathInc.com/tmpdf/

Chapter 1. Why is my child struggling with math?

Your child is the "victim" of a math education system that is failing many students through no fault of their own, or their teacher's either.

To understand this you need to know how almost all students need to be taught math for it to be successful for them.

1. Self-Pacing. They must be taught at a pace they can absorb the new material and review past material.
2. Proper content. It is vital that a student be ready for a new topic. Learning math is like climbing a ladder. Do not try to skip rungs. Also, the content should be relevant to the student's broader interests in life.
3. Interactivity. The student must learn math by "doing math". Math is like any sport. You must practice and get continual feedback. You must accept that mistakes are natural and you learn from them. Mistakes are actually a good sign you are practicing and learning and should be "celebrated" as a sign of progress.
4. Keeping Score. The student must be given continual evaluation and praise for their progress. However, a student is striving for his or her own progress, and NOT competing with other students. Focus on the student's achievements and progress.
5. Empathy and humor. It is vital that the student learn to enjoy "doing math". Laugh at mistakes as a normal thing that happens to us all. Receive continual praise for both effort and success.

What all of this means is that it is very difficult to teach math in a batch environment like a typical classroom. No teacher can address all of these criteria for each student due to logistical and time constraints.

A student needs to be "tutored" one-on-one by a teacher who really understands math. Of course, this is very expensive and impossible for most students utilizing real live tutors.

As a result, in our current schools, both private and public, with their batch mode of teaching, many students "fail" because the students are not receiving the type of training they need for success.

Fortunately, now thanks to modern technology, this is correctable as you will learn in this book.

To more fully understand these things you might want to visit:

www.CraigHane.com/spike

Chapter 2. What can I do about it for my child?

First, understand the problem, which hopefully you do after reading Chapter 1. It is not your child's fault due to laziness or stupidity. And, it's not really their teacher's fault either. Both are victims of a failed math education system.

Second, communicate with your student and answer the questions in Part 2 which are aimed at a student. Talk it over. Be sure your child understands all of the points made in Part 2.

Third, find your child a solution. It can be a live tutor if you can afford it. However, let me warn you that if the tutor is just trying to help your child through the standard math curriculum taught in our schools today, this will be a very rough row to hoe.

The standard curriculum is simply awful for most students. It often teaches very difficult concepts that have no relationship to anything else your child cares about or would ever use. It is difficult to be motivated to study something you see no value or benefit in.

However, if your tutor can teach the content I suggest to you in this book, then it should go quite well. This content is a great way to lay a foundation in math for various future paths.

For students who are not going on to college they will be prepared to go into various non-professional technical careers.

For college bound students, they will be prepared to continue their math studies for additional math topics needed for the STEM subjects.

So what if you can't afford a live tutor, or find one who is really good?

Enroll you child in the Dr. Del Practical Math Foundation online program. It meets all of the criteria laid out in Chapter 1.

It utilizes modern technology to achieve this, plus the proper content as explained in the Appendices A - D.

And, it is very affordable.   It will cost you only a very small fraction of what a live tutor will cost, and in many ways it is much better for reasons you will learn.

For more information on the Practical Math Foundation, go to:
www.CraigHane.com/pmf/

Chapter 3. What's Math all about?

Numbers and Geometry is what math is all about at its most basic practical level. These are the components of understanding most practical problems that arise in many technologies.

Numbers are used to count things and measure things. You probably understand numbers, and in particular, the decimal place system.

Arithmetic is what is used to perform number operations like addition, +, and multiplication, x, and more. In this modern age, calculators or computers are used to perform most arithmetic. That is the first thing you should learn.

The old manual processes and techniques are fine for learning to understand the meaning of the operations, but not to do the actual calculations in practice. You will need to master the power tools of math just as you would master the power tools of carpentry if you were going to learn carpentry.

Geometry is all about things like lines, angles, triangles, circles, etc. You probably know quite a bit about these things too. Often you will use numbers to describe the dimensions of geometric figures as well as areas and volumes.

Algebra is a tool that is used to solve problems involving both numbers and geometry. Algebra is very easy if you approach it properly. In the beginning you will be able to learn all of the algebra you need for practical math in just a few hours of your time, if it is presented properly and you practice and "have fun" with it. Basic practical algebra really is quite easy.

Trigonometry is an extension of algebra and geometry that enables you to solve certain problems involving triangles. Triangles, three sided figures, are used throughout industry and the practical world.

It can be very convenient to solve problems involving triangles, but unfortunately, the things you learn in algebra and geometry are sometimes not enough. Fortunately, utilizing a modern calculator and trig, as it's called, you can solve virtually any triangle problem, and it is very easy and fun too.

Practical Math is the foundation of most modern technologies. It is very useful and necessary in many technical subjects. If you are interested in going into any type of technical job or career today you will find Practical Math invaluable.

By the way, there are many unfilled technical jobs due to lack of qualified people, and these jobs can pay quite a lot and be very satisfying.

Believe it or not, you can learn all of the Practical Math you will need in about fifty hours of your time, spread over two or three months.

And, then you will know more math than most adults do today. You will become the "go to" person in many job situations.

If you decide to go on further and study science and engineering, then you will need more math. But, the Practical Math Foundation will be a great foundation for further math studies where you will learn the subjects of Algebra, Geometry, and Trigonometry at a deeper lever, and also new subjects like Calculus.

You are going to be amazed at how easy and fun learning practical math will be. And, it will open up all types of other opportunities to learn other technical subjects.

For more information on the Practical Math Foundation, go to:
www.CraigHane.com/pmf/

Chapter 4. Why is Math hard for Me?

Most likely math is hard for you because it has not been taught properly for you. This is a common problem for many students.

It's probably not your teacher's fault either. It's a problem with our current math education system.

Fortunately, it is correctable. You most likely will find math very easy and enjoyable once it is presented properly to you. That is the experience of many adults who missed out on math in school, and then learned it later in life.

Here are the things you need to know about how math should be taught to you. It should have the following ingredients:

1. Self-Pacing. Students must be taught at a pace they can absorb the new material and review past material. Each student is unique and his or her pace will vary from time to time and topic to topic.
2. Proper content. It is vital that a student be ready for a new topic. Learning math is like climbing a ladder. Do not try to skip rungs. Also, the content should be relevant to the student's broader interests in life.
3. Interactivity. The student must learn math by "doing math". Math is like any sport. You must practice and get continual feedback. You must accept that mistakes are natural and you learn from them. Mistakes are actually a good sign you are practicing and learning and should be "celebrated" as a sign of progress.
4. Keeping Score. The student should be given continual evaluation and praise for his or her progress. However, a student is striving for his or her own progress, and NOT competing with other students. Focus on the student's achievements and progress.
5. Empathy and humor. It is vital that the student learn to enjoy "doing math". Laugh at mistakes as a normal thing that happens to us all. Receive continual praise for both effort and success.

As you will soon learn there is a program today that will meet these criteria and you will soon be able to learn math easily, and have some fun to boot.

So, then math will not be hard for you after all.

To learn more about the five essential ingredients to a successful math education, go to: www.CraigHane.com/SPIKE

Chapter 5. Is it MY fault or am I "stupid"?

No and No.

You are not "stupid". Most of us struggle with math at some time or other. This is normal, but if we don't realize it we can feel stupid.

I have a Ph.D., or "doctorate", in math and subsequently taught math at all levels in high school, industry, and university, and I can tell you that I often struggled and sometimes "felt stupid".

Most things are very difficult until you learn them, and then they seem very easy. This applies to many things in life and is also true of math.

Just think about a small child struggling to talk or walk. They make lots of mistakes and fall down a lot. Are they stupid? No, of course not.   That is what learning any new skill is like.

Math is just like most other things. You learn it slowly at first and then it seems to get easier, and faster, as you go along.

What happens to many people is that they struggle at some point in their life with math and then are made to feel stupid because they are struggling.   That would be like feeling stupid because it took you a while to learn to walk, or talk.

This is especially true in a typical classroom where some students are naturally faster and more advanced in their learning than others. The slower or less advanced students should not be compared to the other students.

But, often the "fast" students are praised by the teacher, and the slower students are made to feel inferior or stupid, even if that is not the intent of the teacher.   Of course, students often make their fellow students feel bad too.

If you were struggling to learn to walk when you were 13 months old and another child was walking quite well and had learned before you, would that mean you were somehow retarded? Of course not. The same applies to learning math.

I can assure you that virtually anyone can learn math if it is taught properly to them. <u>You are not an exception</u>. If you can play games or engage in other complex activities, then you can learn math.

If you have developed a math phobia or dislike, be assured it will disappear as soon as you begin to learn math and realize how easy it really is.

That is why we will start by showing you how to use a calculator which is a modern power tool used in math problem solving. It takes away most of the drudgery of arithmetic. And, it is easy, and subsequently, fun.

Most students of any age begin to have fun when they begin to master the calculator. After all, it is an amazing power tool. Our ancestors would have considered it "magic".

Today you can solve a problem in less than a minute with the TI 30XA calculator that would have taken a highly skilled well trained ancestor over an hour to solve.

Does that make you a genius? No, not at all. Just a beneficiary of our modern technologies. And, it only gets better as your learn to use even more powerful tools.

I can assure you that you will be using tools five years from now that do not even exist today. But, a knowledge of practical math will still be invaluable.

Chapter 6. How can I understand Math?

Very easily. Just begin by learning Practical Math.

Practical Math is the math you will find useful in almost any technical situation you get into.

How long is something? What is the area? What is the volume? How many do I need? What is the weight? These are the questions of practical math.

You will need "tutoring" that is interactive, self-paced, with a lot exercises and with a lot of feedback.

Learning math is like climbing a ladder. It is easy if you take it one rung at a time and do not skip rungs. So, you will be given lessons in a sequential way with lots of exercises and then quizzes to prove you have mastered the topic.

You are going to probably be surprised how easy it is.

Math is like any sport. You must learn by doing, not just watching. In fact, you will mostly learn by doing it. A topic will be explained with examples, and then you will be given a bunch of exercises to do yourself. You just practice until they are easy.

Some topics will be easier for you than others. That's normal. But, you will soon learn that if you watch the examples and explanations over and over you will soon be able to do the exercises.

Sometimes you will get it fast, sometimes slow. It doesn't matter.

You are not in competition with anyone else. You will learn at your own pace. If you find a lesson confusing, step away and then return later. You will often be amazed at how easy it seems the second or third or fourth time you revisit it.

Never be discouraged by a mistake. You will make a lot of mistakes. That is normal. Whenever you are learning a new skill you make a lot of mistakes. We all do.

Mistakes mean you are practicing, and that is good. Just laugh at your mistakes and think of them as progress in your learning.

When you think you understand and have mastered a topic, take the quiz to prove to yourself, and anyone else who cares, that you got it.

Later if you do forget something go back and review it.

Most students find math a lot of fun once they begin to have success. Learning math is a lot like learning any game or sport. A bit slow and frustrating in the beginning, and then it gets easier and easier, and more and more fun.

Chapter 7. Can Math be Easy for me?

Absolutely.

Is climbing a ladder with no missing rungs easy?

Is learning a new game easy if you learn it in stages?

Math is no different than a game or sport. It will be easy to learn if you approach it properly and do not skip any rungs.

Now, that is a problem today in many school situations. A student misses some material, or rungs of the ladder, and then finds it very difficult to understand the new material.

How hard would it be to climb from rung 7 on a ladder to rung 10? Difficult, but maybe possible. How about rung 7 to rung 13? Impossible for most of us.

The way math is often taught today in the classroom many students find themselves trying to go from rung 7 to rung 10, and this is quite difficult if not impossible for them

You must find a math program which does not do this.

I can assure you that many adults who disliked math and had a very bad experience with it in school found they could learn practical math and were amazed at how easy it was.

I might add some of them were pretty mad when they realized they had been the victims of the system.

Don't be a victim too.

Find a program that meets the requirements of a successful math program.

For more information on Dr. Del's program, go to: www.CraigHane.com/pmf/

Chapter 8. Can Math be Fun for me?

Is a new game or sport fun?

Probably not too much in the beginning, especially if you are playing against more experienced players.

You know you will have to "pay your dues" in the beginning. You will be clumsy and make a lot of mistakes. But, you know this is "par for the course" and will pay off once you get to a decent skill level.

Math is no different than any game or sport.

You may find it a little clumsy at first and you will make a lot of mistakes. That is why we start out by teaching you to use a calculator. It is easy, quick to learn, and can soon become fun.

Learning to use a calculator is like learning to use power tools for carpentry or cooking. The tools will make the practice of either much easier. So it is for the calculator and math.

Then, you will learn to climb the ladder of math knowledge and skills one rung at a time.

You will learn the basic techniques of pre-algebra, algebra, and geometry in about forty hours of your time delivered in short study sessions spread over two or three months.

Then, you can add an extension of algebra and geometry called trigonometry in a few hours more. This is almost unbelievable when you consider how it is taught in school.

When you are done with this Practical Math Foundation you will find you can solve most practical math problems that come up in life and many technical fields, quickly and easily. And, it will be fun.

For example, you will be able to find the area of a triangle whose sides measure 12.4 inches, 17.9 inches, and 26.8 inches. The answer is given at the end of Chapter 10.

Many adults, even some teachers, would find this very difficult or impossible. You will be able to do it easily in less than a minute after you "climb the ladder" in the Practical Math Foundation program.

There are many more such examples.

Any "sport" is fun when you can do it easily. Math is no exception.

Chapter 9. What good will Math do ME?

Depends on you and your future plans and desires of course, but it will certainly open up many doors to various possibilities.

You might ask yourself what types of jobs and projects you might wish to tackle in the future, even though that is really unknowable for most of us.

Math is the foundation of almost any technical field you can imagine. Knowing Practical Math will make your entry into these fields possible.

Math will be like an "Open Sesame" to future projects for you.

Math may help you on all kinds of projects you might undertake. I learned practical math when I was young and then used it in all sorts of projects like construction, drag racing, landscaping, electronics, hydraulics, electrical, mechanical, rigging, business, and these are just some of the areas I applied math to.

All my life many friends and family have come to me with problems they had that required math to solve. And, mostly they just involved practical math.

Now it is true that I studied theoretical math too. And, have found it quite useful for some advanced science studies like quantum theory, vibration analysis, and electronics circuit design, again to name a few. Also, I admit that I find math at all levels the most fun "game" I have ever played. And, it also helps in actual games too.

Truth be told, no one can ever really predict their future. But, rarely have I engaged in any adventure where some math didn't help.

For one thing, you will develop what I call the "math habit" for solving problems. This involves asking what result you desire, what facts and tools you have to use, and then what processes can get you the desired results. This is how math works. The math habit has served me well in all sorts of situations. It will serve you well too.

Our economy and environment is rapidly evolving and changing. When I was a young man I had no idea of how things would evolve. But as the world changed, I found math helpful, sometimes indispensible, in all sorts of new situations.

Math is universal in value, just like language. What good is it for you to learn language and how to read and write? What will you use if for? Probably in a million ways you can't anticipate now or know now. Well, math is the same.

If you become "matherate" that will serve you well just as becoming "literate" will serve you well. In fact, it will be more and more important in the future.

On top of that, I believe you will find math very satisfying just like any complex skill you develop. I find it "fun" just like I find certain games or puzzles fun, but more so. Many other people I know do to.

The problem most people have is they never get "over the hump" and learn enough math to be of real value. Like I told you earlier, it probably isn't their fault. They are victims of a very bad math education system. Don't let yourself become a victim too.

I can virtually assure you mastering practical math knowledge and skills will be one of the most valuable "assets" you will ever acquire.   Not bad for 50 or 60 hours of your time.

For more information on the Practical Math Foundation, go to:
www.CraigHane.com/pmf/

Chapter 10. So, what should You do, right now?

Learn Practical Math as soon as possible. Commit yourself to doing this. It will take you anywhere from 50 to 100 study sessions, each 30 to 60 minutes, spread over a few months.

Talk to your parents if necessary to get permission, and the money necessary. Make a commitment to yourself and to them.

If you are an adult, no excuses. Just do it without delay.

For more information on the Practical Math Foundation, go to: www.CraigHane.com/pmf/

If you cannot raise the funds, then contact me and I will help you find a "scholarship" to do this. Just email me at craig@hane.com. Put "Scholarship for Math" in the Subject line.

You will need to obtain a TI 30XA calculator which costs about $10 U.S. in 2012. You will need access to the Internet. But, this can be in a local library if you don't have one otherwise.

This Practical Math Foundation program will be something you will do outside of school, like any other hobby you might have. It may help you some with some standard math course you are taking in school, but it will not substitute for it.

Later on, if you wish to proceed beyond practical math I will tell you how you can do so. There is a wonderful book called *Pre-Calculus Math in a Nutshell, Algebra, Geometry, and Trigonometry* by Dr. George Simmons I will recommend if you want to go beyond practical math.

But, first things first. Build your foundation.

Learn Practical Math and you will be ahead of most other adults in the U.S. today. The rewards will follow. Have fun.

"Never be Satisfied, Always be Content" is my Motto.

Answer: 92.7 square inches

Appendix A. Calculator and Pre-Algebra Syllabus from Dr. Del's Practical Math Foundation

Using a Scientific Calculator: Introduction plus 16 lessons
- CI: Introduction (5 Min.)
- C1: Basic Operations (6 Min.)
- C2: Real Numbers (6 Min.)
- C3: Negative Numbers (6 Min.)
- C4: Multiplication, Division and Percentage (7 Min.)
- C5: Percentage (3 Min.)
- C6: Using Memory (7 Min.)
- C7: Squares (3 Min.)
- C8: Square Roots (5 Min.)
- C9: Reciprocals (6 Min.)
- C10: Fractions (6 Min.)
- C11: Proper & Improper Fractions (6 Min.)
- C12: Converting Fractions to Decimals (6 Min.)
- C13: Trigonometry Operations (6 Min.)
- C14: Using Sine (6 Min.)
- C15: Using Cosine (6 Min.)
- C16: Using Tangent (6 Min.)

Pre-Algebra: Introduction plus 10 lessons:
- PI: Introduction (3 Min.)
- P1: Real Numbers, Integers & Rationals (5 Min.)
- P2: The Number Line & Negative Numbers (8 Min.)
- P3: Rules of Addition (10 Min.)
- P4: Rules of Multiplication (11 Min.)
- P5: Distributive Law (7 Min.)
- P6: Fractions (6 Min.)
- P7: Squares (5 Min.)
- P8: Square Roots (7 Min.)
- P9: Reciprocals (5 Min.)
- P10: Exponents (15 Min.)

Appendix B. Algebra Syllabus from Dr. Del's Practical Math Foundation

Algebra: Introduction plus 10 lessons
- AI: Introduction (7 Min.)
- A1: Four Ways to Solve an Algebra Equation (5 Min.)
- A2: The Rule of Algebra (8 Min.)
- A3: X + A = B (9 Min.)
- A4: AX = B (6 Min.)
- A5: AX + B = CS + D (11 Min.)
- A6: A/X = B/C (8 Min.)
- A7: X squared = A (5 Min.)
- A8: Square Root of X = A (5 Min.)
- A9: SIN X = A (11 Min.)
- A10: COS X = A (8 Min.)

Appendix C. Geometry Syllabus from Dr. Del's Practical Math Foundation

Geometry: 19 lessons
- G1: What is Geometry? (9 Min.)
- G2: Straight Lines and Angles (8 Min.)
- G3: Parallel Lines (19 Min.)
- G4: Triangle Basics and the Sum of Angles (11 Min.)
- G5: Right Triangles and the Pythagorean Theorem (12 Min.)
- G6: Similar Triangles (12 Min.)
- G7: Quadrilaterals, Polygons and Perimeters (14 Min.)
- G8: Area of Triangles and Rectangles (18 Min.)
- G9: Formulas for Polygons (11 Min.)
- G10: Circles and Circumferences (13 Min.)
- G11: Circles and Areas (13 Min.)
- G12: Circles and Special Properties (10 Min.)
- G13: Surface Areas of Blocks and Cylinders (9 Min.)
- G14: Surface Areas of Cones (7 Min.)
- G15: Volumes of Blocks and Cylinders (7 Min.)
- G16: Volumes of Cones (7 Min.)
- G17: Surface Areas of Spheres and Balls (7 Min.)
- G18: Archimedes Tombstone, Sphere Area and Volume (12 Min.)
- G19: When Geometry is not enough for Triangles (7 Min.)

Appendix D. Trigonometry Syllabus from Dr. Del's Practical Math Foundation

Trigonometry: Introduction plus 8 lessons
- TI: Introduction (6Min.)
- T1: Trigonometry Functions (16 Min.)
- T2: Sines (20 Min.)
- T3: Cosines (18 Min.)
- T4: Tangents (9 Min.)
- T5: Warning about SIN-1 (9 Min.)
- T6: Law of Sines (12 Min.)
- T7: Law of Cosines and the generalized Pythagorean Theorem (14 Min.)
- T8: Trigonometry beyond Practical Math (5 Min.)

Questions or Comments for the Author?

Email Craig: craig@hane.com

Enroll in Dr. Del's Practical Math Foundation.

Visit: www.CraigHane.com/pmf

About The Author

Delbert Craig Hane, Ph.D., aka Dr. Del, has taught mathematics at virtually all levels from basic industrial technical math to the most advanced math required by engineers, scientists and theoretical mathematicians.

Dr. Hane graduated from Oberlin College with a BA in Math and English. He earned his Ph.D. in Algebraic Number Theory from Indiana University.

Dr. Hane, or Dr. Del as his students call him, has tutored, taught high school math, and instructed college level calculus, differential equations and logic, advanced theory math, at Indiana State University and Rose Hulman Institute.

"I love to teach math, both theoretical and practical. However, for most people the proper way to begin is with practical math. Theory should only come later, if ever, for many people."

Throughout his teaching career, Dr. Del discovered that the key to success was a proper grounding in practical math. "This is where I really learned how poorly prepared many of our adult workers are in math. I also learned that almost all of these people are capable of learning practical math when it is presented appropriately, and it greatly empowers them to do so much better in their jobs".

Today, thanks to modern technologies, Dr. Del is "tutoring" math to a diverse audience of students ranging from young middle and high school students to adults in a unique revolutionary Ten Tier Mathematics program that starts with a Practical Math Foundation. This program stands in stark contrast to today's standard math curriculum that we all know is failing so many of our students.

Dr. Hane has explained all of this comprehensively in his book, *Teaching Math*, which is aimed at those who care about our modern math curriculum and what is happening in our middle and high schools.

To view Dr. Hane's Vita, please visit: www.CraigHane.com/vita-of-craig-hane-ph-d/