

How and Why . . .

Home School Math

Can be Vastly

Superior

to

Public School Math



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Preface

If you are interested in mathematics education, then this book is for you!

I have been involved in math education at all levels for 75 years as of 2019. You may learn about me at: craighane.com

As you will learn in this book, I have been dedicated to creating a new Math Curriculum and Delivery System for over fifty years which was impossible until just a few years ago.

I was born in 1938 and lived in a small cabin in the woods south of Greencastle, Indiana on the banks of Deer Creek the first twelve years of my life. In 1942-3, WWII was raging and most fathers were heavily involved in the war effort.

I was fortunate to live next to my Uncle Jack who was a 60 year old barber and builder. At age four and five, Uncle Jack taught me to count and later on geometry. I was thus homeschooled in math.

When I entered the first grade at Putnamville, I was the only child who had been taught to count. My teacher, Miss Lewis, then had me help her teach my classmates to count. My first teaching experience! Wonderful for many reasons,

Uncle Jack then taught me a lot about practical geometry for building and it seemed like I always knew more math than my teachers through the eighth grade.

Then I hit my first brick wall, Algebra in the 9th grade. I didn't do well and was advised I should not plan to go to college by my counselor and principal. Just study "shop" and get a regular job like the rest of your family, none of whom had ever gone to college.

Fortunately, I was 'rescued' by two great math teachers, Miss O'Hair at Greencastle High School, and Dr. Clint Gass at DePauw University. Long story I tell elsewhere.

I then taught high school math for about 12 years both as a tutor and classroom teacher (1954 - 1966). I learned that I could do a much better job for most students as a tutor than I could as a classroom teacher. This led to what I call SPIKE Pedagogy.

Then after obtaining my Ph.D. in Math, I taught advanced University level Math for 7 years (1966 -1973).

Then I applied Math to many business ventures for several years culminating in 25 years teaching thousands of technical workers in many industries practical technical subjects. You may see what we did at: <http://www.hanetraining.com/>. Many technical subjects taught by many instructors, starting with me and my first Workshop on Op. Amps.

Most of the technical workers were deficient in math knowledge and skills when they enrolled in one of our many workshops, and we had to first teach them enough math to be able to learn the technical subject.

This was the basis for creating: workforcemath.com

This became the first two Tiers of a six Tier Program for all students as you will learn all about in this book.

Today, thanks to modern technologies, a Homeschool Parent can deliver a wonderful Math Education to any student that is vastly superior than what the Public School Math programs can deliver.

That's what this book will explain in great detail. As you can imagine, this is a very complex subject.

In each Chapter we will discuss some aspect of this situation succinctly and then direct you to a video which explains it with both audio and visual content, and direct you to additional resources. This is in place of an Index which just directs you to other books.

So, this may be a new experience for you.

First read the beginning of a Chapter to decide if it is something that is of interest to you. If so, read on, and then watch the short Chapter video. Then you can go on beyond that and read an appropriate reference eBook or watch an appropriate additional video.

The goal is to give each reader the information of interest to that reader as efficiently for the reader as possible.

Craig Hane, Ph.D. aka Dr. Del

Introduction

“How and Why... Homeschool Math can be vastly Superior to Public School Math”

You are a Homeschool parent with post-elementary children, ages 12 – 18.

“Superior”? “can be vastly Superior”? Wow! Do you believe this?

Well, thanks to modern technologies and modern resources these statements are true, and I will explain how and why this is so very briefly in this Introduction. The Chapters that follow will explain it all to you and refer you to many Free Resources which will give you in depth explanations on every aspect of the situation.

Of course, this is very good news for Homeschool students who want the best possible math education that fulfills their needs and desires.

Let's begin with a question, “What are the three vital ingredients of a truly optimal great 21st Century Mathematics Program?”

My answer is:

Psychology - Pedagogy – Content

If you get ALL three right you will deliver great Math Education. BUT... if you get any one of them wrong, you will not deliver a great Math Education.

Let me discuss all three of these ingredients briefly, and then much more detail in the Chapters that follow.

Psychology Who's? The student's, of course. A student must not Fear or Dislike Math. Indeed, a student must Enjoy Math and have confidence in his or her ability to learn math. High Self-esteem.

OK, How should a Teacher/Coach create a good psychology in the student?

Answer: The other two essential ingredients: Pedagogy and Content.

Pedagogy is the way you teach Math to a student. Any experienced math teacher or tutor will tell you there are five ingredients of good pedagogy to teach math expressed by the acronym SPIKE.

Here the five are in a nutshell.

<u>S</u>elf-pacing	Each student learns at a his or her unique pace
<u>P</u>roper Content	Huge critical subject you must understand.
<u>I</u>nteractivity	Math is learned with practice with feedback
<u>K</u>eeping Score	Necessary for motivation and good psychology
<u>E</u>mpathy	Mistakes must be celebrated as evidence of progress.

OK, you now have a very quick overview of the SPIKE Pedagogy which is necessary for a good Math Education. Much more detail in Chapter 1.

Now, the facts are that it is very difficult or impossible to deliver the SPIKE Pedagogy for each student in a group setting with many students which is how math is still being taught in our public schools.

Thus, Homeschool Math can be Superior to Public School Math.

But – VASTLY Superior.

How can Homeschool Math be VASTLY Superior?

Content Proper Math Content is dramatically better than the current Standard Math Curriculum taught in our schools.

This is a deep subject and the following Chapters will explain this in great detail in writing or with a video for each Chapter.

Briefly, Math consists of two ingredients, Concepts and Tools.

Math Concepts are actually very easy for most students to learn when taught with SPIKE Pedagogy.

The Tools are where the 21st Century educational opportunities lie.

First, we teach a student to use a Scientific Calculator for all arithmetic calculations.

The old manual algorithms are difficult to master and very slow and error prone to use.

It is a major misconception that a student must master the old manual algorithms to understand the concepts.

An extremely important modern Tool, which should be used with high school math starting with Algebra and going through Calculus, was introduced to the world in 2009.

It is named Wolfram Alpha. Wolfram Alpha revolutionizes how one solves Algebra, Trigonometry, Analytical Geometry, Calculus, and Differential Equations problems.

Ever hear of Wolfram Alpha? It is NOT in many of our high school math textbooks, if any.

This new Math Curriculum is why a Homeschool Teacher can deliver a VASTLY Superior Math Education compared to a public school which is still teaching obsolete manual tools developed by our ancestors in the 1600's, 1700's and 1800's.

Mind you, this is NOT a criticism of our high school math teachers.

They, too, are victims of our antiquated obsolete Standard Math Curriculum and delivery system, both of which were created before our modern technologies.

You may obtain all of the detailed information on how this all works in the following Chapters and at: HomeSchoolerToday.com

Or, if you are in a hurry you can try it out and prove it for yourself or with a student. Actually, this is the only way you will ever be able to judge it.

Just go to HomeSchoolerToday.com and buy one of our Online Math Programs that you think might work for you.

All of our Online Training Programs come with a RISK FREE Guarantee.

Try it out. Learn from it. And, if after a Trial Period you don't like it just cancel the program and receive a full refund of any monies you have paid.

Have Fun reading the book. Visit our Websites. Attend one of our Webinars and ask any question you might have. Best wishes for your success with Math.

Chapter 1: SPIKE Pedagogy for a Wonderful Math Education

Pedagogy means: “The method of teaching a subject”

SPIKE Pedagogy is an essential ingredient of delivering an optimal math education to any student as you will learn. Any good tutor knows this.

The SPIKE Pedagogy is virtually impossible to practice in a group environment for reasons that will be obvious.

However, Homeschool Parents can easily practice SPIKE Pedagogy for each of their children.

Public school teachers teaching a group of students in a typical classroom environment have a much more difficult time doing this. This is the first reason Homeschool Math can be Superior to Public School Math.

In later chapters you will learn that “can be vastly Superior” is because of Content which is what most of this book is about.

So, just what is SPIKE Pedagogy?

Go to HomeSchoolerToday.com/C1 for my video discussing Chapter 1.

You may also go the Free Resources at HomeSchoolerToday.com and click on the Educational Tab and then go to: The Five Essential Ingredients to a Successful Math Education.

Or, just read on.

You will learn about SPIKE Pedagogy which is one of the essential ingredients in a great Math Education.

Pedagogy is the way you teach Math to a student. Any experienced math teacher or tutor will tell you there are five ingredients of good pedagogy for Math expressed by the acronym SPIKE. Here they are in a nutshell.

Self-pacing is how each student will learn math at his or her own pace which is determined by myriad factors.

It is extremely difficult for a student to have self-pacing in a group environment where the Math is being taught on a schedule.

Any good tutor realizes this, and this is one reason why rich parents use good tutors to teach their children math when they are struggling with a school's math taught in a classroom to a group of students.

That is why companies like Sylvan thrive, and private tutors thrive.

Indeed, that is how I made a good living during my school years from 15 – 27, high school thru graduate school.

Proper Content. A student should be taught Math topics in a sequence so that the student always has the necessary pre-requisite math knowledge for each new topic.

Furthermore, it is desirable that the Math topics chosen are of interest and relevance to the student.

This is a horrible failure of our current Standard Math Curriculum taught in most of our public schools.

Part of proper motivation is to explain to the student how a given topic will serve the student well in the future given the student's larger potential interests in life.

This is discussed extensively in many of the Chapters in this book.

Unfortunately, this is also a huge weakness of most public school math education. It is a complex subject that can only be really understood by people who already understand Math.

Just realize that Math is a HUGE subject. No single Human understands or knows all of the Math there is.

Different people need different math topics depending on their broader interests in life. This will be explained in much more detail in later Chapters.

Interactivity. Math is like a sport or game.

To learn math You must do math. You must practice.

You will make a lot of mistakes. You will struggle to overcome hurdles.

But, with the right attitude Math can be one of the most Fun and Rewarding sports or games you can ever play.

This is why the psychology of the student is so important. The student must enjoy the sport or game of Math.

This is why having both a great Teacher and a great Coach is so important.

The Teacher explains the Math and selects the proper topics for the student.

The Coach guides and encourages the student.

Mistakes are celebrated as evidence of effort, just like in a sport.

Personal achievements are celebrated as the student climbs the ladder of Math topics.

The Coach must be sure the student doesn't miss any rungs of the ladder.

The Coach must be sure the student practices.

This is a very brief description of the responsibilities of the Teacher and the Coach. See Chapters 7 and 8.

Keeping Score. It is very important to keep score of a student's progress and recognize the student's progress and achievements, just like any game or sport.

This is an important responsibility of the Coach.

Keeping Score is a powerful motivator for a student. It is like ranks and merit badges in scouting. It is important to create and maintain a good psychology for the student.

Math can sometimes be frustrating for virtually any student. I have a Ph.D. in Math, but I can tell you that many, many times I was frustrated.

I probably have made more mistakes in Math than anyone you know.

Remember, Babe Ruth was the Strike Out King, as well as the Home Run King.

Remember always, The Proper Math Content will vastly improve most students' lives.

Keeping score will prove this when you compare it to the student's other achievements.

Empathy and Humor. A good math student will practice a lot, and make a lot of mistakes. When I make a mistake, I just chuckle a little and correct it and go on. If I make a big mistake I laugh out loud.

Life is funny if you approach it right. In your life you will make a lot of mistakes. It is up to you to decide how to deal with them.

This is very important if you want to maintain a good psychology. I would not have earned a Ph.D. in Math IF I had not learned to laugh at myself and my mistakes.

Summary:

OK, you now have a quick view of the SPIKE Pedagogy which is necessary for a good Math Education.

Now, the facts are that it is very difficult to deliver the SPIKE Pedagogy for each student in a group setting of many students which is how math is still being taught in many of our public schools.

That is why Homeschool Math can be Superior to Public School Math.

In a typical classroom, the teacher will be going too fast for some students and they will fall behind and FAIL.

Any grade less than an A is essentially failure. You either understand a Math Topic or Concept or Tool, or you don't.

Grading on the Bell Curve is a HOAX. Math performance is essentially Bi-modal. Either you understand it, or you don't.

So, if a teacher tries to slow down as much as possible to keep fewer students from failing, this then makes the Math boring for the good students.

Boredom with a subject again creates bad psychology and bad ultimate results. Indeed, often the primary “motivation” for a good student is to just get a good grade. We'll discuss this more a little further down.

But, the bottom line is that a good Homeschool Teacher and Coach can deliver SPIKE pedagogy and, thus, a superior math education even IF the same math content is taught.

However, in later Chapters you will learn how much better Math Content can be today due to new Tools and technologies which have not yet been included in the Standard Math Curriculum.

And, this is why Homeschool Math “can be vastly Superior” to Public School Math. That is what the bulk of this book is all about.

Chapter 2: Math? Help!

This Chapter is for a parent with a child who is struggling with math.

Go on the Chapter 3 if you have a student who likes math and you want to know the best way to teach this student math.

We will discuss two questions the parent might have, and eight questions the student might have. The answers to these questions should help both the parent and the child/student.

Math? Help! is a 24 page eBook for parents with a child who is struggling with middle or high school level math that I wrote some years ago that gives my answers to these questions in quite a bit of detail.

Go to HomeSchoolerToday.com and click the Free Resources Tab. Then Click on the Educational Tab at the top, and then select eBooks. Now you can download the *Math? Help!* eBook in PDF format.

I suggest you think about what you, the reader, thinks the answers are for both you and your child. Then look at my answers in the eBook *Math? Help!*

Ultimately, you must come up with answers you believe, and then act on them in the best way you can for your child.

1. Why is my child struggling with math?
2. What can I do about it for my child?
3. What's Math all about?
4. Why is Math hard for me?
5. Is it MY fault or am I “stupid”?
6. How can I understand math?
7. Can math be EASY for me?
8. Can math be FUN for me?
9. What good will Math do ME?
10. So, what should I do, RIGHT NOW?

My very short answers. More details in *Math? Help!*

1. Why is my child struggling with math?

Poor Pedagogy and Content... see Chapter 1.

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

Deliver good Content (see below) with SPIKE Pedagogy.

3. What's Math all about?

Numbers and Geometry and Modern TOOLS to solve problems.

4. Why is Math hard for me?

See #1

5. Is it MY fault or am I “stupid”?

NO! Math is no harder than your games.

6. Can I understand math?

YES! In fact, you can get good at it.

7. Can math be EASY for me?

Yes. When taught properly to you.

8. Can math be FUN for me?

Yes. Math is a great Game.

9. What good will Math do ME?

Oh WOW! YES! It can transform your life. Math will Empower you to pursue many different careers and learn many things that might interest you either for a hobby or job.

10. *So, what should I do, RIGHT NOW?*

If you don't understand the number system have your parent teach it to you following the Uncle Jack videos.

Once, you understand numbers, learn to use the TI 30Xa Scientific Calculator to do your arithmetic calculations.

Then learn Practical Algebra.

Then learn Practical Geometry.

Then learn Practical Trigonometry.

You probably will be able to complete this in a two or three months if you will work a little daily, say 30 minutes to an hour five days a week.

You will then know more math than most people and be ready for the military or technical workforce.

See my one question 'test' you will be able to answer you can use to prove this!

My one question test which will prove you are now “Matherate” for the practical technical workforce is you will be able to calculate, in less than one minute, the area of a triangle with sides of 8.3 in, 10.4 in and 15.4 in.

The solution involves most of the things you have now learned, including Trigonometry. Easy Peasy!

Very few people can solve this very common practical problem!

It's a great way to challenge a “wise guy” with a friendly bet. Have FUN!

(Answer: 40.5 sq in)

Immediate Action Plan

Go to HomeschoolerToday.com and enroll your student into the Tier 1 Program and try it out.

Better yet, enroll in the Family Plan and you will have 30 days to see if this program works for your child, and you! If this does not work for your child, just cancel the Family Plan and get your money back.

You are the Coach. See Chapter 8

I am the Teacher available via the videos and Learning Management System 24/7 for less than \$1 per day.

Chapter 3: How to Give Your Child a Great Education in Algebra, Geometry, Trigonometry and Beyond

This Chapter is for a parent who has a student who likes Math and wants to give this student the best possible Math Education, one that is vastly superior to what the Public Schools deliver.

This is explained in our eBook with the same title. You may obtain a free PDF copy of this book at HomeschoolerToday.com by clicking on the Free Resources Tab, and then the Educational Tab and then the eBook choice and downloading the eBook.

Why would you want to give your child a great math education, and why would your child want it? Here in one big reason.

Math for success!

It's a huge responsibility, but fortunately very easy to achieve today thanks to modern technologies and resources, even if you don't know much math or even like math.

Here are some Questions and my Answers any parent and child needs to know to achieve Math Success in an efficient and affordable way.

Why is Math so important?

In a nutshell, Math will open up many doors of opportunity for your child that will otherwise remain closed. Math is like a special universal language that is necessary for understanding and communicating many things in life.

Mathematics, or Math, is an indispensable tool used in almost all modern technologies.

You may have heard of the STEM subjects. STEM stands for Science, Technology, Engineering and Mathematics. It is widely known that a STEM career can be very lucrative and satisfying.

Mathematics at some level underlies all STEM subjects. So if your child has any aspirations for a STEM career, then your child needs a good math education.

Many STEM careers require advanced education in science or engineering schools, which require math competency for success.

But also, there are hundreds of thousands of jobs going unfilled today in our modern manufacturing economy because there are not enough qualified trained people available.

And, the U.S. manufacturing economy is actually expanding so there will be more and more new jobs created.

Health care is similar. Many technical job and career opportunities.

You should know that there are many non-professional technical careers or jobs that do not require college that also are very well paid.

For example, jobs in high tech maintenance require training and knowledge in things like hydraulics, electronics, electrical and mechanical power systems, and much more.

You might want to visit www.HaneTraining.com to see a listing of the types of subjects and programs industry is training its employees in. And, all of these programs require practical mathematics for optimal success.

If a technical worker knows practical mathematics s/he is much better off than one who does not.

It is much better to introduce a child to basic practical mathematics first, before going on to more advanced topics for reasons you should soon fully understand.

What may surprise you even more is you will learn how virtually all children can learn all the math they need for any STEM subject, all the way through calculus and differential equations, in high school IF, and this is a very big IF, they are taught math properly and in a tiered manner.

Even more amazing, is how quickly and easily a child can learn all of the practical math they will need for a non-professional career.

Unfortunately, this is not how math is taught in our modern standard middle and high school mathematics curriculum.

Fortunately, there is something you can do about it.

In fact, a home school teacher can do things for their student today that is not possible in a regular school.

That is why Home School Math can be “vastly Superior” to Public School Math.

Just what is Math?

Math consists of numbers and geometry, and the tools needed to solve problems. Numbers start with the counting numbers, 1, 2, 3,... and expand to include negative numbers, fractions or rational numbers, and then decimal representations.

At that point you could just mention irrational numbers which are non-repeating decimals. This constitutes what is called the Real Number System and corresponds to the points on a straight line ruler.

Complex Numbers corresponding to points on a plane come later. These are critical for STEM and we cover them in Tier 4 in a way that is rarely done at the high school level, and is actually easy to understand.

Arithmetic consists of learning to perform various operations with these numbers like addition, multiplication, etc.

Geometry consists of various physical figures you can create like lines, angles, triangles, polygons of various types, circles, cones, boxes, balls, etc.

Algebra is a tool used to solve arithmetic and geometry problems. It combines numbers and geometry in a very powerful way resulting in what is called analytic geometry.

Trigonometry is an extension of geometry to better understand triangles. This is what we cover in the Practical Math Foundation, Tier 2.

Then trigonometry has been extended in many wonderful ways to solve many more problems. We cover this in Tier 4 to get the student ready for Calculus and STEM subjects.

Calculus, which we cover in Tier 5, is a powerful tool that extends the power of algebra and geometry to solve many more problems involving rates of change and continuous sums.

If you want a “crash course” in calculus and you already know pre-calculus math you may simply watch the three Calculus videos in the Free Resources at HomeSchoolerToday.com.

Differential Equations are an extension of Calculus and are the workhorses of modern science and engineering. We cover this in Tier 6.

Calculus and Differential Equations are easy to learn conceptually.

Today with the 21st Century Tool, Wolfram Alpha, it is very easy to do all of the problems, which were extremely difficult with the old Manual Tools still being taught today in the Standard Math Curriculum.

This is Why this Program is “Vastly Superior” to Public School Math.

Math can be understood at many levels. It is kind of like some video games.

There are many levels each building on the previous one. One can go as far as one has the time and energy and motivation to do so and there is NO END ever.

Math is a huge field. There is as much math as there is music or literature. It is continuously expanding. As we progress as a civilization our math expands too. New mathematics is being created all the time.

Math also consists of “tools” developed and used to solve problems. In the old days we used many “tables” to solve problems. For example, we used logarithm tables just to carry out arithmetic calculations.

Then these tables were put into a device called a slide-rule which was the tool all engineers and scientists used for centuries, until 1972.

Trigonometry tables were also used a lot, and they too were sometimes included in a circular slide rule.

Then, in 1972, came the first scientific calculator, the HP-35, and all these tables and tools became obsolete. But the best was yet to come!

In 2009 an extremely powerful tool called Wolfram Alpha was unleashed onto the world. Wolfram Alpha has had a greater impact on STEM Math than the scientific calculator did.

We introduce Wolfram Alpha in Tier 4, which does for calculus, differential equations, and linear algebra what the calculator does for arithmetic and trigonometry. And, so on.

What You Need to Know is this: Today a student should first learn to use a power tool called the scientific calculator (the TI 30Xa is the one I use), and then all of the Algebra, Geometry, and Trigonometry needed to solve most practical everyday problems in about fifty hours of their time very easily and enjoyably too. (Tiers 1 and 2.)

In fact, the TI 30Xa can seem like “magic”. It is kind of like having a staff of many very fast brilliant calculating mathematicians at your disposal 24/7.

It is hard for a person today to appreciate just how much drudgery has been eliminated – literally 99% of the very tedious and difficult calculation techniques that were taught and used pre-1972 are gone – disappeared – vanished. It really seemed like magic in the 1970's.

Learning to use the TI 30Xa is a great way to “motivate” students who have previously had difficulties with math. And, it is a great Foundation for any student, even those who will go on into a STEM subject.

And, now since 2009 we have a Tool which does for all advanced STEM Math what the Scientific Calculator did for arithmetic.

And, so far as I know, Wolfram Alpha has not been incorporated into any high school textbooks yet.

That is why I say you can teach your student math that is “vastly superior” to public school math.

SO, What should you do if you don't know math very well yourself?

Punt? Pray? Give up? Soldier on as best you can?

What would you do if you had a mechanical problem with your car you didn't understand or have the tools or knowledge to fix?

My guess is you would take it to a mechanic you trust. That's what I do.

First, you should realize you will not be able to teach math effectively and optimally to your child if you don't really understand math any more than you could fix your car on your own unless you are a trained mechanic.

You will need to find a math teacher you trust who can do the job for you.

You may use the later chapters in this book to help you evaluate a potential teacher or tutor.

But beware, a bad teacher can “ruin math” for your child and induce a dislike of math or even a phobia. Of course, tutors are expensive too.

Enrolling your student into a classroom situation might work, but it won't for most children for reasons discussed in other Chapters. Any child needs self pacing, interactivity and continual positive feedback to succeed in any real or optimal way. And, this is virtually impossible in a typical classroom class no matter how good the teacher is.

If you want to Homeschool your child in Math, here is what I recommend.

Go to HomeSchoolerToday.com and enroll in the Family Plan.

Then, you can be sure you are using the Content I recommend and SPIKE Pedagogy.

You will be the Coach, and I will be the Teacher via the video lessons and the exercises and quizzes all tracked in the Learning Management System so you, as Coach, can track your child's progress and do the Coaching.

In later Chapters I will discuss in more detail just what to do with three categories of students;

Students who do not want to attend college.

Students who want to go to college, but not study STEM subjects.

STEM students, who are college bound.

However, ALL three categories should start with Tiers 1 and 2 as a foundation for their math education.

SO, I recommend you just get started, and go for it!

Visit: HomeSchoolerToday.com

You may look over the Table of Contents of Tier 1 and 2 there also to see just what you are getting.

Chapter 4: Non College-Bound Students

This Chapter is for parents who think they have a student who does not want to go to college. What Math should the student learn?

The good news is that all post-elementary students should start the same. With our program it is Tiers 1 and 2.

Then, if it is possible the student might want to go into the Military or into an Apprentice Program or a Tech School for some technical career path, we recommend additional topics we cover in our Workforce Math program.

We will soon be adding a Quantitative Reasoning Math Program that includes these special Workforce Topics and some other Finite Math topics as well.

We also will be adding a Consumer Math program which includes some of the topics we cover in Tier 3 and some others as well.

Visit HomeShoolerToday.com to see these programs, coming soon.

But, the first thing you might want to do is enroll your student into our Family Plan and get started on Tiers 1 and 2.

You can try it out for a month and if for any reason you don't like it just tell us and we will refund your money.

Remember it is delivered with SPIKE Pedagogy explained in Chapter 1.

Also, remember You will be the Coach and I will be the Teacher. See Chapters 7 and 8.

If you have access to a great Math Teacher and Coach who can deliver the Proper Content with SPIKE Technology, this is your best solution. Of course, it will probably cost a lot. No problem for a rich family.

However, if you are on a modest budget, then I highly recommend our Tiers 1 and 2 program and supplementary Programs.

Probably the most cost effective way is the Family Plan.

It is totally Risk Free since you get to try it for 30 days and get your money back if for any reason you want to then cancel it.

Chapter 5: College Bound Non-STEM Students

This Chapter is for Parents whose child is going to go to college, but is not going to study STEM subjects.

Tier 3 has a bunch of Math Topics which a student will need to know for the SAT, plus a sample SAT test set of questions and advice on taking a timed test.

We tell the student that there will probably be some topics which the student will never use for any other purpose, but that will be included on the SAT and ACT tests.

The ACT test has even more topics at this time and so we have supplementary videos on those. Most of these are selected from Tier 4, which is designed for future STEM students.

I will tell you that I am not a big fan of these tests. However, if your student is selecting a College or University where they are required, then they are unavoidable.

You will need to check with the Schools you will be applying to.

Here's the problem with these timed tests in my opinion. They are designed to get a Bell Curve distribution.

So, there will be a few very easy questions and then several reasonably hard questions and a few very difficult tricky questions a student will have been prepared for. I explain all of this in my training in Tier 3.

Ironically, a student can score very high on the SAT or ACT tests and still be very unprepared for a good STEM school. See Chapter 6.

If you can hire a special SAT or ACT tutor that is fine. However, I believe that our Tier 3 will do just as good a job, and be a lot less expensive and easier for the student since it utilizes SPIKE pedagogy.

There is a new test, the CLT test which some homeschoolers are using. It may be a better test and will require many topics from Tier 4, e.g. Trigonometric Identities.

So, go to [HomeschoolerToday.com](https://www.HomeschoolerToday.com) and look at the Curriculum and Pricing Tabs and choose the best choice.

The Family Plan is usually the best option.

However, if you want your student to study this over a long period of time for some reason, then you may want to choose the a la carte plans which last indefinitely.

I suggest you study the Syllabi of the first three Tiers, and even Tier 4 for the ACT and CLT tests.

Of course, if your student goes through Tier 4, he or she should have no trouble at all. They will then know much more math than these tests require.

Chapter 6: STEM Math

This Chapter is for Parents of a child who might be interested in some STEM subject like Science or Engineering. It will be a challenging chapter to anyone who doesn't know much STEM Math.

However, I think you can probably understand the main ideas and themes even if you don't understand the math details.

If you have someone you know who is a STEM Professional like a Scientist or Engineer, then you might want to have him or her read this Chapter or, better yet, watch the video of this Chapter.

This is the Chapter which explains why Homeschool Math today can be vastly Superior to Public School Math.

There are two approaches to learning Math, Heuristic and Rigorous:

“A **heuristic** technique is any **approach** to problem solving, learning, or discovery that employs a practical **method** not guaranteed to be optimal or perfect, but sufficient for the immediate goals.”

“A **rigorous** technique is an **approach** which involves proving a meaningful statement is true with a series of **logical deductions** from a well defined set of assumptions, called Axioms, Postulates, or previously proven Lemmas or Theorems.”

Modern mathematicians, and some math educators, often try to teach math with a rigorous approach which can be very tedious, boring and DIFFICULT to understand.

Classical mathematicians usually utilized a heuristic approach to learning and teaching mathematics which can be easier and quite enlightening. This is the approach I believe we should take when teaching Math at the High School level.

The wonderful 20th Century teacher, Dr. George Simmons, agrees with this approach as demonstrated in his wonderful book, *PreCalculus Math in a Nutshell*, which is the only textbook I utilize in my Six Tier Program.

Any Parent or Teacher should at least read Dr. Simmons' Preface and the Introductions to his three Chapters on Geometry, Algebra, and Trigonometry. Brilliant, as is this book.

Believe it or not, this amazing book is only about 119 pages long.

https://www.amazon.com/gp/product/1592441300/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=1592441300&linkCode=as2&tag=greatstuff09f-20&linkId=7Q6O6KYHXC2WJRCY

It costs only about \$15. Wonder why it isn't adopted by our high schools?

BTW, Dr. Simmons wrote what I consider the best Calculus and Differential Equations books before he wrote the PreCalculus book.

And, he wrote the best Topology and Modern Analysis book first, which is how I learned about him when I taught this subject as a professor. This is the math behind theoretical physics subjects like quantum theory. George was a Great Math Teacher.

OK, so what should we be teaching our high school STEM students that will get them optimally prepared for a great University STEM education?

Numbers: Real Numbers, HyperReal Numbers, and Complex Numbers.

We need to teach these number systems heuristically, not rigorously.

Real Numbers correspond to all the points on a Straight Line and are expressed by the decimal number system.

Subsets are Natural Numbers, Negative Numbers, Integers, Rational Numbers all of which a STEM student must understand heuristically.

Non-repeating decimal numbers are called Irrational with Algebraic and Transcendental subsets. These are ONLY of interest to Theoretical Mathematicians and should just be mentioned.

Complex Numbers correspond to all of the points in a two dimensional Plane. They are vital for many STEM subjects.

They are very easy to understand heuristically and involve Trigonometry Functions and Infinite Series.

HyperReal Numbers include the Real Numbers and Infinitesimal Numbers.

Our ancestors approached Numbers Heuristically until the mid-19th Century.

Then mathematicians began to approach Numbers Rigorously with an Axiomatic Approach. This had a dramatic effect on math education.

Indeed, there was a great split between Applied Mathematician and Scientists and Theoretical Mathematicians in the mid 1800's that was not resolved until 1966, ironically the year I earned my Ph.D.

Mathematicians starting with the best ancient Greek Mathematician, Archimedes, used Infinitesimal numbers reasoning to solve many wonderful math problems such as relating the Area of a Circle to the Ratio of its Circumference and Diameter.

Euclid had not done this in his famous Euclid Elements, the first attempt at rigorous math. See Archimedes Tombstone in Tier 2 for a greater example. It involves the volume and surface area of a Sphere. Amazing!

The creators of Calculus like Liebniz in the 1600's and Euler in the 1700's utilized infinitesimals for the wonderful creation of Calculus and Differential Equations. Amazing understandable heuristic arguments.

Of course, Applied Mathematicians and Scientists and Engineers used them extensively. And, still do even today!

BUT, when theoretical mathematicians began to make the Number Systems Rigorous in the mid 1800's, they could not figure out how to include Infinitesimal Numbers. SO, what did they do?

They BANNED THEM.

Wow. Applied Mathematicians and Scientists went their own way and continued to use them heuristically.

Unfortunately, the theoretical mathematicians wrote our 20th Century calculus books and went a rigorous and difficult way.

No more infinitesimals!

Horrible setback for Math Ed.

Then in 1966, Abraham Robinson figured out how to make Infinitesimals and HyperReal Numbers Rigorous and they are back in mathematics.

Unfortunately, our Calculus books have not caught up yet. Wonder why?

Could it be the huge investment in the current Calculus books?

But, of course, I use Infinitesimals extensively when I teach Calculus because they are a very good heuristic way to understand Calculus.

What are the ingredients of STEM Math?

Algebra, Geometry, Analytical Geometry, Trigonometry, Calculus, Differential Equations, all of which depend on. . . .

Functions: Polynomial, Trigonometric, Exponential and their Inverses and Composite Functions.

Infinite Series: These are like infinite Polynomials and can represent any Function, which is invaluable to solve certain problems.

Tools for analyzing Functions and Solving STEM Problems.

Graphing a Function to get a visual picture of its behavior.

Differential and Integral Calculus: The two Tools for analyzing the behavior of Functions, and understanding their Visual Representations called Graphs, and calculating the Area under their Graphs.

The Fundamental Theorem of Calculus: The most important Theorem ever, and the reason we are here today! It's what makes Calculus work for us.

Differential Equations are how Functions are discovered and how Physical Models are created. Indispensable for STEM.

I realize that most people have difficulty understanding what this all means. For what it's worth, many current High School teachers do to!

This is what a Student must learn in order to master STEM subjects.

Math is the Foundation of all STEM subjects, which essentially are based on Functions which are used to build STEM Models, which then are used to understand STEM topics and subjects.

Any Homeschool Parent with a STEM student must deal with this situation, and now it is possible as you will learn!

Now, you are ready to learn why Homeschool Math CAN BE VASTLY Superior to Public School Math.

THE FUNDAMENTAL PROBLEM with the Standard Math Curriculum and Its Solution!

Wonderful Manual Tools were developed to deal with all of the above Math topics by our ancestors who essentially only had Pencil and Paper Tools.

Unfortunately, these Manual Tools are very difficult to learn, master, and use! Maybe you experienced this. Did you?

This is the main reason so many students develop an intense fear and dislike of math. Don't blame them. It was a great struggle for me too.

One has to deal with Numbers and arithmetic calculations. Algorithms were developed for addition, multiplication, division, and square roots of real numbers. And, then algorithms for Complex Numbers.

Logarithms, the inverse of the Exponential Function, became a wonderful tool for performing arithmetic. And the Slide Rule, or Slip Stick, became a wonderful tool used by all Scientists and Engineers for centuries.

Trigonometry Tables were created which were indispensable in solving many math problems.

Then came Calculus in the 1600's, which was the foundation of our modern Science and Technology world. Newton's Physics started it.

Calculus is used to analyze Functions.

Manual Tools were developed by Leibniz and Euler and others. Wonderful, but very difficult to learn and master and use.

Then, we had to learn to solve Differential Equations which often led to what are called Special Functions, i.e. Infinite Series.

All of these Manual Tools are very difficult to master.

So, if you wanted to become a STEM professional you had to first learn these Concepts and Manual Tools.

Intelligence was necessary, but even more important was a lot of very hard dedicated work to master these things.

Math was TOUGH and was often an insurmountable Barrier to STEM subjects. As you will learn soon, this has all changed.

Integral Calculus flunked many kids out of engineering schools since it was the first really difficult manual tool that had to be mastered. Much more difficult than the tools that led up to it.

Then Miracle #1 happened in 1972.

The first Scientific Calculator, the HP-35 was unleashed on the world.

Now Log and Trig Tables were obsolete. The Slide Rule was obsolete.

Now, a STEM professional could do all arithmetic calculations very quick and easy, AND the Scientific Calculator was an order of magnitude easier to learn and to use to solve math problems.

Needless to say this was a Crisis for Math Educators.

Many of their books and courses were obsolete! Students rejoiced.

Many Teachers were depressed. Much of what they had been earning a very good living teaching for all their lives was now in the dust bin of history.

Teachers had to adapt to the new technology and reality.

Many textbooks became obsolete.

But, Calculus and Differential Equations, the workhorses of STEM were not affected very much. Still the old Manual Techniques were all we had. So, for advanced STEM math not much changed.

Until 2009! Miracle #2.

A massive Educational STEM Math Earthquake more significant than the 1972 Scientific Calculator Miracle #1 happened.

Some background first.

Computers were developed shortly after WWII and really took off in the 1950's. By the 1970's a sophisticated Computer Algebra Program, Macsyma, which could solve Math Problems easily, was developed at MIT.

A teenager in the UK, Stephen Wolfram, used Macsyma to solve physics problems, and soon went to the greatest physics graduate school in the world at Cal Tech, and earned his Ph.D. in physics at age 20 in 1978.

He also won the MacArthur Genius Award.

Wolfram then wanted to develop a more powerful tool, and in 1988 introduced Mathematica to the world.

This was an incredible programming language unlike anything before.

It was like an incredible Miracle #2.

Steve Jobs incorporated Mathematica into the Next Computer and this system was used to create the World Wide Web, by Tim Berners-Lee.

Stephen Wolfram introduced an incredible Tool to the world called:

Wolfram Alpha <https://www.wolframalpha.com/>

Guess what?

Wolfram Alpha will solve any Calculus or Differential Equation Problem immediately including problems that cannot be solved with the Classical Manual Techniques. And, much, much more!

Wolfram Alpha is more revolutionary for STEM Math than even the Scientific Calculator was for arithmetic calculations.

Now, starting in Middle School we can teach math to students that is virtually impossible to teach with the old, now obsolete, manual tools.

So, the new 21st Century Math Curriculum utilizes this amazing Modern Tool to teach virtually all STEM Math starting in Tier 4 with Algebra and Geometry like Conic Sections.

Then we go on in Tier 5 with Calculus and then Tier 6 with Differential Equations.

A student can now learn all of the STEM math needed for Science and Engineering in a very small fraction of the time and effort needed for the Classical approach.

Unfortunately, ALL high school textbooks are now obsolete.

All Calculus and Differential Equations books are obsolete.

Why?

They are loaded with all the very difficult Manual Tools which are now obsolete, yet very difficult to learn and master and use.

No modern STEM professional uses them anymore.

Indeed, you don't really need a book to learn Calculus and Differential Equations.

Just some Notes, Exercises, Videos and Wolfram Alpha.

All delivered with SPIKE Pedagogy.

Unfortunately, the Math Education Community doesn't want to give up a multi-billion dollar set of products developed over the last decades.

I can't blame them any more than I could blame the engineering professors who didn't want to abandon Slide Rules and Log and Trig Tables in 1972.

But, that's the world we live in.

It's just like Smart Phones replacing Land Lines and many other classical obsolete technologies.

The Standard Math Curriculum is like teaching carpentry with the manual tools of the 1700 and 1800's. Just visit a museum and imagine how difficult it was to use the manual tools. Compare that to modern electrical tools.

Here's an analogy of Carpentry to Math.

The Concept of “a hole in a piece of wood” is easy to learn.

How do you solve the problem of creating a hole in a piece of wood?

Without any tool it is probably impossible.

First, you could create a hole with a nail or spike and hammer. Of course, it was difficult and you could split the wood.

Then came a wonderful manual tool, the Brace and Bit.

This is how I was taught to create a hole when I was a boy in the 1940's. It took a lot of effort to learn it and a lot of practice to master it, which I never really did. And, it took a lot of slow physical effort.

And, it was often impossible to drill a hole where I wanted one due to the limitations of this tool.

Then came the electric drill. Wow. Much easier to learn and to use. And, much faster and less physical effort. And, you could drill holes in more inaccessible places.

Wow! Brace and Bit obsolete.

Then came the electric drill with a battery . Even easier to use.

OK, analyzing a function with old algebraic and manual graphing techniques is like making a hole with a hammer and nail.

Analyzing a function with the Manual Techniques of Calculus is like a Brace and Bit. Hard to learn and difficult to perform. But, much better than a Hammer and Nail.

Analyzing a function with Wolfram Alpha is like a battery powered electric drill. Easy Peasy.

Now, any student can learn STEM math and apply it very quickly and easily.

Manual Calculus and Differential Equation techniques are OBSOLETE!

Math is NO LONGER a Barrier to learning a STEM subject.

That is why the Homeschool Math Programs can be vastly Superior to Public School Math.

Eventually Public School Math will catch up, I HOPE.

But, a multi-billion dollar industry will have to transform.

Math teachers will become Coaches. Which they will love, I predict!

Math will be delivered with SPIKE Pedagogy.

Now, visit HomeSchoolerToday.com and look at the Curriculum, and particularly the Tier 4 and 5 Table of Contents.

We begin to utilize Wolfram Alpha in Tier 4 which revolutionizes how Algebra and Analytical Geometry and Trigonometry are learned and used.

Then, in Tier 5 we teach the student Calculus in about one semester.

We then have Tier 6 on Differential Equations available to a student who completes Tier 5.

Better yet, an amazing new Tool was invented in 2016, the SupraComputer. And, it is very easy to use.

It is based on the Raspberry Pi, and includes all the Wolfram Tools, plus the training on how to use it.

Once a student gets to Tier 4, the student will want to acquire a SupraComputer which will make it much easier to learn to use Wolfram Alpha, and also lead the student into the use of the modern powerful Wolfram Language which was introduced to the world in 2016.

So, what to do?

Just get started.

Enroll your student into our program.

The Family Plan is probably the most cost effective way to do it.

Visit HomeSchoolerToday.com and check out the Curriculum and Pricing.

It is Risk Free to try it for a month and actually quite inexpensive to use compared to any other Programs we are aware of today (2019).

Remember, YOU are the Coach, and I am the Teacher.

Chapters 7 and 8 are recommended to fully explain this.

Together we can give your STEM students a great Math Education that will prepare them to compete with the best educated students in the world.

SPIKE Pedagogy and PROPER Content.

Chapter 7: Teacher & Coach

To learn Math, a Student needs both a Teacher and a Coach.

The Teacher selects the appropriate topics for a student and then explains each topic and gives the student exercises and feedback via a quiz.

The Coach monitors the student's activities and gives the student motivational feedback with both "carrots" and "sticks".

The "sticks" might be requiring the student to spend a certain amount of time studying math with the Teacher.

The "carrots" are giving the student positive feedback in the form of compliments and rewards for efforts and accomplishments.

Mistakes are unavoidable when learning math, just like any sport or skill.

The Coach should acknowledge the student's mistakes as good efforts and progress in learning the math concepts and skills.

DO NOT ever let a student feel s/he is a "failure" because of some mistake s/he makes. Celebrate mistakes as a sign of effort and progress.

A Coach should be able to come up with various "rewards" for a student's progress and efforts.

Recognition and sincere compliments are often the best rewards.

A Coach must be present in a student's life, and care about the student, and make persistent and consistent efforts to give the student these positive feedbacks. And, a Kick when needed.

A Coach must be prepared to encourage the student to make efforts even when these efforts seem to not be producing good results.

All successful people go through periods of "doldrums".

Any successful person in the development of any skill will make many "mistakes". That's Life!

The Coach must be sure the student understands this and appreciates this.

Compare Math to some game or sport or music or any other skill the student likes. We all make mistakes.

The better we become the fewer mistakes we make, but we always make mistakes. The more we learn the more mistakes we will have made.

The Coach should try to help the student see where learning the concepts and skills of Math will help the student in other areas of interest to the student.

If a student is interested in any technical field s/he must realize the value of math in this field. The Coach should be sure the student is aware of this.

A Coach does not have to be the Teacher.

The Coach does not have to know much math.

The Coach will work with the Teacher.

It is possible that one person can be both the Coach and the Teacher. But, this is usually impossible.

I can be the Teacher thanks to modern technology.

You can be the Coach.

Any parent must find a local person to be the Coach since this requires a continual presence and a personal relationship.

Chapter 8: How to Be A Great Coach

Let's examine Motivation and Learning Techniques:

Intrinsic vs. Extrinsic.

Intrinsic Motivation . . . is when a student studies and learns math simply for the internal satisfaction and enjoyment. It is what motivates any person to play a game or sport.

Once a student starts to learn math and gain confidence and self-esteem Intrinsic Motivation often sets in.

This is what we want as a Coach and Teacher.

However, for many students this takes some time.

In the meantime, a Coach can use Extrinsic motivators.

Extrinsic Motivation . . . is when a student wants something that the study of math will provide. That “something” is an extrinsic motivator.

For example, if a student wants to study any STEM subject then that is an extrinsic motivator since Math is necessary for virtually any STEM subject.

If a student wants to enter any technical field in industry or the military, then Practical Math is necessary and that is an Extrinsic motivator.

Triad Math's Tiers 1 and 2 provide this necessary math and also are a great foundation for future math studies.

Ironically, the Standard Math Curriculum IS NOT necessary for this goal.

If a student wants to excel on the SAT, then Triad Math's Tier 3 program will satisfy this need.

Again, this is quite different, and easier, than the Standard Math Curriculum.

Of course other extrinsic motivators can include any type of rewards.

This can include grades, praise, privileges, money or many other things the student might want including the avoidance of some type of punishment.

However, we find that when the proper Content and Pedagogy are utilized by the Teacher, then usually the student becomes intrinsically motivated since most of us enjoy anything that is challenging that we succeed at.

Okay, let's assume that your student is motivated enough to study math.

It is imperative that the math be taught in such a way that the student is successful. Only that will lead to intrinsic motivation.

Learning Techniques.

To successfully learn math, a Coach should teach the student to engage in certain practices. This is different than teaching the math itself.

That is why a Coach and Teacher are two different necessary components of a good math learning experience.

I recommend Dr. Barbara Oakley's great book, *A Mind for Numbers – How to excel at math and science, even if you Flunked Algebra* for an elaboration on what I am going to recommend to you as a Coach and to any student.

First, be sure the student studies topics in a proper sequence so that the student always has the necessary prerequisite knowledge for the topic at hand.

Go back and fill in any deficiencies you can identify. Follow the Tiers if you utilize me as your Teacher.

Second, be sure the student studies a new topic with a Focused approach by studying the video and working on the exercises.

Do this for a reasonable length of time until either the student understands the topic and how to do the exercise, OR gets confused and tired.

Then stop. Take a break!

Third, have the student engage in various activities so his or her mind can go into an Unfocused Mode.

This is when and where the subconscious mind processes the focused activities. We don't understand how this really works, but it often does.

Usually this involves some routine task or habit that itself requires little thought. Do some routine boring chores.

Watching entertaining videos or playing games may not work.

Who knows? Try various things and see what works for the student.

Fourth, have the student then engage in another Focused session and work on the same topic.

Sometimes, now the topic seems more understandable and the confusion lifts. It's pretty amazing how often this works.

If it works one out of five times, that is great. Persistence will yield success.

No one to my knowledge knows how this really works, but it does often work.

Many great thinkers have confessed this is how they often solve a problem or discover a new concept.

It certainly works for me and I use it all the time.

Try it. Give it a chance to work.

It is important for a Coach to explain and convince a student that s/he will succeed if s/he practices and tries hard enough and perseveres.

I can remember many times when as a student I struggled with a new Concept, and then after several Focused and Unfocused Sessions it finally fell into place. That's how I wrote my Thesis for my Ph.D. in Math.

Sometimes, I wondered why I ever had a problem with it in the first place.

Often, you have to try many things and go down many blind alleys before you achieve the understanding and solve the problem.

The more you believe in your capabilities the more success you will have.

Yes, you will have failures and frustrations.

The more difficult the problem or concept the more you will experience this.

But, the greater the reward and satisfaction when you achieve the breakthrough and achieve success.

A good Coach will explain these things and encourage the student.

Success does breed confidence and Success.

But, Failure should also be a sign of Progress in ultimately achieving Success.

Success is built on the back of many Failures.

A student must “learn to learn” and a Coach can greatly facilitate this.

The Coach and Teacher must work in tandem.

Eventually, the Student should become the Student's own Coach.

Chapter 9: Standard Math Curriculum (SMC)

What I call the “Standard Math Curriculum” (SMC) has evolved over the 20th Century until today and essentially consists of the following.

Math Education has been compartmentalized into several one year Courses, Algebra 1, Geometry, Algebra 2, Trigonometry, and Calculus.

Each of these courses usually comes with a large expensive book that has evolved over the decades right up to the present time.

Each of these books has been loaded up with a lot of premature theoretical materials, and a lot of obsolete manual algorithms.

This varies from book to book, but if a book in any one of these subjects is over fifty pages long, this is probably true.

How much do all of these books cost?

Compare this with Dr. George Simmons book, *PreCalculus Mathematics in a Nutshell, Geometry, Algebra, Trigonometry* which is 119 pages long and costs about \$15 on Amazon.

https://www.amazon.com/gp/product/1592441300/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=1592441300&linkCode=as2&tag=greatstuff09f-20&linkId=7Q6O6KYHXC2WJRCY

This book was written in 1987. If a high school graduate knows all of the math in this book, I would be impressed. Check it out!

When I use it in Tiers 3 and 4 I do add some materials such as Complex Numbers and, most importantly, the use of the incredible 21st Century Tool, Wolfram Alpha, which revolutionizes how one learns and practices STEM Math.

<https://www.wolframalpha.com/>

Now, as you learned in Chapter 2, I believe all students should first be taught the basic Concepts of Algebra, Geometry, and Trigonometry along with the first modern Tool, the Scientific Calculator.

We use the TI 30Xa, and then the student can easily learn any other Scientific Calculator:

https://www.amazon.com/gp/product/B00000JBNS/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=B00000JBNS&linkCode=as2&tag=greatstuff09f-20&linkId=XGC6OBOCD652YMP7

The One Question “Test” I use is to have the student calculate the Area of an arbitrary triangle using the Scientific Calculator.

Once a student has completed Tiers 1 and 2 and Quantative Reasoning the student is ready for the Military and/or an Apprentice Program or a Tech School.

This usually takes about one year or less.

Ask if your Public School does this. Very few do. Congratulations to any one that does! Take advantage and learn math.

I recommend that any Parent, or Teacher, read the Preface and Introductions to the three Chapters in Dr. Simmons book. This pretty much explains what is wrong with the Standard Math Curriculum.

Algebra and Geometry really should be taught together.

This sometimes happens if the school is teaching what is called Analytical Geometry by the 11th grade. But, it is usually getting students ready for STEM.

Our program teaches this in Tier 4 too, for STEM students.

But, we first teach this to a beginning student in Tier 2.

In Tier 3 we teach any college bound student math needed for one of the standardized tests like the SAT or ACT.

Finally, ask what your school is doing to get its students who are interested in some STEM subject ready.

Are they teaching the obsolete Manual Tools for Algebra and Calculus, or a modern 21st Century Tool like Wolfram Alpha?

Even if a school is using some modern technologies like Chrome Books and online learning, it won't help much IF it is not teaching the right Math Topics in the right order.

So, First, what I would examine in any school is... are they using some form of SPIKE Pedagogy I explained in Chapter 1?

If so, are all five of the ingredients being satisfactorily delivered?

Then, I would examine the books they are using. If they are using large expensive books this is a huge red flag.

Unfortunately, this is what many states mandate.

One thing you can do is use our Syllabi for our Five Tier Program and compare it to the Syllabi of your school's math program.

Remember, this is NOT a criticism of the math teachers. They are 'victims' of the SMC just as much as the students are.

Actually, it's not really the fault of the school's Administrators or even the School Board either. They, too, are victims of their State's Standards which are essentially established by the Math Education Leaders.

Unfortunately, our current Standard Math Curriculum is the result of an “evolutionary” process over the last two hundred years, and not “intelligent design” utilizing modern technologies and asking just what a modern math student needs to know, if you'll pardon the analogy.

I've been watching it for about 65 years now. See Chapter 10 for how it is ruining our Public Schools. So sad.

Hopefully, the Homeschool Community can lead the way to a revolution in our Public Schools Math Curriculum and Delivery Systems.

In a Nutshell, as Simmons might say, just compare our Six Tier Syllabi to your Public School's Syllabi.

Also, compare their Delivery System Pedagogy to our SPIKE Online System.

Chapter 10: Why Public High School Math is Failing our Students

Questions to Start

What happens if a student gets discouraged with math early in his or her middle or high school career?

What happens if a student decides s/he can't understand math and pass the required tests to graduate from high school?

Give up on High School and Drop out?

If so, what does this cost the Student in terms of his or her future job opportunities and life?

What is the effect on the Student's life and family?

What does it cost the school in terms of funding?

What effect does it have on the community?

What does it cost our economy?

What effect does it have on our society?

My answer is that this is a horrible situation, especially considering it is so unnecessary.

What happens to a student who is interested in some STEM subject and can't learn the necessary modern math Tools and Concepts to compete with better trained students?

You tell me.

I think the consequences are horrible for the student, our economy, our society, and our future.

And, this is all so unnecessary today.

Let's think about and analyze the effect our current Standard Math Curriculum is having on our Public Schools. NOT GOOD!

There are basically three categories of students.

1. Students who are not going to college but need to learn the Workforce Math necessary to pursue a wide variety of career paths in the technical world we live in today.

This Math can be taught to them in about one or two years if Proper Content and SPIKE Pedagogy is utilized.

Many of these students are the ones who drop out of school if they become too discouraged with the math taught in the Standard Math Curriculum.

This is a huge loss and cost to our economy and society, and of course, a real disaster for the student.

And, it so unnecessary today thanks to modern technologies! SAD!

2. Students who plan to go to college, but are not interested in STEM subjects. These students need the same Workforce Math along with some Consumer Math.

They also need some extra Math to excel on exams like the SAT or ACT or CLT. But, they don't need very much additional math. See Tier 3.

They also need coaching on how to take a timed tricky exam efficiently.

Why do rich kids have an advantage over poor kids?

Again the Standard Math Curriculum is not an easy way for them to get just what they need for reasons explained in Chapter 9.

Most of these students survive our current SMC, if they are lucky.

But, it is very unpleasant for them, and costly to our schools and society.

3. Students who wish to study STEM subjects. This is where our current Standard Math Curriculum is most deficient. See Chapter 6.

You need to understand STEM Math to fully understand this situation.

This is a HUGE TRAGEDY today.

This is why our students are at such a disadvantage when competing with students who are properly trained with modern technologies.

This is the reason Homeschool Math can be vastly Superior to Public School Math.

No doubt this will be a very controversial statement, but to anyone who really understands STEM Math requirements, it is obvious.

Think what the consequences for our economy and society are.

So, just in case you have not read the previous Chapters, here is a quick synopsis of the situation.

The Standard Math Curriculum is the Culprit as explained as follows:

First, “. . . is too compartmentalized”.

Our modern math curricula divide math into a variety of subject areas called “precalculus math” including: Prealgebra - - - Algebra - - - College Algebra
Plane Geometry - - - Solid Geometry - - - Trigonometry Analytic geometry
- - - Finite Math - - - Etc.

This division has its roots in the 19th century math curricula and has not advanced much in the sixty years I have been involved with mathematics, as student, teacher, and mathematician. “Evolution” not “Intelligent Design”?

The student is left with the impression that these various subjects are somehow independent areas.

This is a horrible misconception, unfortunately shared by some teachers who are often forced to “specialize” on one or two topics.

These subjects are intimately related and interconnected, as any good mathematician would tell you.

It is difficult to solve many modern practical problems without invoking concepts and techniques from several of these areas simultaneously.

The sooner a student realizes this and achieves a basic mastery of several of these topics, the better.

A student needs such a Foundation as early as possible.

And, it is possible in about one year thanks to modern technologies and a modern curriculum like Workforce Math.

Let me give you a quick example.

Find the area to two decimal places of the triangle whose sides measure 3.00 ft., 4.00 ft., and 6.00 ft.

Answer 5.33 sq. ft.

This is the type of problem that could arise in a practical situation.

Looks easy, but it is not UNLESS you are properly trained and can use a Scientific Calculator. We do this in Tier 2!

The usual area formula from geometry is not applicable.

You can solve it with algebra and geometry (simultaneous quadratic equations), but this is tedious and difficult, especially without a calculator.

You could apply Heron's formula if you knew it. Not easy either.

A good solution is to use some trigonometry and a calculator.

Then it can be solved in less than a minute by any Practical Math Foundation, Tiers 1 and 2, graduate.

And, it is just as easy to find the area of any other triangle with three known side lengths.

Try 13.5 in, 16.8 in., and 25.6 in. Answer. 102.9 sq. in.

Students delight in being able to do this quickly and easily.

In the standard high school math curriculum this problem probably would not be presented in a geometry class.

Problems are rigged to be solvable with the limited tools presented there.

Give this problem to any high school math graduate or teacher and see how long it takes them, if they don't just give up.

So practical problems such as this may require up to three years of math courses to solve, and this is just one of many such examples.

This is simply unacceptable considering how unnecessary it is.

It's quite unfair to the student.

In a modern curriculum these various subjects should be taught in a tiered or layered manner so the student can realize their interconnections very early on, say within three months.

For example, in the Tiers 1 and 2, basic facts and techniques from Algebra, Geometry, and Trigonometry are all presented so the student can see the interconnections very early on, and solve many practical problems quickly and easily.

It takes all three of these subjects to accomplish this.

The Practical Math Foundation takes a student about forty hours (+/- twenty hours) to complete over a one to three month period.

The modern Tools should be introduced and used as early as possible.

They make the understanding of the Concepts much easier, and the solutions of the problems much easier too, which any Employer will demand.

The Scientific Calculator needs to be introduced and utilized very early.

Learning the old manual algorithms one will never use are a serious impediment to learning math.

Wolfram Alpha.

This is the amazing 21st Century Tool (2009) that revolutionizes how Algebra, Analytical Geometry, Trigonometry, Calculus, and much more should taught today.

This is the CRITICAL DEFICENCY in the Standard Math Curriculum.

If course, it requires the creation of a whole new Math Curriculum as we have done in Tiers 1,2,3,4,5 and 6.

Wonder why the Math Ed Community has not done this yet?

You tell me.

Could it be the Huge Investment in the Standard Math Curriculum?

No expensive books?

Online Teachers?

Coaches at the local level?

Revolutionize the Standard Math Tests to take account the needs and goals of the three distinct categories of students.

Hopefully, the Homeschool Tribe can lead the way by demonstrating how successful this 21st Century approach can be compared to the obsolete horribly expensive and ineffective SMC.

Supra... which means Beyond.

Chapter 11: Financial Facts of Life

What kind of a life can an adult have IF s/he can earn \$25/hr or more in a modest cost of living area in the USA in 2019? Your thoughts?

My belief is that if the adult is single, then the adult can work part time about 20 hrs. per week (\$500/ wk) and live a pretty good life from a financial perspective.

Two such adults can room together with a combined budget of about \$4,000/Month. A very good life from a financial perspective!

Or, an adult can live with some older person as a tenant and help out and live a pretty comfortable life for \$2,000/Month.

Then the adult can do many other things of interest in the remaining 148 hrs in the week. Do you agree?

11 hours per day for eating and sleeping and other necessities, leaves X hours for study and life improvement.

$X = 71$ Hrs

Suppose you are earning \$500/wk for 20 hours of part time work.

You will find out that you can learn many other things very quickly if you are free to use the library and all the myriad online sources and learn from other students, and even teachers.

Many teachers are eager to help an eager student learner even if the student is not enrolled in the class.

If the adult is the 'bread winner' in a family, then it would take about 40/hrs per week (\$1,000/wk) to provide a comfortable life for the family.

Notice, "adult" means any male or female no longer a child.

To achieve a \$25/hr income legally an adult will need to learn some skill that someone will pay \$25/hr for this skill. Obviously?

So, my advice to any student is to plan to learn such a skill ASAP. How?

First, try to figure out what kind of skill you would enjoy learning and practicing. It can be any type of service or activity people pay for.

Find someone that has this skill and offer to work as an assistant to learn this skill, which should take a few years.

Work for free, if necessary, at first and then the skilled person will begin to pay you more and more as you become more and more valuable as an assistant.

You might find a company that will do this too. But, more than likely it will be some small company or independent worker.

In order for this to work out, you must “learn to learn”. You must have discipline and a long term view for your life.

Now, suppose you decide to choose some technical skill you want to acquire. The challenge is to get someone to hire you as an assistant.

The chances are that you will need to know what I call Workforce Math in order to understand the things you will need to learn this technical skill.

So, the first thing you should do is learn Workforce Math.

If you are in high school and your school will teach you Workforce Math, great! Go for it!

In learning Workforce Math you will be 'learning to learn' as well as learning math. This is called gaining workforce maturity!

If your school won't or can't teach you Workforce Math, then you will need to “homeschool” yourself, hopefully with some adult “coach” to help you.

Thanks to modern technologies, you will be able to do this in just a few months and for a very low cost.

Mostly, it will be your efforts as you learn math and learn to learn.

What about college?

If you are interested in “college”, but aren't ready to go into debt and aren't sure what you want out of college, then just go to a “college town” and work there part time with your \$25/hr skill.

Now, you can associate with college students, perhaps audit some college classes, and participate in the college scene as you mature.

It should be a lot of fun, and I can tell you many students will envy you since you are financially independent of your parents.

Now, if after spending some time in the college life you decide you want to go to college to acquire some credential or specialized advanced knowledge, you may very well be able to earn a scholarship.

If not, go to some good state school.

Here us how to do this without incurring a lot of debt.

Suppose you want to go to the University of Illinois in Champaign, which is a really top school in your field of interest.

But, you live in some other state today.

Go to Champaign and work part time for a year and establish Illinois residency. Get an Illinois driver's license.

Learn all about the U of I and be sure it is the school you want to attend.

Enjoy the college life as described above.

Then enroll as an Illinois resident and pay in-state tuition.

You will then probably be able to pay your way through college with part time work during the school year and full time work in the vacation times.

You will want to get into the advanced classes in your chosen major field ASAP. Audit the beginning courses during your initial stay there, and then sign up for the advanced courses when you enroll as a regular student.

When auditing these courses you should meet and befriend some of the leading professors. This is probably easier than you think.

Just stay after a class and ask them some “good questions” you should have researched first, or visit them during their office hours, or go to department “teas”, etc.

Talk to and learn from the older students majoring in your field of interest.

After a year or two you will probably be able to get a scholarship or some type of paid internship in your chosen field.

Your goal is to graduate with a degree and credential and great recommendations in your chosen field with NO school debt.

It might take you two or three extra years, but you will also have much more maturity and probably a much better recommendation.

And, NO DEBT! Think how proud your family will be of you!

Compare this to a student who drops out of high school with no particular knowledge or skill, or even graduates from high school with no particular knowledge or skill.

No matter what “minimum wage” bill is ever passed, that will not lead to a good financial situation IF you don't learn some valuable skill.

Routine jobs that can be learned in just a few days will not pay very much and usually don't lead to better jobs. And, they are disappearing anyway.

Smart machines are replacing routine jobs requiring few skills.

Our economy is changing rapidly and you must develop skills consistent with the needs of our evolving job markets.

Learn to Learn!

For technical skills learn Workforce Math, and keep on learning more and more as your life evolves.

Life in the USA will be financially great for anyone who learns to learn and acquires a valuable skill, and over a life time more and more skills.

Math is a sort of Universal Language that will open up many career paths, many of which don't even exist today.

And, it all starts with Workforce Math.

Or, better yet, just join the Family Plan and try it for a month at no risk to prove it works for you.

Chapter 12: Future of our Economy

Wow. What a world we live in!

The 21st Century Economy is evolving faster and faster each year.

Machine Learning, Robots, A.I., Electric Vehicles, Energy Independence.

On and On!

This means new jobs and careers are unfolding at record rates.

Old jobs are disappearing at record rates too.

BUT, these new jobs and careers require new knowledge and skills.

What is the role of education in the new economy of the 21st Century?

My answer is to teach our students how to learn and to teach them the underlying knowledge required to learn these new skills for these new careers.

Literacy is still important as it has been for a long time in the old economy.

However, I believe that some Math will be equally important.

Matheracy may become just as important in the new economy as Literacy.

Math is the Universal Language.

Service Jobs that need Workforce Math.

Technical Jobs that need Workforce Math.

Projects that need Workforce Math.

Quantitative Reasoning. Just Part of Workforce Math.

Risk Assessment. Critical to make good decisions.

CO2 Controversial Subject. See Dr. William Happer.

Nuclear Power. New world energy source?

Self Driving Vehicles. Coming soon?

Cyberwar. Who knows?

What about adults who are not educated adequately?

I asked Google how many high school drop outs in the USA there are.

What do you think the answer was? I was amazed!

“In the USA there is, on average, one student high school drop out every 26 seconds. That's about 7,000 per day and 1.2 Million Student Dropouts PER YEAR.”

What do you think are the financial consequences for a high school drop out? Short term, Long term, Global?

What kind of a legal job can s/he get?

How much can s/he expect to earn?

What will be the effect on the Dropout's current family?

What will be the effect on the Dropout's future children, if any?

On the school?

On the Community?

On the State?

On the USA?

Now multiple this all by 1,000,000.

Here is something to think about.

Many jobs today and in the future will be of a technical nature.

Hundreds of thousands of technical jobs will go unfilled according to “Ask Google”.

Learning any technology requires some Math understanding. Just visit www.hanetraining.com to see all of the many technical jobs we did training or that required at least some of the Math we cover in Workforce Math.

IF a student learns what I call Workforce Math, then the student can most likely join the Military and do quite well in some technical fields. I have seen that in my own extended family.

Or, the student can get into an Apprentice Program, or get an Entry Level Job with a company.

This will then lead to a high paid job within a few years.

A worker with technical skills can earn a very good living.

Naturally, the job evolves with technology, but the worker can easily keep up with the changes IF the worker has a good background and knows how to learn new things.

If a worker can learn Workforce Math, then the worker will be able to learn new technical things as life goes on.

Compare two students.

One learns Workforce Math and has a good well paid career.

The other is a High School drop out.

Consider that 80% of prisoners are high school drop outs.

This DOES NOT tell us what percentage of high school drop outs are in prison. But, common sense tells us that the probability of going to prison for a high school drop out is much higher than for a high school graduate.

You figure it out if you want to.

Percentage of high school graduates who go to prison is A%, and percentage of high school drop outs who go to prison is B%.

Bet you that B% is much higher than A%. What do you think?

But forget prison.

How do you think the material quality of life compares?

Then, how does this spill over into the emotional and spiritual quality of life.

What can be done about it?

Many High School Dropouts are actually quite capable and can still learn Workforce Math and then get into a good technical career path.

So, IF our Economy is going to reach its fullest potential we need to deal with the High School Dropout situation, and I believe it is possible with modern technologies now available.

The readers of this book can perhaps help a High School Dropout get onto a good path by educating them about the things I have discussed in Chapters 11 and 12.

What better good could anyone do?

It's the Golden Rule on steroids!

Indeed, contact me and I will help you with this endeavor.

Nothing is free in this life.

However, we can arrange it so the beneficiary pays for it out of future earnings that will accrue from his or her new abilities.

Win. Win. Win.

Chapter 13: Future of our Society

How do you define a great Society?

My definition is where all of the members are living productive happy lives.

One basis for such a life is a good financial situation for the person and his or her family. One way this can be achieved I discuss in Chapter 11.

An interesting Concept for a Society is “Tribes”. I recommend Amy Chua's recent book, *Political Tribes*, to get a good understanding of this.

A Tribe is a well defined group of people who share some Beliefs and agreed on Actions. Tribes have Members and Guests, and Enemies.

Two Tribes can be friendly or they can be enemies.

All too often conflicting Tribes try to destroy each other.

We are seeing a lot of this today in many different parts of the world, including the USA. (2019).

The ultimate conflict is genocide, where one Tribe annihilates another Tribe.

A large Tribe can have various smaller Sub-Tribes, some of which conflict with each other. There are many examples of this throughout history and today!

We are all members of some Tribes of varying sizes, and these Tribes change over time as people enter and depart from the Tribes, as both Members and Guests.

Members adopt the Beliefs of the Tribe, and Guests just pretend to while they associate with Members.

I personally have been a Guest of many Tribes in my life and a Member of very few. I see both Good and Bad in most Tribes.

For most of us, our smallest Tribe is our Family and then extended family and friends, and then the larger Tribes we find ourselves in due to our birth place and time in history.

Then most of us are Members or Guests of larger Tribes.

Society is the collection of all the Tribes within the Society.

I am going to discuss several Tribes that I believe are critical to our Society's future behavior and consequences.

The USA Education Tribe consisting of all Teachers, Students, and Administrators at all levels.

This is a huge Tribe and most of us have been Members some time or other, and many of us still are today.

Public Schools are one smaller sub-Tribe, but very large.

Private Schools are a smaller sub-Tribe.

Homeschoolers are an even smaller sub-Tribe too, but growing all the time.

I would say that the Public School Tribe and the Homeschoolers Tribe don't like each other very much.

Indeed, I'm guessing the Public School Tribe would like to see the Homeschool Tribe disappear and works with governments to achieve this.

It is my Belief that Public School Math Education needs to be dramatically and radically reformed in this 21st Century as I explained in Chapter 10.

I doubt this will ever happen just internally for many reasons that are pretty obvious.

I do believe that the Homeschooler Tribe can adopt a new Math Education System that is vastly superior to the current Standard Math Curriculum thanks to 21st Century technologies which empower SPIKE Pedagogy and new 21st Century Tools which make Math much easier to learn and practice.

Obviously, that is the theme of this book.

IF that happens, then I believe this will stimulate and force a reformation of Public School Math Education.

When that happens then I believe our whole USA Society will vastly improve. Why?

The USA Economy will improve in a healthy way when more and more USA citizens can have financially solid lives due to a good technical Career.

This is what is empowered by Workforce Math and STEM Math.

Do you agree?

I don't judge an economy just by its global GDP numbers.

I judge an Economy by its ability to distribute wealth creation and wealth consumption widely among its members and their families.

This requires a combination of both socialistic and capitalistic ideas and concepts and practices.

I was very fortunate to have three wonderful Math Teachers in my life which then empowered me to create a lot of wealth by helping a lot of people and distribute this wealth among my many family members and friends and associates, who are now creating more wealth and distributing it.

If one person in ten becomes Matherate and then Economically Successful, that will go a long way in creating a wonderful Economy and Society.

Today one person's efforts are greatly amplified by new technologies.

What about the Whole World?

After all the USA is just only about 5% of the world's humans.

I believe that IF the USA can create the new technologies for very cost effective energy and material products and food, THEN this can be spread throughout the world to everyone's advantage.

I hope that will then allow many of the world's Tribes who now compete and hurt each other in various ways to become more tolerant and get along.

Maybe we can achieve world peace IF we can create good living conditions for everyone, which modern technologies should empower.

For better or worse, the USA has become a world leader in many ways economically with the world's Reserve Currency and the world's most powerful Navy and Military.

We should be able to spread material wealth and security throughout the world. But to do this we must first do it at home.

Obviously, I believe a modern effective Math Education Program can help this in the ways I have discussed in this book.

It is now up to you, the reader, to decide if and how you can participate in this opportunity.

I pray for us all, and wish you well.

Chapter 14: Future Mathematicians

This Chapter is for those parents or teachers who might have a precocious math student who might wish to consider a career in mathematics.

This will not be an easy chapter for people not well educated in mathematics.

But, perhaps it will give a layman an idea of what is needed for those relatively few precocious students who are potential mathematicians.

Short Changing our Best Math Students

What is more important to us as parents and educators than delivering an adequate education to our students?

Very few things I would say.

Until this 21st Century, the best we could do is what we are doing today.

Batch teaching in our massive school “factories”. A Second Wave approach.

Today, our modern technologies empower us to deliver a Third Wave type of education that is vastly superior in virtually all ways to our current system . . . and more cost effective too.

But, what this means for our brightest and best Math students is even more dramatic.

And, it may one of the most important things we can do for the long term health of our society.

Imagine that we did not have youth sports activities, both in and out of our school systems. No Little League, or Junior Football.

Suppose our athletes had to wait until their late teen years to obtain good sports education and coaching.

How good would our best athletes be?

Same for music. Suppose we did not start teaching music to a future musician until s/he was in late teens or twenties.

Here are some Concepts we should be teaching our future mathematicians.

This can be done for a precocious student very early in their life.

1. The Axiomatic Method and Rigorous Number Systems
Natural, Rational, Real, Complex, Hyperreals, etc.
2. Math Models
Algebraic, Geometric, Topological, Linear Algebra, etc.
3. Modern Math Structures
Topology, Groups, Fields, Hilbert Spaces, etc.
4. Chaos and Non-linear Dynamics - Extremely important for Science
5. Spectral Logic - Basis of modern control systems.
Propositions can be assigned truth values between 0 and 1.
6. Fractals and non-integral dimension
7. Infinity - Many sizes of Infinite sets. $\#X < \#P(X)$
8. Axiom of Choice and Zorn's Lemma
9. Infinitesimals - Archimedes to Robinson 1966
10. Impact of Modern Math on Science
11. The Black Swan and risk analysis
12. Other topics TBA

One of my Goals for the Future is to teach these topics in Tiers 7-10.

See my eBook, *Teaching Math* for details.

Of course, “Man Plans and God Laughs” is my favorite Mantra.

So who knows if this will ever happen?

It might depend on you, and The Homeschoolers Tribe reaction to this situation.

Bring on the Math Prodigies.

Chapter 15: Conclusions

If you have read the relevant Chapters of this book, you should know what my Conclusions are. Here they are in a Nutshell.

Identify one or more students who might benefit from a good Math Education Program, whether they have succeeded in other programs, or not.

Go to HomeSchoolerToday.com and enroll them in one of the Program choices there.

Probably the best choice is the Family Plan whereby they can try the program for one month with no risk since they can cancel and get a refund if they don't like it for any reason.

Try to be sure the student has a good Coach as described in Chapter 8.

Enjoy the many Benefits that will accrue to the student and his family.

In the meantime, you may enjoy the many Free Resources there if you are just interested in math. Enjoy!

Easy Peasy.

Here's wishing you a great life!

Addendum 1: Sapien's Communications (- - 1950)

Communication Modalities

Note: “Sapien” = “Homo Sapien” = “Human Being”

Non-verbal communications

Most mammals have a wide variety of non-verbal communication skills. A gesture, look, motion, or other method can communicate a wide variety of actions and feelings. Most of this involved sight.

Various audio sounds were also used by most mammals also to communicate various things.

Sapiens (Human Beings) utilized these non-verbal modes of communication for a very long time.

Then eventually, audio sounds were created that also communicated various nouns, verbs, and other concepts and activities.

This may be when Sapiens began to adapt to the environment and to dominate other species.

Verbal Language - Communications

Long, long ago, Sapiens began to put together audio sounds to create verbal signals to communicate a wide variety of things necessary for a more complex life and society.

Sapiens have been Tribal from the very beginning of our history. No Sapien can survive without the smallest Tribe of a Mother and Father.

A Tribe is a group that lives together and communicates and has agreed upon rules of behavior.

I would imagine that living in small Tribes whose very survival depending on superior communication skills was the genesis of verbal language.

Natural Languages - Universal for Sapiens

A Natural Language is a verbal language shared by a Sapien Tribe.

There are an estimated 6500 Natural Languages in the world today shared by about seven billion (7,000 million, 7,000,000,000) living Sapiens.

Most Sapiens have one Native Natural Language they learned when very young. The largest of these is Mandarin Chinese.

Many Sapiens have a second Natural Language they acquire later in life to better communicate with other Sapiens.

English is the native language for about four hundred million Sapiens.

However, English is used by over one billion people worldwide.

Written Languages - Beginning of Civilization

Verbal communications was limited to one on one or small group communication at a specific place in time and space.

Sapiens then invented a way to express audio languages in a symbolic format which could be communicated to much larger groups of Sapiens over space and long periods of time.

This is what eventually began to create what today we call Human Civilization.

In the beginning only a very small percentage of Sapiens could create and read written language. They became a part of the elite ruling class.

Very few Sapiens could “read and write” until the 15th Century in what we call Western Civilization.

Far Eastern Civilizations did this earlier.

Mathematics - a Universal Language

Mathematics can also be considered a Universal Language used by most Sapiens.

There are many things that can be communicated in the Mathematics language that are difficult or impossible to communicate in a Natural Language.

Indeed, it is the language of Mathematics that is responsible for our modern civilization which could not have happened with just Natural Languages.

Printed Languages - Modern Civilizations

The first printing press was produced in about 1450 and modern Western Civilization was launched.

Suddenly, it was orders of magnitude easier to create and distribute written documents.

Now, many more Sapiens needed to learn to read written documents and knowledge could be spread among more Sapiens exponentially.

The first printed copy of Euclid's Elements was created in the late 15th Century. This was the first Math "textbook" and was the beginning of a vast creative movement to build on Euclid and Archimedes and create new mathematics.

There would have been no Galileo or Newton or Leibniz without the printing press.

Then came Calculus, Differential Equations and modern STEM Math which is the basis of modern Science and Technology.

Then came Martin Luther and the split of Christianity. Rome lost much of its power.

[I am ignoring all that happened in the far east prior to this and focusing just on the Western Civilization.]

Natural Languages and Mathematics were pretty much the basis of modern civilization up until the mid 20th Century.

In Mathematics the Problem Solving Techniques were limited to manual algorithms that could be carried out with pencil and paper and then printed for wide distribution.

This took Sapiens through the first industrial revolution and modern science theories like Relativity and Quantum Theory.

Then we developed a new Technology which was destined to propel us into a whole new revolution. The first Electronic Computer was developed in 1946 right after WWII and the Bretton Woods agreement. The new World began!

Addendum 2: 21st Century Communications (1950 – 2019)

Second - Modern Languages

Note: “Sapien” = “Homo Sapien” = “Human Being”

Computer Languages

Computers have their own unique language unlike any Sapien Natural Language.

Essentially, computers communicate with a very simple binary language, 0's and 1's.

These are called Computer Languages.

Sapiens communicate with Computers via the Computer Languages.

These communications are called Programs, which consist of a sequence of Computer Language “commands”.

First came simple binary number words.

Then, Hexadecimal numbers and 8 Bit Bytes.

Then Assembly Language words or commands.

Then “higher language” program languages like ForTran and Cobol

Then Basic and Pascal

Easier and easier to write programs.

Then Python and Java and JavaScript, etc.

These higher and higher level computer languages were easier and easier to write programs to communicate with the computer.

Then, in 1988 a completely new much higher level language was created by a brilliant young theoretical physicist (Ph.D. at age 20 from Cal Tech), Stephen Wolfram, named **Mathematica**.

Wolfram has said that Steve Jobs suggested this name. Jobs did bundle Mathematica with his new NEXT computer and this was used to create the World Wide Web by Tim Berners-Lee.

Mathematica became a widely used programming language used by scientists worldwide.

Still a Mathematica Program was not useful for communicating with other Sapiens, only with a computer.

Computer program were NOT a practical way for two Sapiens to communicate.

No computer could understand a Natural Language Message.

No Human could understand a Computer Language Message.

In 2009, that all changed and the Sapien species once again entered a new level of Civilization.

Wolfram Alpha

Natural Language to Computer and MORE!

STEM Math is Revolutionized Too!

The Best is Yet to Come!

As Mathematica grew more and more powerful and tapped into more and more databases Wolfram wondered if it would be possible to create a Mathematica Program that could recognize simple Natural Language commands and translate them into a Mathematica program to answer the questions or respond to the command.

It turns out he could.

In 2009 a very large Mathematica Program (50 million line program) was introduced to the world which could answer Natural Language questions or commands.

<https://www.wolframalpha.com/>

Simply go there and type in questions or commands. Unbelievable!

It's now a Brave New World, for better or worse.
Essentially all the factual information in the world is at your finger tips and can be displayed in a wide variety of modes. Furthermore . . .

Wolfram Alpha Revolutionizes STEM Math.

Wolfram Alpha will solve virtually any Math Problem very quickly and in ways impossible manually.

A STEM student can now master Calculus and Differential Equations in a

very small fraction of the time required for the old now obsolete approach.

The manual algorithms which are very difficult to learn and master and which are limited in their capability are now obsolete.

Recall what the Scientific Calculator did for arithmetic operations. It was revolutionary in 1972 when the HP-35 made all manual techniques obsolete. No more Slide Rules and Log and Trig Tables.

Wolfram Alpha is MUCH MORE revolutionary.

Calculus and Differential Equations are no longer a Great Barrier to STEM subjects.

Wolfram Alpha is a great Tunnel through this Great Math Barrier opening the STEM fields to many more students. Truly, a New World!

In Tiers 4, 5, and 6 we present all of the STEM Math subjects in a revolutionary new way which is Vastly Superior to the Classical Standard Math Curriculum.

You don't even have to go to Wolfram Alpha to experience this.

Wolfram Alpha is the basis for SIRI on the i-phone.

Modern A. I. technologies have also made the understanding of Natural Language verbal commands possible, so we can even communicate with tools like SIRI via voice.

There is one "problem".

You can only ask one question or pose one problem at a time.

You can't write a more complex program with Wolfram Alpha to make your computer perform a more complex activity.

And, now that has changed too!

In 2016 a revolutionary new programming language was introduced to the world.

Wolfram Language will Revolutionize STEM.

Wolfram Language will Revolutionize how Sapiens deal with the world in myriad ways.

What if you could write a Mathematica Program using Natural Language commands?

And, what if it was easy to understand the Mathematica Program just by looking at it?

For the first time in history, one would be able to communicate with BOTH Computers and Sapiens with this new language.

Stephen Wolfram combined the natural language of Wolfram Alpha with the Mathematica Programming Language to create Wolfram Language.

Now, a Sapien can write a Wolfram Language Program that is quite complex and sophisticated that the Computer can execute AND that another Sapien can understand too.

Stephen believes that modern properly educated Sapiens will now have a new language to communicate with that is vastly superior to any Natural Language in many situations.

Just from a very brief study of the Wolfram Language I believe he is right.

A student today can learn Wolfram Language much easier than any of the classical computer languages like Python or Java, etc.

Better yet, a Sapien can look at a Wolfram Language Program some other Sapien has written and understand it too!

Indeed, Stephen says that he can express many things in Wolfram Language that is difficult or impossible to express in any Natural Language.

Today, one can obtain access to all the Wolfram Tools, Mathematica, Wolfram Alpha, and Wolfram Language in one small inexpensive Computer that has many other advantages and features too!

The SupraComputer. 2018

Wolfram bundles all three of the Wolfram Tools with the Raspberry Pi, RPi, a wonderful single board computer that costs \$35 USA\$ from the UK.

The RPi uses the Linux Operating System which has many advantages, and requires a variety of peripheral components, and is pretty difficult for a non-technical person to use.

The SupraComputer is based on the RPi with a lot of peripheral components, and many other educational components that is very easy to use.

Simply go to: <https://supracomputer.org/> to learn all about it.

You will note the SupraComputer comes with many things that are of great value to students of all ages.

The SupraComputer is a great way to surf the Internet without fear of viruses thanks to Linux.

Along with the Six Tier Program the SupraComputer revolutionizes modern math education.

Modern 21st Century Math Education is Vastly Superior to the obsolete classical 20th Century Math Education called the Standard Math Curriculum.

It is just as difficult today to foresee the next 50 years and future generations' lives as it was to foresee our futures was in the 1950's.

I know, I lived through all of this, and I can tell you NO ONE foresaw the future we are living in today with such technologies as:

Smart Phones – Blockchain - Convolution Neural Networks - Alpha Go - 3D Printing - 5G (Internet of everything - Autonomous vehicles - Space revolutions – CRISPR- Cas9, Thorium Nuclear Reactors, and on and on.

Prepare your children for the future.

One good way is to teach them modern 21st Century Math and now, introduce them to Wolfram Language via the SupraComputer.

Is this a Sales Message?

YES.

First, educate yourself, and then . . .

Give your children a wonderful future with the latest 21st Century Math Education and Technologies.

Two choices available today are:

<https://homeschoolertoday.com/> for Math Education both Free and No Risk Products.

<https://supracomputer.org/> for Wolfram Tools including Wolfram Language and MORE!