Shormann Math, Algebra 1

Connecting Math to Your World and Your Creator

Core Ideas, Course Description, and Table of Contents

Overview

The following pages describe the essence of *Shormann Math*, the latest product from DIVE, LLC! Unlike our DIVE Math Lectures that teach the content in textbooks authored by the late John Saxon, *Shormann Math* is a standalone curriculum. ***Shormann Math* is designed to connect students to their world and their Creator by using an incremental approach with continual review to teach 10 major math concepts from a Christian foundation.** The 10 major concepts are: number, ratio, algebra, geometry, analytical geometry, measurement, trigonometry, calculus, statistics, and computer math. The first course produced will be Algebra 1, followed by Algebra 2, Precalculus and Calculus.

If you are wondering "Where's the geometry?" in the 4 courses listed, it's there! Because scholars consider mathematics to be "the language of science," *Shormann Math* teaches math like a language, where you don't just learn nouns for a year, verbs for another year, etc. You learn a little of each concept, combined with lots of review, and then you combine the different concepts together. So, ***Shormann Math* Algebra 1 and 2 will contain a full credit of geometry**, including plenty of proofs, even some straight out of Euclid's famous book, *The Elements*. We'll even cover non-Euclidean geometry, and show students how the concept of proof applies to all of mathematics, not just geometry. All the geometry, and trigonometry, a student needs to be ready for the SAT or ACT are covered in Algebra 1 and 2. Scroll down to the Algebra 1 Table of Contents where you can see more detail about geometry coverage.

While *Shormann Math* will guide your child through high school algebra and geometry, that is not our primary goal. Our primary goal is to connect your child to their world and their Creator by teaching them math, the language of science, from a Christian foundation. And because the last 300+ years of technological innovations can be connected to calculus in one way or another, we will present calculus early and often, and not in an intimidating way, but in a gentle way that is based off things they already know.

Unlike many new math programs, *Shormann Math* is not about an entirely different approach. Instead, Shormann math builds on a foundation of time-tested and proven methods. Famous mathematicians and math educators like Euclid, Euler, Saxon, Whitehead, Kline, Sawyer, Nickel, etc. were studied for years before work on *Shormann Math* began.

For 2014-15, *Shormann Math* will be offered as a live, online class only. Please read the following for more details on *Shormann Math*, including the Algebra 1 Table of Contents. Then, if you are ready to dive into this new adventure in learning math, click here to register!

Core Ideas

Defining mathematics

Thinking of mathematics as the "ship" and the definition as the "captain", a good captain can use the ship for what it's designed for. A good captain knows who built the ship. A good captain can help others better understand what the ship is capable of. Here is how mathematics is defined in *Shormann Math*:

> **mathematics**: the language of science and a God-given tool for measuring and classifying pattern and shape.

This definition tells us that mathematics, with all of its unique symbols, is best thought of as a language. It is a language we can use to study creation. Next, this definition tells us mathematics is about measuring things. It also tells us mathematics helps us find truth, goodness, beauty, and unity and diversity as we classify pattern and shape.

But most importantly, this definition of mathematics tells us "who built the ship." Mathematics is not man-made, it is God-given. Created in His image (Genesis 1:26), we are designed by God to use this tool to be creative, too! God designed us to be creative and to engage in fruitful, productive activities (Genesis 1:28). Click here to learn more about the *Shormann Math* definition of mathematics.

Jesus Christ is the "Common Core" of Shormann Math

Perhaps you have heard of the United States government's "Common Core" curriculum. Perhaps you have also heard that a lot of people are concerned about it. Leading experts believe the Common Core's mathematics standards will not prepare students to study science, technology, engineering, and math (STEM) in a selective four-year college. And a white paper by the Pioneer Institute concludes by saying

> "At this time we can conclude only that a gigantic fraud has been perpetrated on this country, in particular on parents in this country, by those developing, promoting, or endorsing Common Core's standards."

Unfortunately, man and his ever-changing ideas are at the core of this curriculum. At DIVE, we strive to place Jesus Christ at the core of all our products, and we pray that this will result in students learning math and science for His glory and the service of others. So, even though our primary goal is NOT to prepare students for STEM, we believe by putting Christ at the foundation, students will naturally be STEM-ready, because they learn to use mathematical tools that connect them to their world and their Creator.

Mathematics History Matters

Most modern mathematics curricula ignore math history. But core ideas have consequences, and studying history often reveals which ideas are worth repeating and which ones aren't. Did you know that Isaac Newton, author of the most famous science book ever written (*The Principia*), based the format of

his book off of Euclid's *Elements*, the most famous math book ever written? Did you know *Shormann Math* bases its format off Euclid's and Newton's famous works, stating rules and definitions up front, and using these as the building blocks to learn new concepts? Did you know that modern mathematics has a rich Christian heritage? Well, if you use *Shormann Math*, you will learn all about these things and more! Whether or not you are using a classical, trivium/quadrivium approach to your child's education, understanding mathematics within a biblical, historical framework will help students make more sense out of what they are learning and why they are learning it.

The 10 Major Concepts of Shormann Mathematics

After years of teaching mathematics, researching math curricula and math history, and applying mathematics as a scientist and engineer, I've concluded mathematics can be taught by covering 10 major concepts. **The 10 major concepts taught in Shormann Math are: number, ratio, algebra, geometry, analytical geometry, measurement, trigonometry, calculus, statistics, and computer math.** While all 10 concepts can be taught in any K-12 course, specific concepts will be emphasized more or less at appropriate times. For example, number and ratio will be emphasized in younger grades, algebra in Algebra 1 and 2, etc.

I know you might be thinking "But Calculus is one of the 10 major concepts! How can you possibly teach calculus to a kindergartner, much less an Algebra 1 student?!" Well, if you have even an 8th grade level of math proficiency, you know that if it took you exactly one hour to drive 60 miles, your average speed would be 60 mph. If you understand that, you already understand something about calculus, because calculus is really nothing more than studying rates of change. And yes, it gets more complicated than that example, but it also gets less complicated, too, so much so that there are things about calculus you could teach a kindergartner!

Most state mathematics standards do not include calculus, and none that I know of require calculus in high school. And the Common Core math standards include no calculus, and almost no precalculus either! However, the discovery of calculus is one of the greatest mathematical achievements ever! All the great technological achievements of the last 300+ years are in some way or another related to calculus! And proficiency in calculus opens the door for a student to choose any college major, while an inability to pass calculus limits a student to about 20% of college majors.

But more important than all of that, calculus has to do with the infinite, which has to do with eternity, and if you look at history, the only way anyone would have known that eternity is real is if they read (and trusted) Scripture. So, perhaps, one of the main reasons calculus has been for years presented as this "scary subject" that less than 1% of the population can master, is not for academic reasons, but anti-Christian reasons? The historical evidence for this is quite compelling, and one of the few places you can learn about it is in Shormann Math!

For high school mathematics, most home schools and private schools simply parrot whatever their state standards are, which means they complete Algebra 1, 2, and Geometry, and check off math on their transcript, not really knowing why they did math this way. With *Shormann Math* though we want you to know why you are doing math differently. We are going to paint a broader brush than most math

curricula, while at the same time helping you become proficient in standard Algebra 1, 2 and Geometry concepts. Along the way, rather than avoiding calculus because you heard it was scary, you will be gently introduced to it and, before you know it, you will be understanding more calculus than all your peers, and probably even your parents, ever did! Rather than an afterthought or a scary thought, *Shormann Math* makes calculus a normal, natural part of the curriculum, and culminates with a formal (and yes, it's optional!) calculus course that will prepare students to receive college credit via CLEP or AP Calculus Exams.

Done in a thoughtful and age-appropriate way, all 10 major concepts can most definitely be taught in a K-12 mathematics curriculum.

Using Math to Unlock Mysteries, Reveal God's Beauty, and Interact with Others

Shormann Math teaches students that mathematics is the language of science, and therefore an important tool for unlocking important tool for unlocking mysteries and revealing the amazing beauty found in God's creation. It is also an important tool for interacting with others, such as when buying and selling things. *Shormann Math* will train students to become skillful at using mathematics in a way that will help them become productive members of God's world, using their talents to serve Him and serve others.

Shormann Math teaches students what mathematics is, and how to solve problems using mathematical concepts. In math, problem solving is simply the application of mathematical concepts in new situations. It is about building on foundations that have already been laid, using mathematical tools developed over the centuries and applying those in new situations to solve problems. This is the essence of deductive reasoning, which is simply about applying rules. Mathematics is primarily deductive in nature, while scientific investigations are inductive (about finding rules).

What follows is a partial list of areas that mathematics is used, and that you may see covered in a *Shormann Math* Practice Set. At least one problem in each Practice Set will be about one of these areas. If you don't see an area you think we should cover, let us know. One thing is for certain, *Shormann Math* students will not be asking the "what am I ever gonna use this for" question regarding math!

Science: astronomy, chemistry, biology, physics, biochemistry, computer science, oceanography, meteorology, medicine

Farming: animals, plants, aquaculture

Natural history: geology, volcanism, genealogy

Business: marketing, accounting, finance, business startup, productivity, employment

Engineering: mechanical, electrical, petroleum, aerospace, civil, industrial, robotics

Architecture

Art

Sports: baseball, football, basketball, soccer, fishing, tennis, NASCAR, track & field, volleyball

Music

Standardized Test Prep

The main purpose of *Shormann Math* is to help students use math to become more creative like their Creator, glorifying Him and serving others. However, that doesn't mean *Shormann Math* cannot prepare students to take standardized tests, too. To the contrary, **by the time a student finishes *Shormann Math* Algebra 1 and 2, they will have covered all the math concepts presented on the SAT, ACT, CLEP College Algebra and CLEP College Math exams! And by SAT, we mean the new SAT, scheduled for release in Spring 2016.** From what we've seen of the new SAT, the math looks more capable than before of testing a student's ability to complete calculus, as well as treating math as the language of science.

Regarding standardized test prep, From Lessons 26-100, Practice Set problem #15 will ask a question about a concept covered on either the SAT, ACT, CLEP College Math, or CLEP College Algebra exam.

Again, you might be asking, "Why are you having Algebra 1 students solve CLEP College Algebra questions? How could they possibly be ready for that?!" Well, first of all, CLEP College Math and College Algebra exams are covering things a normal high school Algebra 1 and 2 course covers. Also, the incremental approach taken in *Shormann Math* will help a student progress from simple to more challenging concepts in a steady and patient manner. Finally, every standardized test prep question asked will be based off of a lesson the student has already covered in *Shormann Math*. They won't be asked questions they have never covered.

Course Description

General Description

100 lessons, presented as text and video lecture formats

20 Homework problems per lesson. The homework is called the Practice Set. There will be a few problems from the current lesson, but the rest are a review of previously learned concepts. Each homework problem is cross-referenced back to the lesson that taught that concept. . On the e-learning version of the course, students will receive a 25% penalty if they miss an individual problem, as opposed to getting that problem 100% wrong. This allows them to go back and review their notes, check their work, etc., and try again. Assessing a penalty also allows the Practice Set problems to be treated more like practice than an exam. Just like when playing a sport, practice time is for skill building, where some mistakes are to be expected.

4 Quarters. Each course is broken into 4 quarters of 25 lessons each. The first quarter is review plus foundations for the rest of the course. The lessons are a little longer, but the Practice Sets are a little easier. The remaining three quarters focus on presenting new concepts. The lessons in these quarters are shorter, but the Practice Sets are a little more challenging because more new material is being covered. However, every lesson builds off of something learned in the first quarter. This connectivity to previous lessons helps the student learn about mathematics' deductive nature, where new concepts are building off of previously-learned ones. This also makes math less intimidating, because almost no new concept is entirely new, but is building on something the student already covered.

Weekly Quizzes. Students will take a timed weekly quiz based off the lessons they covered that week. They are allowed to use their lecture notes during the quiz. If they understood the concepts covered that week, the quiz will be easy.

Quarterly Exams. Each quarter ends with an exam based off the 25 lessons covered that quarter. Unlike the Practice Set, the exam is like "the game," and problems are scored right/wrong. On the e-learning version, the student can take a quarterly exam twice, and their two scores will be averaged. This is a way for them to earn some extra credit by reviewing their missed problems, correcting mistakes, and trying again. For example, if a student makes an 80% on their first try and a 100% on their second try, their average would be 90%. They end up improving their score by 10 points for putting that extra effort into reviewing their exam and correcting their mistakes. Students also have two practice exams they can take prior to the actual exam. The practice exams are treated as part of their homework grade, and they will get an automatic 100% on them for completing them. You will learn more about how this works when you enroll in the class.

Standing on the Shoulders of Giants

If *Shormann Math* is better than other math courses, it is because we have worked hard to "see further by standing on the shoulders of giants," a phrase often attributed to Sir Isaac Newton.

Why do *Shormann Math* lessons begin by presenting Rules and Definitions? Because that is how Euclid did it in his book, *The Elements*, the most famous math book ever written. And Isaac Newton thought Euclid's idea was a good one, so he applied it in *The Principia*, the most famous science book ever written! Students who strive to memorize the rules and definitions will find they are able to solve math problems with more speed and accuracy. For proficiency in mathematics, understanding and memorization go hand-in-hand.

Why does Shormann Algebra 1 and 2 courses include content from Leonhard Euler's *Elements of Algebra*? Because all modern algebra courses are based in one way or another off his book! Euler, son of a Christian pastor and a godly Christian family man himself, is considered the best mathematician ever. In *Shormann Math*, we go a step beyond other math books, revisiting Euler's historic work by having students solve some of the same problems Euler presented. And not just any old problems, but problems that will help students develop proficiency in algebra.

Why do *Shormann Math* courses incorporate an incremental approach to learning, coupled with continual review? Because that is how the late John Saxon, author of a famous math curriculum with proven results, taught math. Whether John Saxon realized it or not, what he did was treat math like a language. In *Shormann Math*, we define math as "the language of science," and for good reason! If you are learning a language, you would not study nouns for an entire semester, then verbs, etc. You would learn a little about each, combine the different parts into sentences and phrases, and then build on that some more. *Shormann Math* is set up in a similar way, where students learn some foundational rules and definitions related to the 10 major concepts, practice them, and then begin connecting them together in various ways.

After retiring from a career as a flight test pilot, John Saxon started teaching algebra at a community college. He realized students weren't learning math very well with the curriculum he was assigned. He started researching how math was taught in Europe and Asia, countries that normally outperform the United States in mathematics, and applied what he had learned to creating his own curriculum.

As with a textbook authored by John Saxon or ones like it, in *Shormann Math*, a concept is presented, and then students are given several lessons to practice the concept before building on it in a later lesson. For example, in Lesson 5 of *Shormann Math* Algebra 1 on ratio, students review dividing numerical fractions. Then, in Lesson 39, they are introduced to simplifying complex fractions, which is very much like dividing numerical fractions, except the numbers have been replaced with letters. Later, in Lesson 62, they learn to simplify an even greater variety of complex fractions. Between lessons, the Practice Sets provide many opportunities to practice a concept before building on it in another lesson.

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