CHAPTER 1

—Nature of Math

The nature of something refers to what it is. Mosquitos bite by nature because of what they are as fallen creatures. This chapter, then, will investigate the question, "What is math?" The question includes four topics.

1.1 Definition of math
1.2 Spirit of math
1.3 Purpose of math
1.4 Extent of math

These four topics help us to understand four important aspects of mathematics: clarify its meaning, discern its moral quality, recognize its God-given purpose, and understand its content, use, and scope.

Before you can survey math in the Bible, you must know some things about math. The four sections of this chapter set the stage for your study. Further information on these and related topics can be found in the pamphlet *The Christian Teaching of Mathematics* (Greenville, SC: Bob Jones University Press, 1982). In the first section, we will answer the question "What is math?"

Section 1.1

Definition of Math

Memory Verse: 1 Thess. 5:21

Prove all things; hold fast that which is good.

Is math a good thing to study? This book will attempt to answer that question by checking math against the Bible. It will be easier to evaluate math as a subject if we have in mind a clear idea of what the term means. A definition of math will help immensely in seeking to evaluate math against the Bible. The memory verse, which commands us to "prove all things," will set the goal for our study.

Christians must test everything in life against the Bible. This is not always easy, but it is a solemn responsibility. Often we evaluate details against the Bible (what places should I avoid in town?) without evaluating the big picture (what country does God want me to live in?).

Bible-believers are not permitted to study some subjects. The occult is one such subject (Deut. 18:9-14; child sacrifice, divination, astrology, necromancy, enchantment, charms, witches, familiar spirits, wizards). Since some subjects are prohibited, a Christian must evaluate every subject that he studies. He must always ask, Is this subject permissible for Christians? In order to check math against the Bible, we must have a reference point as to what constitutes math.

We study math every year from kindergarten through high school, but it is not easy for most of us to define math. We may say that math is arithmetic or the study of numbers. Certainly math includes those things, but is that all there is to math? Math classes also include geometric shapes, graphs of equations, proofs of theorems, and proofs of trig identities. What is it that links all these different topics? What, then, is math anyway? Look at these definitions.

> Mathematics is the study of the measurement, properties, and relationships of quantities, using numbers and symbols. (American Heritage Dictionary)

> Mathematics as a discipline comprises (1) the symbols and operations used to represent quantitative characteristics of the physical world and (2) the principles and relationships found in an analytical examination of those symbols and operations. (*The Christian Teaching of Mathematics,* p. 1)

Compare the definitions. Each definition has various parts in order to encompass the variety of mathematical studies. Consider which parts of each definition include counting and arithmetic, properties, solving equations, classifying geometric shapes, proving geometric theorems, and graphing lines or parabolas.

You probably understand that when we count we measure the size of a collection. Thus, measuring includes counting and arithmetic as well as measurements to classify geometric shapes. The second definition uses the phrase "symbols and operations" for this group.

Properties include relationships among the symbols and operations. The commutative law of addition ($x + y = y + x$) is an example of a property of numbers. Theorems in geometry also convey relations between shapes and therefore also fit into this category. Graphing also conveys relationships between the x and y variables. Solving equations and proving theorems use these various properties. The second definition groups these as "principles and relationships."

The two definitions really say the same thing: both show that math is both computational (measurements or operations) and abstract (properties, principles, and relationships). The first definition says it in a simple way (appropriate to a dictionary), and the second says it in a more technically accurate way (appropriate to a math teacher).

Some people argue about whether math is drill or theory. You should recognize from the two aspects of the definitions that math has a computation and drill side that is immediately practical, but that it also has a theoretical and conceptual side that strengthens the mind and is more practical in the long run.

Having defined math and recognizing the importance of testing all things against Scripture, it is time to test math as a subject. According to the memory verse, if we cannot justify a subject biblically, we should not be studying it.

Section 1.2

The Spirit of Math

Memory Verse: Genesis 1:31

And God saw every thing that he had made, and, behold, it was very good. And the evening and the morning were the sixth day.

We speak of people with a gentle spirit or a greedy spirit, because all spirits have a moral quality. In this section we investigate the moral quality of math. The memory verse tells us about the moral quality of God's creation. God calls everything that he had made "good."

The Bible specifically tells us to think on things that are good, honest, just, pure, lovely, and of a good report (Phil. 4:8). You saw in the previous section that some possible studies, such as the occult, do not fit this description. This should cause us to ask whether math fits the description. Since it is important that we think only on good things, we must answer the question, "Is math good?" If it is not, we should not be studying it.

Neutrality of Math?

Some people think that math is amoral or neutral. They claim that a tool can be used for good or evil, and then conclude that in itself the tool must be neutral. They say that the use of the tool has a moral purpose, but the tool itself does not. Some will give the example of a rock. You can do good with it and build a house, or you can do evil with it and kill someone; so, the rock is neutral.

There is a problem with this argument. In Genesis 1:9-13, God created the rocks on the third day. God called the rocks that he created good (v. 12). Notice that people had not even been created yet, so the rocks were not "used" for anything. In verse 31, God called them "very good." The rocks are therefore good just because they were created by God. While their use can be good or evil, this does not change the fact that the rocks are good in themselves.

The problem with the neutrality argument is that the use of a thing and the thing itself are not necessarily related. All the gifts of God are good (James 1:17), but God's gifts are not always used for good. Also, although evil things are not often used for good, God can make good come from them as he did from the evil act of Joseph's brothers (Gen. 50:20). In fact, you will not find Scriptures to support the neutrality of anything.

Likewise, either an object reflects the Creator or it doesn't. In logic, there is no middle ground: statements are true or false. This is called the Law of the Excluded Middle. Likewise, in creation, there is no middle ground: all things are good or evil. Man likes to blur the distinctions until it is hard to tell, but God knows. According to Luke 9:50 and Luke 11:23, people are either good or evil as well. There is no middle ground. Nothing is gray from God's perspective.

If math is not neutral, then we must determine if it is good or evil. There are three lines of investigation to consider. The creation of math, the characteristics of math, and the fruits of math.

Creation of Math

First, consider the creation of math. Start reading in Genesis 1, and write down the first references to math that you find.

The first references that involve numbers are verses 5, 8, 13, 19, and 23. Numbers precede the creation of man just like the creation of rocks. Therefore, we should conclude from verse 31 that numbers are good.

You can see that God created math very early, even before the fall. It was an essential part of his plan for the universe. So math, like the rest of his creation, is very good.

Characteristics of Math

The other aspect of math that will help us identify its moral quality is its character. Before we investigate this, we must clarify the meaning of the term *good.*

In Luke 18:19, Jesus says that in the strictest sense of the term "There is none good, but one, that is God." However, a broader sense of the term is also used in Scripture. For instance, in 1 Tim.

4:4 God's creatures are called good. Likewise, in 3 John 11 we read that those who do good are of God.

It should be clear that in the broader sense, the Bible calls something good if it reflects God's character. God's creation reflects God's goodness (Romans 1:20). Therefore, by investigating the characteristics of something, we should be able to tell if it reflects God's attributes or not.

Math has many good characteristics. Math is orderly, reasonable, and abstract. It is truth, precise, accurate, and yet infinite. Math is invisible, omnipresent, immutable, and dependable. It displays complexity, unity, and harmony. Most importantly, though math also displays vitality, historical setting, power, design, creativity, and beauty. If math actually has all of these good attributes of God, it appropriately reflects the goodness of its creator. Let's see why math has each of the qualities listed.

Some of the characteristics are fairly obvious. It is easy to see that math is orderly (builds sequentially), that it is a reasoned system, that it involves general principles in symbolic language (abstract). Mathematical statements are either true or false, right or wrong, and should be precise and accurate. Many of its concepts continue infinitely: counting numbers, lines and planes, many graphs and sets, limits, repeating decimals, and sequences. Of all the subjects, math may be the best for teaching us about the infinite.

Math deals with concepts rather than objects (invisible), and must be true everywhere at once (omnipresence), never changing (immutable), and trustworthy (you depend on math whenever you drive over a bridge or use a microwave oven). Math is a complex subject, but yet integrated enough that we always know what it is (unity). The unity of math can also be seen when its branches interrelate, as when algebra helps you to prove a theorem in geometry, or when a geometric graph helps you understand an algebraic equation. For more on the unity of knowledge consult *Education in the Truth* by Norman De Jong (Lansing, IL: Redeemer Books, 1989). Finally,

mathematics principles do not contradict one another, but work together in harmony.

However, the most important group may not seem quite so obvious. Vitality means that it is an active (living) and growing field. This may not be obvious to a student in high school or college, but each year hundreds of graduate students discover new theorems and prove them to obtain their doctorates in math. Over 1300 new theorems are proved every year, and since man will never know everything about math (see Section 7.3), he will never run out of math to learn. Math was also developed in a historical setting, which displays God's sovereignty (see Chapter 7). The power of math is its applicability to a wide range of fields from business to engineering and from science to economics. It is truly amazing that the same calculus problem can be used to solve problems of electrical fields, falling objects, and fluid flow. This broad applicability is what makes mathematics such a powerful tool. The method of math is its style of deductive proof, which is addressed in chapter 4.

The design, creativity, and beauty in math are perhaps the least clear to a student, but consider an analogy. An orchestral score reveals design and beauty through meticulous precise synchronization of many musicians playing different notes and patterns to create a whole. Likewise, the proof of a theorem reveals a meticulous precise synchronization of many steps and theorems having previously unsuspected relationships. The composer and the conductor must know what each instrument is capable of and must follow rules in the score to bring the pieces together into a beautiful unified whole. The mathematician must know what each axiom and theorem can prove, and he must arrange the pieces according to the rules of logic to reveal the beauty of the structure in God's design. Just as the composer and conductor can display creativity in arrangement and interpretation of the piece, so the mathematician requires creativity to discern the structure in God's pattern and to organize the proof pleasingly (elegance balances clarity with efficiency). The analogy should help you to see how math involves design, beauty, and creativity.

The following verses show that these are indeed attributes of God.

God is orderly: 1 Corinthians 14:33
God is reasonable: Isaiah 1:18
God is abstract: Hebrews 5:12-6:1
God is truth: Deuteronomy 32:4
God is precise: Matthew 5:18
God is accurate: Numbers 23:19
God is infinite: Psalm 147:5
God is invisible: Hebrews 11:27
God is omnipresent: Psalm 139:7-10
God is immutable: Malachi 3:6
God is dependable: Hebrews 13:5
God is complex: 2 Peter 3:16, Hebrews 5:11
God is a unity: Deuteronomy 6:4
God is harmony: Matthew 3:17, 2 Timothy 2:12-13
God is living (vital): Psalm 42:2
God is historical: Revelation 1:8, 11, 18
God is powerful: Genesis 17:1
God designs: Romans 12:2, 1 Cor. 2:7
God is creative: Genesis 1:1
God is beautiful: Psalm 90:17

Fruit of Math

Finally, we can evaluate math by its fruits. Math can be frustrating as we struggle toward conformity to Christ. Growing in godliness is hard work, and it does not come easy or without chastening. Math develops honesty (regard for truth), accuracy, reason, orderliness, perseverance (when discouraged by wrong answers or difficult problems), discipline (mental self-control), and diligence. Each of these character qualities is a godly quality as shown by the verses below.

The following godly qualities are expected of Christians according to the given verse.

Quality	Verse
Accuracy	Ezekiel 45:10
Diligence	Proverbs 12:24
Discipline	1 Corinthians 9:25
Order	1 Corinthians 14:40
Perseverance	Proverbs 24:16
Reason	Isaiah 1:18
Truth	Ephesians 4:25

You have seen that math is good on the basis of three arguments. First, math is good because it was created by God and declared good on the seventh day. Second, math is good because it testifies of its creator, reflecting twenty of God's own attributes. Finally, math is good because it bears good fruit in the life of the student, conforming his character to Christ's and teaching him about God.

Section 1.3

Purpose of Math

Memory Verse: 1 Cor. 10:31

Whether therefore ye eat, or drink, or whatsoever ye do, do all to the glory of God.

In this section, you will answer the question, "What is math for?" or "Why does anyone study math?" This includes the goals, purposes, and objectives for the study of math.

Scripture is the great stabilizer. No knowledge is possible without a sure starting point. In fact, if we do not base our mathematics on the Bible in faith, then our math is driven only by the changing winds of doctrine (humanistic philosophy) according to Ephesians 4:14. In this case, math would be unstable and unanchored, tossed like the waves of the sea (James 1:6).

Your view of what a subject is and where it came from is as important in math as it is in science because it determines the selection of content. Therefore, as noted above, math is not a secular subject. For more on this point, see *The Pattern of God's Truth* by Frank Gaebelein (Chicago: Moody Press, 1968).

The Purposes of Math

Math glorifies God. God's glory is the ultimate purpose for everything. There are four more specific ways that math glorifies God.

- **God created math to reveal his attributes to man.**
- **God created math to display the unity of knowledge in Christ.**
- **God created math to mold Christians to make them more Christlike.**
- **God created math as a tool for His servants to use to subdue the earth.**

Each verse below shows that God has these purposes in everything he does including math.

God's purpose	Verse
Glory of God	1 Corinthians 10:31
Revelation of God	Romans 1:19-20
Unity of knowledge	Colossians 1:16-17
Conforming Christians to Christlikeness	Romans 8:28-29
Dominion over the earth	Genesis 1:26-30, 9:2-3

These purposes are God-centered, not man centered. They should therefore drastically alter the way we teach or study math. Many people have the purpose of preparing students for a vocation. This is not the main reason for studying math or for education as a whole. Preparation for college entrance tests or vocational work fits in with God's purpose in preparing servants of God to fulfill the command to have dominion over the world, but when this purpose becomes the primary motivating force for education it is the old error of humanism. A student does not need to learn to be independent or to fend for himself. He needs to learn to be God-dependent. What seems practical to a boy of 18 may not be at all the calling that God has for him. Only God knows what is practical. For more on the fulfilling of God's dominion mandate, see *Education for the Real World* by Henry Morris (San Diego, CA: Master Books, 1977).

The Goals of Math

To achieve the above purposes through mathematical study, specific goals must be implemented. People do not automatically recognize how math glorifies God or how it conforms them to the image of Christ. Such things must be taught, stressed, and tested. In fact, no true knowledge is possible without the basis of faith in Christ. Romans 1 shows that erroneous "knowledge" results from a determination to continue in sin, which in turn follows a rejection of faith. In fact, we know that without Christ we have no power to resist sin. True knowledge is impossible unless one possesses both faith in Christ and moral virtue in the power of Christ. We must add virtue to our faith before we add knowledge (2 Peter 1:5).

The following particular goals aid in the achievement of a biblically-integrated math curriculum. We must give examples of these six points.

Scripture teaches us about math by providing

- **the foundation for math: a basis and framework for all math study.**
- **illustrations of mathematical terms and principles.**

Math teaches us about God by reflecting or illustrating his

- **character: order, reason, harmony, power, vitality, beauty, etc.**
- **works: natural revelation (math) does not contradict special revelation (Bible).**

Math prepares us for God's service by developing godly

- **discipline, diligence, accuracy, honesty, perseverance, orderliness, and reason.**
- **vocational/stewardship skills: computation, problem solving, logical reasoning.**

The Objectives of Math.

The following specific objectives in the study or teaching of mathematics are steps toward the fulfillment of these purposes and goals.

A math student should be able to:

- justify mathematical study on the basis of Scripture.
- explain the role of math in God's creation.
- display godly character, in reasoning, accuracy, and discipline.
- recite memory verses emphasizing the relation of math and Scripture.
- explain mathematical concepts and their relation to other fields.

Section 1.4

Extent of Math

Memory Verses: Colossians 2:3 and John 17:17

In whom are hid all the treasures of wisdom and knowledge. (Col. 2:3)

Sanctify them through thy truth: thy word is truth. (John 17:17)

You have already seen that math has its source in God. In fact, you have also seen that there is a unity of knowledge in Jesus Christ. Thus, all truth is in God, Who is not visibly here with us. Instead he gave us the Word of God as our primary source of knowledge. Thus, the ultimate source of mathematics is God, and the Bible is the source of truth which He gave us.

You know that God gave us the Bible to teach us about Himself. The Bible was not written for the purpose of teaching us everything there is to know about math and science. In this sense, the Bible is not a textbook of math or science. However, the Bible is always accurate. The Bible is a textbook of math and science in the sense that it gives us the proper view and basis for math and science. You may be surprised by how much the Bible has to say about math. The memory verses show the two sources of math.

The extent of math describes the development of mathematics from this starting point. It includes the content of math, the use of math, and the scope of math.

Content of Math

Since the sources of math are Jesus Christ and the Bible, all branches of math are interrelated in Christ. You can classify the interrelated branches in an orderly way by content because God is a God of order and made them thus. The biblical basis for each branch of math will be explored in the ensuing chapters. What are the branches of math?

Math can be divided into several areas.

Division of Math	Includes
Arithmetic	counting, number systems, arithmetic operations, and inequality
Geometry	shapes, measurements, and relationships among them
Logic	truth, reasoning, definition, theorems, axiomatic systems, proof
Applied Math	rounding, estimation, approximation, probability, statistics
Higher Math	algebra, trigonometry, calculus, and beyond

Use of Math

The use of a subject in the Bible is limited but accurate. Liberals may attack the use of any subject in the Bible, but the Bible nevertheless provides the basis for more advanced and technical studies in each field. The Bible may not teach about magnets or nuclear physics, but it does refer to basic sciences. Its scientific statements are accurate (though attacked) and provide foundations for correctly understanding the more technical sciences. The same occurs in math. Liberals may question mathematical statements in the Bible, but the statements are true as well as providing the basis for all mathematical truth.

The Bible uses or illustrates mathematics in six areas.

- **Bible commands which required math (command to take a census)**
- **Bible principles which apply to math (stewardship)**
- **Bible examples of math (specific topics: arithmetic, reasoning, estimation)**
- **Bible words sharing a root meaning with math terms (substitution, translation)**
- **Bible analogies which shed light on math (building on foundations)**
- **Bible character qualities developed by mathematical study (accuracy)**

The commands show that math is needed by some of God's servants in order to perform their service. The principles show how math is useful to all of God's people. The examples provide guidance on the proper use of math and form the main foundation for the

subject. The words and analogies permit comparisons between math and another subject, thus enabling one to learn by comparison. Finally, the character qualities provide encouragement to mathematical study: Christians have an advantage of knowing the benefits of perseverance through difficult material.

The value of comparisons is sometimes questioned. Granted an analogy to math is not the same as finding an example of math in the Bible. On the other hand Jesus made many analogies to physical things in order to help people understand spiritual principles. For example, simply read the parables, he likened the kingdom to a net, a pearl, a mustard seed, and many other items. While we should not use parables as the basis for the doctrine of heaven, yet we do use them as illustrations of the doctrine of heaven after establishing it from other clear passages. Similarly, the examples of specific mathematical commands and operations found in Scripture form the foundation of math. This foundation can be viewed as the backbone of math or the "doctrine" of math. Building on this biblical teaching, the mathematical words and analogies offer useful illustrations to help students understand a concept.

For example, a mathematical *translation* moves all the points of the plane a certain distance in a specified direction. The *translation* of Enoch describes Enoch's direct move to heaven without dying. If a student is struggling with the term in either context, the observation of the common root meaning offers a useful teaching tool. In both cases a motion or change of state is involved. Likewise a *translation* of the Bible into French provides another illustration, showing the moving of meaning from one language to another. In fact, the term translation was selected for this mathematical concept because of these meanings in general usage.

You have learned that the source of math is ultimately in Christ alone, but that it is also in the Bible as Christ has given it to us. The content of math includes arithmetic, geometry, logic, applied math, and higher math. Finally, the Bible sanctions using mathematics in six ways.

Scope of Math

How far does math go? It never stops, because man cannot know everything. However, as you think about the scope of mathematics, you should not think of math as algebra problems. Algebra is an abstraction from arithmetic, using variables to represent any number. Likewise, abstract algebra is an abstraction from algebra by taking all of algebra as a single example of something called a field. Remember that abstraction is what makes mathematics powerful, so the abstraction in mathematics should not surprise you.

The same type of abstraction happens in the other branches of mathematics as well. Topology is the generalization of geometry in which all of Euclidean geometry is a single example. Likewise analysis is the generalization of calculus. In fact, category theory is even more abstract, since it studies the relations between these branches of mathematics.