

TEACHER GUIDE

7th –8th Grade

Includes Student
Worksheets

Math



Answer Keys



Weekly Lesson Schedule



Worksheets



Quizzes and Test

BOOK 1 PRINCIPLES OF MATHEMATICS

[JR HIGH - YEAR 1 - TEACHER]
BIBLICAL WORLDVIEW CURRICULUM

TEACHER GUIDE

7th – 8th Grade

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Math

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PRINCIPLES OF MATHEMATICS BOOK 1



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Unless otherwise noted, Scripture quotations are from the New King James Version of the Bible.

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Problems from the Early 1900s

History...in math? Why not! Throughout the text, we've sprinkled in some math problems from history, often with significant adaptation. The sources are listed here for your reference. Feel free to look up the books and have fun with additional problems:

The following problems were adapted from Eugene Henry Barker, *Applied Mathematics for Junior High Schools and High Schools* (Boston: Allyn and Bacon, 1920). Available on Google Books, <http://books.google.com/books?id=t5EAAAIAAJ&vq=3427&pg=PR2#v=onepage&q&f=false>

Worksheet 2.6, problem 5; Worksheet 4.1, problems 3, 4, and 5; Worksheet 4.5, problem 1; Worksheet 5.2, problem 6; Worksheet 5.7, problem 8; Worksheet 6.5, problem 3; Worksheet 8.2, problem 2b and 3; Worksheet 8.3, problems 5 and 6; Worksheet 8.6, problems 3a and 3b; Worksheet 9.1, problem 8; Worksheet 14.3, problem 5; Worksheet 18.1B, problem 4a; Worksheet 18.4, problems 1e, 3a, and 3b; Worksheet 18.6, problem 3; Worksheet 21.1, problem 2a and 7; Worksheet 21.4B, problem 14; Quiz 3, problem 1; Quiz 6, problem 3a; Test 5; extra credit problems

The following problems were adapted from John C. Stone and James F. Millis, *A Secondary Arithmetic: Commercial and Industrial for High, Industrial, Commercial, Normal Schools, and Academies* (Boston: Benj. H. Sanborn & Co., 1908). Available on Google Books, <http://books.google.com/books?id=RtYGAAAAYAAJ&pg=PP1#v=onepage&q&f=false>

Worksheet 12.3, problem 3; Worksheet 12.6, problem 1; Worksheet 12.7, problem 4; Worksheet 12.8, problem 7; Worksheet 15.4, problem 4; Worksheet 16.4, problem 8; Worksheet 18.1B, problem 4b; Worksheet 18.2B, problems 2a and 2b; Worksheet 18.3, problem 2a; Worksheet 18.5, problem 3; Worksheet 18.6, problem 4; Worksheet 21.2, problem 6

This problem was adapted from Joseph Victor Collins, *Practical Algebra: First Year Course* (New York: American Book Co., 1910). Available on Google Books, <http://books.google.com/books?id=hNdHAAAIAAJ&pg=PP1#v=onepage&q&f=false>

Worksheet 10.7, problem 2b

Some problems are also adapted from Katherine Loop, *Revealing Arithmetic: Math Concepts from a Biblical Worldview* (Fairfax, VA: Christian Perspective, 2010).

For the most part, units are based on the official standards given in Tina Butcher, Linda Crown, Rick Harshman, and Juana Williams, eds. *NIST Handbook 44: 97th National Conference on Weights and Measures* 2012, 2013 ed. (Washington: U. S. Department of Commerce, 2012), Appendix C. Found on <http://www.nist.gov/pml/wmd/pubs/h44-13.cfm> (Accessed 10/6/2014)

Note to Parent/Teacher: God has created each person individually, so please modify and adapt this curriculum as needed.

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Preparing to Use the Curriculum

We've tried to streamline everything to make this curriculum as easy to use as possible. Rather than long instructions on how to teach each lesson, the *Student Textbook* contains all the explanation of the material. Important terms are bolded in the textbook so you can easily spot them. Examples you can work through with the student if needed are all included there.

Here are two different suggestions for how to prep the information in this *Teacher Guide*:

- Tear out the schedule, answer key, quizzes, and tests and put them in a binder for you to use as needed, and then hand the student the rest of the guide to work from when instructed.
- Tear out each worksheet as you assign it and hand it to the student, and have them store the completed pages in a binder.

Either way, all the pages are already hole punched for you and ready to go.

The schedule on page 6 explains what to assign each day. This schedule can be adapted to fit your needs. For example, in a classroom setting, several days could be taught at once, with the assignments due at the next class.



Katherine Loop is a homeschool graduate from northern Virginia. Understanding the biblical worldview in math made a tremendous difference in her life and started her on a journey of researching and sharing on the topic. For over a decade now, she's been researching, writing, and speaking on math, along with other topics. Her books on math and a biblical worldview have been used by various Christian colleges, homeschool groups, and individuals. You can connect with her at www.ChristianPerspective.net.

Using This Teacher Guide

Features: The suggested weekly schedule enclosed has easy-to-manage lessons that guide the reading, worksheets, and all assessments. The pages of this guide are perforated and three-hole punched so materials are easy to tear out, hand out, grade, and store. Teachers are encouraged to adjust the schedule and materials as needed in order to best work within their unique educational program.

Lesson Scheduling: Students are instructed to read the pages in their book and then complete the corresponding section provided by the teacher. Assessments that may include worksheets, activities, quizzes, and tests are given at regular intervals, with space to record each grade. Space is provided on the weekly schedule for assignment dates, and flexibility in scheduling is encouraged. Teachers may adapt the scheduled days per each unique student situation. As the student completes each assignment, this can be marked with an “X” in the box.



Approximately 30 to 45 minutes per lesson, four to five days a week



Includes answer keys for worksheets, quizzes, and tests.



Worksheets for each section



Quizzes and tests are included to help reinforce learning and provide assessment opportunities.



Designed for grades 7 to 8 to complete in a one-year course or for older students to use at an accelerated speed.

Course Description

This is Book 1 of a two-book math course. It is aimed at junior high students, fitting into most math approaches the year or two years prior to starting high school algebra. If following traditional grade levels, Book 1 should be completed in grade 6 or 7, and Book 2 in grade 7 or 8. Students should have a basic knowledge of arithmetic (basic arithmetic will be reviewed, but at a fast pace and while teaching problem-solving skills and a biblical worldview of math) and sufficient mental development to think through the concepts and examples given. The focus of the course is actually learning math for life, not simply preparing to pass a test. Students will learn to see math as a way of exploring and describing consistencies God created and sustains.

Course Objectives

Students completing this course will:

- Discover how the very existence of math concepts proclaims the faithfulness of God... and experience the joy of using math to explore God's creation.
- Learn why the rules work...and get practice applying those skills to real-life settings as they build problem-solving skills.
- Find the height of a tree without leaving the ground
- Use negative numbers to describe the force on objects
- Explore historical multiplication methods
- Apply math to music

Supplies Needed

- ***Principles of Mathematics Student Textbook Book 1***
- **Binder with Notebook Paper** — Students will need to tear out the reference section from this book and put it in the binder, as well as add notes to it during the course.
- **Abacus** — You can either make your own (instructions are given on Worksheet 1.3), use a premade one, or use an online abacus (see www.christianperspective.net/math/pom1).
- **Blank Index Cards** to use in making flashcards
- **Calculator** — Anytime students see a , they are permitted to use a calculator to solve the problem (instructions on using a calculator can be found in Lesson 4.5). Unless instructed otherwise by a parent/teacher, all other problems should be solved without the use of a calculator, as they won't always have a calculator when they need to solve a problem in real life.
- **Graph Paper**
- **Compass**
- **Measuring Tape** with both metric and U.S. Customary markings
- **Ruler** with metric and U.S. Customary markings
- **Protractor**

Additional Ideas and Support

- For additional math ideas and resources, please check out www.ChristianPerspective.net. You'll find links to helpful supplemental resources there (including links to online fact sheets for students needing more drill), as well as ways to stay connected and ask questions.

Suggested Daily Schedule
 (to complete Year 1 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
First Semester—First Quarter					
Week 1	Day 1	Lesson 1.1 (<i>Student Textbook</i> , pages 13–14) Worksheet 1.1 (<i>Teacher Guide</i> , page 21)			
	Day 2	Lesson 1.2 (<i>Student Textbook</i> , pages 15–17) Worksheet 1.2 (<i>Teacher Guide</i> , page 23)			
	Day 3	Lesson 1.3 (<i>Student Textbook</i> , pages 18–22) Worksheet 1.3 (<i>Teacher Guide</i> , pages 25–26)*			
	Day 4	Lesson 1.4 (<i>Student Textbook</i> , pages 22–27) Worksheet 1.4 (<i>Teacher Guide</i> , page 27)			
	Day 5	Lesson 1.5 (<i>Student Textbook</i> , pages 27–30; Worksheet 1.5 (<i>Teacher Guide</i> , pages 29–31)			
Week 2	Day 6	Lesson 1.6 (<i>Student Textbook</i> , pages 31–35) Worksheet 1.6 (<i>Teacher Guide</i> , pages 33–36)			
	Day 7	Lesson 2.1 (<i>Student Textbook</i> , pages 37–42) Worksheet 2.1 (<i>Teacher Guide</i> , page 37)			
	Day 8	Lesson 2.2 (<i>Student Textbook</i> , pages 42–45) Worksheet 2.2 (<i>Teacher Guide</i> , pages 39–40)*			
	Day 9	Lesson 2.3 (<i>Student Textbook</i> , pages 46–51) Worksheet 2.3 (<i>Teacher Guide</i> , pages 41–42)			
	Day 10	Lesson 2.4 (<i>Student Textbook</i> , pages 52–56) Worksheet 2.4 (<i>Teacher Guide</i> , pages 43–44)			
Week 3	Day 11	Lesson 2.5 (<i>Student Textbook</i> , pages 56–58) Worksheet 2.5 (<i>Teacher Guide</i> , pages 45–46)			
	Day 12	Lesson 2.6 (<i>Student Textbook</i> , pages 58–63) Worksheet 2.6 (<i>Teacher Guide</i> , pages 47–50)			
	Day 13	Lesson 2.7 (<i>Student Textbook</i> , pages 63–64) Quiz 1 (<i>Teacher Guide</i> , pages 335)			
	Day 14	Lesson 3.1 (<i>Student Textbook</i> , pages 65–66) Worksheet 3.1 (<i>Teacher Guide</i> , page 51)			
	Day 15	Lesson 3.2 (<i>Student Textbook</i> , pages 67–68) Worksheet 3.2 (<i>Teacher Guide</i> , pages 53–54)			
Week 4	Day 16	Lesson 3.3 (<i>Student Textbook</i> , pages 68–73) Worksheet 3.3 (<i>Teacher Guide</i> , pages 55–56)			
	Day 17	Lesson 3.4 (<i>Student Textbook</i> , pages 73–76) Worksheet 3.4 (<i>Teacher Guide</i> , page 57–58)			
	Day 18	Lesson 3.5 (<i>Student Textbook</i> , pages 76–81) Worksheet 3.5 (<i>Teacher Guide</i> , pages 59–60)			
	Day 19	Lesson 3.6 (<i>Student Textbook</i> , pages 81–83) Worksheet 3.6 (<i>Teacher Guide</i> , pages 61–62)			
	Day 20	Lesson 3.7 (<i>Student Textbook</i> , pages 83–84) Study Day			

* Worksheet 1.3 includes instructions on building an abacus. To build an abacus, students will need an 8 x 10 or larger picture frame, multi-color pony beads, wire, needle-nose pliers, and carpet tacks/small nails. Alternately, students can use an online or premade abacus.

* Worksheet 2.2 includes extra-credit assignment to research the history of time zones.

Suggested Daily Schedule
 (to complete Year 1 in a school year)

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 21	Quiz 2 (<i>Teacher Guide</i> , pages 337–338)			
	Day 22	Lesson 4.1 (<i>Student Textbook</i> , pages 85–91) Worksheet 4.1 (<i>Teacher Guide</i> , pages 63–64)			
	Day 23	Lesson 4.2 (<i>Student Textbook</i> , pages 92–94) Worksheet 4.2 (<i>Teacher Guide</i> , pages 65–66)			
	Day 24	Lesson 4.3 (<i>Student Textbook</i> , pages 95–99) Worksheet 4.3 (<i>Teacher Guide</i> , pages 67–68)			
	Day 25	Lesson 4.4 (<i>Student Textbook</i> , pages 99–102) Worksheet 4.4 (<i>Teacher Guide</i> , pages 69–70)			
Week 6	Day 26	Lesson 4.5 (<i>Student Textbook</i> , pages 102–105) Worksheet 4.5 (<i>Teacher Guide</i> , pages 71–72)			
	Day 27	Lesson 4.6 (<i>Student Textbook</i> , pages 105–107) Worksheet 4.6 (<i>Teacher Guide</i> , pages 73–75)*			
	Day 28	Quiz 3 (<i>Teacher Guide</i> , pages 339–340)			
	Day 29	Lesson 5.1 (<i>Student Textbook</i> , pages 109–114) Worksheet 5.1 (<i>Teacher Guide</i> , pages 77–78)			
	Day 30	Lesson 5.2 (<i>Student Textbook</i> , pages 114–117) Worksheet 5.2 (<i>Teacher Guide</i> , pages 79–80)			
Week 7	Day 31	Lesson 5.3 (<i>Student Textbook</i> , pages 117–120) Worksheet 5.3 (<i>Teacher Guide</i> , pages 81–82)			
	Day 32	Lesson 5.4 (<i>Student Textbook</i> , pages 121–123) Worksheet 5.4 (<i>Teacher Guide</i> , pages 83–84)			
	Day 33	Lesson 5.5 (<i>Student Textbook</i> , page 124–125) Worksheet 5.5 (<i>Teacher Guide</i> , pages 85–86)			
	Day 34	Lesson 5.6 (<i>Student Textbook</i> , pages 125–129) Worksheet 5.6 (<i>Teacher Guide</i> , pages 87–88)			
	Day 35	Lesson 5.7 (<i>Student Textbook</i> , pages 130–131) Worksheet 5.7 (<i>Teacher Guide</i> , pages 89–92)			
Week 8	Day 36	Lesson 5.8 (<i>Student Textbook</i> , pages 131–133) Quiz 4 (<i>Teacher Guide</i> , pages 341–343)			
	Day 37	Lesson 6.1 (<i>Student Textbook</i> , pages 135–138) Worksheet 6.1 (<i>Teacher Guide</i> , pages 93–94)			
	Day 38	Lesson 6.2 (<i>Student Textbook</i> , pages 138–141) Worksheet 6.2 (<i>Teacher Guide</i> , pages 95–96)			
	Day 39	Lesson 6.3 (<i>Student Textbook</i> , pages 142–145) Worksheet 6.3 (<i>Teacher Guide</i> , pages 97–98)			
	Day 40	Lesson 6.4 (<i>Student Textbook</i> , pages 146–147) Worksheet 6.4 (<i>Teacher Guide</i> , page 99)			
Week 9	Day 41	Lesson 6.5 (<i>Student Textbook</i> , pages 148–152) Worksheet 6.5 (<i>Teacher Guide</i> , pages 101–102)			
	Day 42	Lesson 6.6 (<i>Student Textbook</i> , page 152) Worksheet 6.6 (<i>Teacher Guide</i> , pages 103–104)*			
	Day 43	Worksheet 6.7 (<i>Teacher Guide</i> , pages 105–108)			
	Day 44	Study Day			
	Day 45	Test 1 (<i>Teacher Guide</i> , pages 373–374)			

* Worksheet 4.6 includes hands-on activity with gas prices and extra-credit assignment to make Napier's rods.

* Worksheet 6.6 includes an assignment to half or double a recipe.

Worksheets



1. **Numbers Everywhere** — Take a piece of paper and write down every different use for math you encounter today. Try to find at least 10 different ways math (including numbers) is used outside a textbook. Ask your parents how they use math if you get stumped. (*Hint:* Look for numbers on phones, exit signs, at stores, etc.)
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 - g.
 - h.
 - i.
 - j.
2. **Definition** — Look up the word “worldview” in a dictionary and write out the definition you find.
3. **Misconceptions** — List the three common misconceptions about math covered in Lesson 1.1.
 - a.
 - b.
 - c.
4. **Question** — When are you allowed to use a calculator in this course? (See “Course Objectives” section at the beginning of this *Teacher Guide*—be sure to read it if you haven’t yet!)



1. **Math in Action** — Give 5 examples of how math is used outside a textbook that are different than the uses you listed in Worksheet 1.1.
 - a.
 - b.
 - c.
 - d.
 - e.
2. **Notebook Preparation** — Tear out the Reference Sheet Section from this *Teacher Guide* and place it inside a binder, along with some lined paper you can use to add additional notes as you study. Taking notes of key information as you go will help you both remember the information and find it easily when you forget.
3. **Math Defined** — What is math and why does math work outside of a textbook?



1. **Question** — How would you define the spiritual battle in math?
 2. **Definition** — Look up the words “naturalism” and “humanism” in a dictionary and write out the definitions you find.
 3. **Preparing Your Abacus** — Some of the problems in the upcoming lessons will require the use of an abacus. You can either make your own, use a premade one if you have one, or use an online abacus (see www.christianperspective.net/math/pom1). Today’s the day to decide and either find or make one! The instructions for making one are below if you choose to assemble your own.

WARNING: These abacuses contain small parts (beads) that can be a choking hazard as well as wires/nails that could hurt if handled inappropriately; please be careful if using around young children.

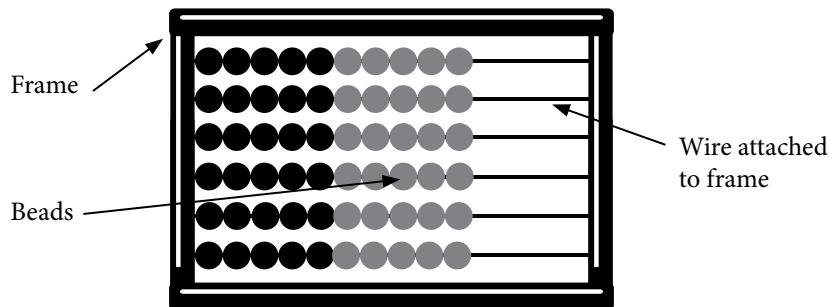
Supplies:

- **Wooden frame** — You will need an 8 x 10 or larger picture frame with the glass removed, or make your own frame out of 1 x 2s.
 - **Multicolor beads** — Basic pony beads will work—look in the craft section of your local department or craft store. The number of beads you need depends on the size of your frame. You need 50 beads for an 8 x 10 frame.
 - **Wire** — You can use plant wire, stripped electrical wire, or any sort of thin, flexible wire you can wrap around a carpet tack/small nail. Alternately, if you have a thick enough picture frame to drill holes into, you can use any sort of thick wire that is sturdy enough to insert into drilled holes.
 - **Needle-nose pliers and carpet tacks/small nails**, or, if using thicker wire, a **drill**

Instructions:

1. Cut the wire into strips a few inches longer than the width of your frame. Five is a good number of rows for most medium frames and the minimum required for the problems in this text; really large frames can handle more.
 2. Mark the frame at evenly spaced intervals along both sides where you want your rows to be.

3. Prepare the frame for the wire by either inserting carpet tacks or tiny nails at each of the marks, or else drilling holes in the frame. A lot will depend on what type of frame and wire you have. You must have a sturdy frame and wire to drill holes; otherwise, you will need to use the carpet tacks or tiny nails.
4. Secure one end of the wire by wrapping it around the carpet tacks/tiny nails, or by pushing a thicker wire into the drilled holes.
5. Add the beads to the first row of the abacus. Alternate between 5 beads of one color and 5 beads of another color (grouping makes it easier to see the quantity represented). You should have at least 10 beads on each row.
6. Secure the second end of the wire to the frame the same way you did in step 4.
7. Repeat steps 4–6 until you have completed all the rows.





- 1. Writing Numbers¹** — Write out the following quantities using our place-value system.
 - a. 2011 Population of the U.S.: three hundred eleven million, fifty thousand, nine hundred seventy-seven
 - b. 2010 U.S. National Debt: thirteen trillion, five hundred sixty-one billion, six hundred million
 - c. 2011 Population of China: one billion, three hundred thirty-six million, seven hundred eighteen thousand, fifteen

- 2. Reading Numbers²** — Write the words you would use to read these numbers.
 - a. 2010 Population of California: 27,253,956
 - b. 2010 Population of Texas: 25,145,561
 - c. 2010 Population of New York: 19,378,102

- 3. Greater Than, Less Than, or Equal To** — Put the appropriate symbol (>, <, or =) in between each pair to show how they relate.
 - a. 1,589 1,590
 - b. 445,020,008 445,008,500
 - c. 3,427 3,359

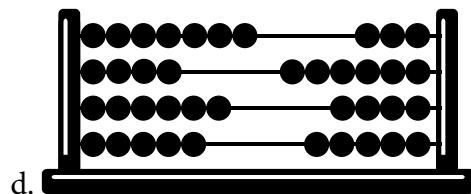
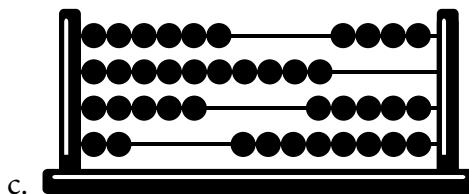
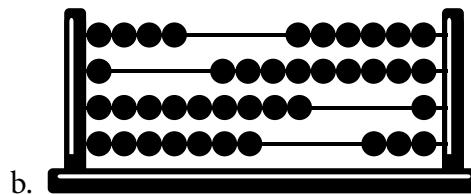
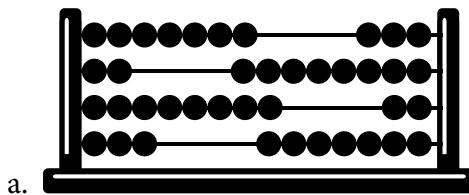
- 4. History Check** — Use one of the historic equal signs shown in today's text to show $5 = 5$.

¹ Facts from Sarah Janssen, sr. ed., M. L. Liu, Shmuel Ross, and Nan Badgett, eds., *The World Almanac and Book of Facts, 2012* (Infobase Learning, NY: 2012), pp. 63, 734.

² Facts from Ibid., p. 607.



- 1. Reading an Abacus —** Identify the following quantities and record the quantity using the decimal system.



- 2. Abacus/Place Value¹ —** Use the abacus you made or located (see Worksheet 1.3) to form the following 2010 populations. (If you do not have an abacus or access to one online, draw one on paper for each problem.)

- Population of Bismarck, ND: 61,272
 - Population of Dickinson, ND: 17,727
 - Population of Amherst, OH: twelve thousand, twenty-one
 - Population of Mansfield, OH: forty-seven thousand, eight hundred twenty-one
- 3. Reading and Writing Numbers —** Express the first two quantities in the last problem (2a and 2b) with words, and the last two (2c and 2d) in the decimal system.

a.

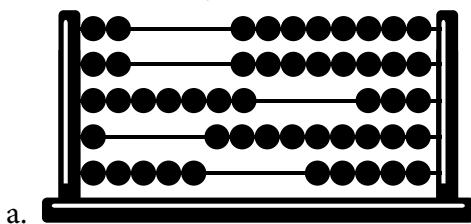
b.

c.

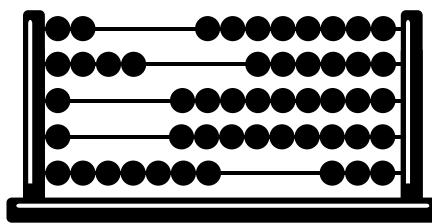
d.

¹ Facts from Sarah Janssen, sr. ed., M. L. Liu, Shmuel Ross, and Nan Badgett, eds., *The World Almanac and Book of Facts, 2012* (Infobase Learning, NY: 2012), p. 639.

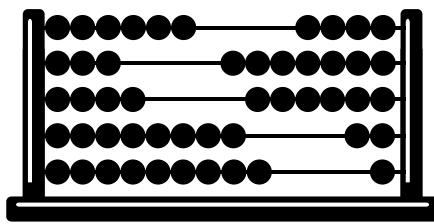
4. **Comparing on an Abacus** — Put the appropriate symbol in between each pair of abacuses to show how the quantities they represent relate.



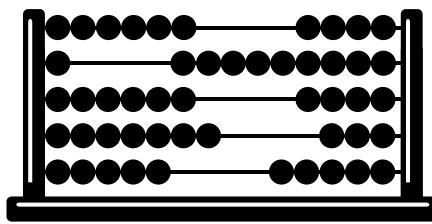
a.



b.



c.



5. **Question** — What do we call the number system we use today?

6. **Thinking It Through** — If one city has a population of 102,300 people, and another has a population of 123,000, which city has the greater population?

7. **Question** — Describe in your own words how place value works.

8. **Egyptian Hieroglyphics** — Looking at the figures presented in this lesson, do your best to represent the following quantities using Egyptian hieroglyphics (don't worry if you're not sure of a detail—just try to use the necessary symbols to convey the correct quantity and don't forget to put the smaller quantities on the left, opposite the way we do in our place value system).

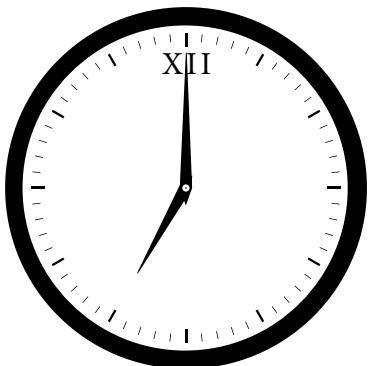
a. 26

b. 75

c. 89

9. Numerals

- a. Finish labeling this clock using Roman numerals to mark each hour.



- b. Books will sometimes list their publication date in Roman numerals. Suppose one says it was published in MCMXCVIII. What year is that in decimal notation? *Hint:* Work from left to right.
- c. In music, Roman numerals are used to number chords. The V chord (read “fifth chord”) is the chord based off the fifth note of a scale. Knowing this, take a guess at what the IV chord means.
- d. Sundials keep track of time using the sun’s shadow as the “hour” hand. Notice that the shadow on this sundial is falling near the spot labeled II. What hour is the sundial indicating?

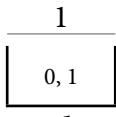


10. Question — How do different numbering systems help us see our place-value system from a biblical worldview?

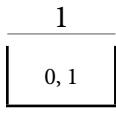


1. **Binary** — The following numbers are written in binary. Translate them into the decimal system by filling in the blanks.

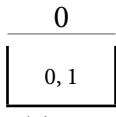
a. 1100

**Eights**

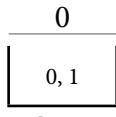
(Each digit represents sets of eight, or two fours.)

**Fours**

(Each digit represents sets of four, or two twos.)

**Twos**

(Each digit represents sets of two, or two ones.)

**Ones**

(Each digit represents sets of one.)

Meaning:

$\underline{\quad} \text{ set(s) of } 8 = \underline{\quad} \times 8 = \underline{\quad}$

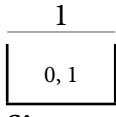
$\underline{\quad} \text{ set(s) of } 4 = \underline{\quad} \times 4 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 2 = \underline{\quad} \times 2 = \underline{\quad}$

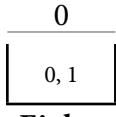
$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$

1100 in binary is the same as _____ in the decimal system.

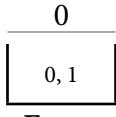
b. 10000

**Sixteens**

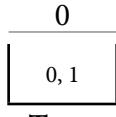
(Each digit represents sets of sixteen, or two eights.)

**Eights**

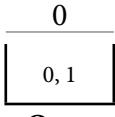
(Each digit represents sets of eight, or two fours.)

**Fours**

(Each digit represents sets of four, or two twos.)

**Twos**

(Each digit represents sets of two, or two ones.)

**Ones**

(Each digit represents sets of one.)

Meaning:

$\underline{\quad} \text{ set(s) of } 16 = \underline{\quad} \times 16 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 8 = \underline{\quad} \times 8 = \underline{\quad}$

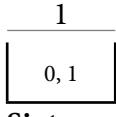
$\underline{\quad} \text{ set(s) of } 4 = \underline{\quad} \times 4 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 2 = \underline{\quad} \times 2 = \underline{\quad}$

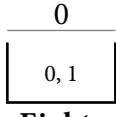
$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$

10000 in binary is the same as _____ in the decimal system.

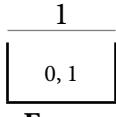
c. 10100

**Sixteens**

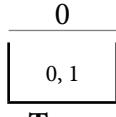
(Each digit represents sets of sixteen, or two eights.)

**Eights**

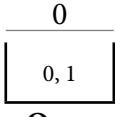
(Each digit represents sets of eight, or two fours.)

**Fours**

(Each digit represents sets of four, or two twos.)

**Twos**

(Each digit represents sets of two, or two ones.)

**Ones**

(Each digit represents sets of one.)

Meaning:

$\underline{\quad} \text{ set(s) of } 16 = \underline{\quad} \times 16 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 8 = \underline{\quad} \times 8 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 4 = \underline{\quad} \times 4 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 2 = \underline{\quad} \times 2 = \underline{\quad}$

$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$

10100 in binary is the same as _____ in the decimal system.

Hexadecimal System (Base 16)

16 Symbols: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

A represents the decimal value of 10.

B represents the decimal value of 11.

C represents the decimal value of 12.

D represents the decimal value of 13.

E represents the decimal value of 14.

F represents the decimal value of 15.

2. **Hexadecimal Number and Color** — Website programmers often specify colors using hexadecimal numbers in the RGB color system. RGB stands for Red, Green, and Blue. We can represent the intensity of each color using a scale, with 0 being none of the color and values increasing from there. A color with 0 red would have no red in it.

We use two hexadecimal digits for each color. For example, in 8EC5E9 the 8E tells us the amount of red in the color, the C5 the amount of green, and the E9 the amount of blue. When all these colors mix together, we get a specific shade of blue.

8E	C5	E9
Red	Green	Blue

Use what you know about the hexadecimal system to answer the question.

Example: Write the amount of red—hexadecimal number 8E—using the decimal system.

$\overline{8}$	\overline{E}								
<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0, 1, 2, 3,</td></tr><tr><td>4, 5, 6, 7,</td></tr><tr><td>8, 9, A, B,</td></tr><tr><td>C, D, E, F</td></tr></table>	0, 1, 2, 3,	4, 5, 6, 7,	8, 9, A, B,	C, D, E, F	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0, 1, 2, 3,</td></tr><tr><td>4, 5, 6, 7,</td></tr><tr><td>8, 9, A, B,</td></tr><tr><td>C, D, E, F</td></tr></table>	0, 1, 2, 3,	4, 5, 6, 7,	8, 9, A, B,	C, D, E, F
0, 1, 2, 3,									
4, 5, 6, 7,									
8, 9, A, B,									
C, D, E, F									
0, 1, 2, 3,									
4, 5, 6, 7,									
8, 9, A, B,									
C, D, E, F									

Sixteens

(Each digit represents sets of sixteen, or sixteen ones.)

Ones

(Each digit represents sets of one.)

$$8 \text{ set(s) of } 16 = 8 \times 16 = 128$$

$$14 \text{ set(s) of } 1 = 14 \times 1 = 14$$

$$128 + 14 = 142$$

- a. Write the amount of green—hexadecimal number C5—using the decimal system.

\overline{C}	$\overline{5}$								
<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0, 1, 2, 3,</td></tr><tr><td>4, 5, 6, 7,</td></tr><tr><td>8, 9, A, B,</td></tr><tr><td>C, D, E, F</td></tr></table>	0, 1, 2, 3,	4, 5, 6, 7,	8, 9, A, B,	C, D, E, F	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0, 1, 2, 3,</td></tr><tr><td>4, 5, 6, 7,</td></tr><tr><td>8, 9, A, B,</td></tr><tr><td>C, D, E, F</td></tr></table>	0, 1, 2, 3,	4, 5, 6, 7,	8, 9, A, B,	C, D, E, F
0, 1, 2, 3,									
4, 5, 6, 7,									
8, 9, A, B,									
C, D, E, F									
0, 1, 2, 3,									
4, 5, 6, 7,									
8, 9, A, B,									
C, D, E, F									

Sixteens

(Each digit represents sets of sixteen, or sixteen ones.)

Ones

(Each digit represents sets of one.)

$$\underline{\quad} \text{ set(s) of } 16 = \underline{\quad} \times 16 = \underline{\quad}$$

$$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$$

C5 in hexadecimal is the same as _____ in the decimal system.

- b. Write the amount of blue—hexadecimal E9—using the decimal system.

E	9
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

Sixteens

(Each digit represents sets of sixteen, or sixteen ones.)

Ones

(Each digit represents sets of one.)

$$\underline{\quad} \text{ set(s) of } 16 = \underline{\quad} \times 16 = \underline{\quad}$$

$$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$$

E9 in hexadecimal is the same as _____ in the decimal system.

- c. Find the value of hexadecimal FF. Note: FF is the highest hexadecimal value we could form using just two digits; it is thus the max amount of red, green, or blue we could represent in the RGB color system.

F	F
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

Sixteens

(Each digit represents sets of sixteen, or sixteen ones.)

Ones

(Each digit represents sets of one.)

$$\underline{\quad} \text{ set(s) of } 16 = \underline{\quad} \times 16 = \underline{\quad}$$

$$\underline{\quad} \text{ set(s) of } 1 = \underline{\quad} \times 1 = \underline{\quad}$$

FF in hexadecimal is the same as _____ in the decimal system.

3. **Comparing Numbers** — Put a comparison symbol ($<$, $>$, $=$) to show how the quantities compare.

Hint: You don't actually need to convert these binary numbers to our decimal system in order to tell how they compare. Instead, just look at where the 1s and 0s are and use place value to tell you which one must represent the greater quantity.

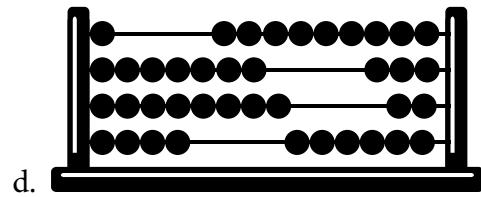
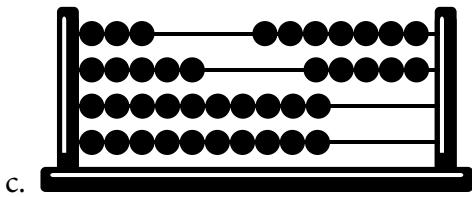
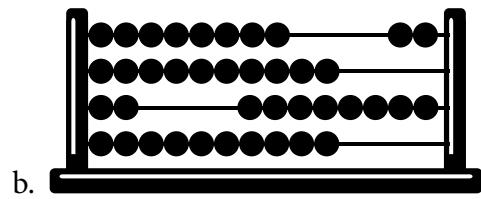
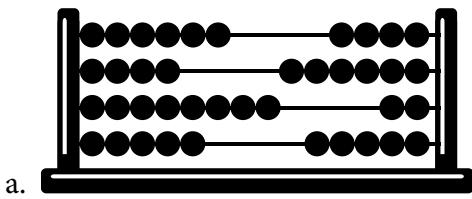
- a. 1100 1000
- b. 10000 1000
- c. 1010 1011
- d. 1111 1111

4. **Writing Numbers** — Write these numbers using our decimal system.¹

- a. Land and water area for 50 states and Washington, D.C., in square miles: three million, seven hundred ninety-six thousand, seven hundred forty-two
- b. Distance to the sun in miles: ninety-two million, nine hundred sixty thousand
- c. Mean radius of the sun in miles: four hundred thirty-two thousand, two hundred

¹ Facts from Sarah Janssen, sr. ed., M. L. Liu, Shmuel Ross, and Nan Badgett, eds, *The World Almanac and Book of Facts, 2012* (Infobase Learning, NY: 2012), pp. 428, 344.

5. **Reading an Abacus** — Identify the following quantities and record the quantity using the decimal system.



6. **Roman numerals** — Express these quantities using Roman numerals.

- a. 2014
- b. 1,076
- c. 592

7. **Questions**

- a. What would it mean if you were told a number was written in a base-5 place-value system?
- b. How many digits would you need to write a number in a base-5 place-value system? *Hint:* Think through what you learned about the base-10 (decimal), base-2 (binary), and base-16 (hexadecimal) systems.

Quizzes and Tests



1. Comparing Numbers — Use the symbols $<$, $>$, or $=$ to show how these quantities compare.

- | | |
|-------------|-----------|
| a. $56 + 8$ | $2 + 60$ |
| b. $88 - 4$ | $49 + 17$ |
| c. VII | IX |

2. Place Value

- a. Describe how a place-value system works.

- b. What does it mean if a number is written in a base-12 place-value system?

3. Time for Time

- a. If a luncheon starts at 10:30 a.m. and lasts 2 hours, when will it end?

 - b. If a TV show is airing at 7 p.m. PST and you're in EST, at what time is it airing in your time zone?

 - c. If it is 1600 military time, what time is it in 12-hour clock?

4. Keeping a Checkbooks — Find the ending balance of this checkbook register.

Check Number	Date	Memo	Payment Amount	Deposit Amount	\$ Balance
	2/1	Opening Balance			5,612
120	2/5	Music Lessons	57		
	2/10	Birthday Check		75	
121	2/15	Groceries	104		
	2/15	Interest		1	
	2/15	Paycheck		508	

5. Bonus Question — Why does math work?

1. Fractions in Action

- a. You have divided up your land into sections and have evaluated the lighting and soil conditions. You have $1\frac{1}{2}$ acres on one side of the farm and $\frac{1}{3}$ of an acre on the other that you've determined are ideal for planting strawberries. How many acres of strawberries will you have altogether if you plant both sections?

b. If you're cooking and want to triple a recipe that calls for $1\frac{2}{3}$ cup flour, how much flour should you use?

c. If you need $\frac{1}{2}$ a yard of trim for one part of a dress and another $\frac{2}{3}$ a yard for another part, how many yards altogether should you buy?

d. If you bought $12\frac{1}{2}$ inches of wood and used $5\frac{3}{4}$ inches, how much do you have left?

2. **Pricing Items for Sale** — You are trying to price tomatoes you're growing to sell at a farmer's market. You spent \$16 on seeds, \$60 on starter containers, \$13 on fertilizer, and \$11 on potting soil. You have 10 plants, which according to the package should yield about 20 pounds of tomatoes each. How much should you charge per pound to make 8 times your expenses? (You need to charge more than your expenses to cover your actual cost...including overhead costs such as your time in planting and selling, the water you used to water the tomatoes, etc....plus make money!)

- 3. Keeping Track of the Checkbook** — Input these transactions into the checkbook register, updating the balance column as you go.

07/01 Opening Balance: \$24,587

07/02 Deposit Sales for Week: \$1,568

07/02 Pay Farmer Supply Company \$120 with check 292

07/03 Pay Tractor Repair Company \$134 with check 293

Check Number	Date	Memo	Payment Amount	Deposit Amount	\$ Balance

- 4. Computing a Total Mentally** — Solve these problems mentally.

- a. 89 cents – 62 cents
- b. 78 cents – 25 cents
- c. 32 cents + 65 cents
- d. Round 56 to the nearest ten.
- e. Round 35 to the nearest ten.

- 5. Checking the Skills** — Remember, all fractional answers should be simplified.

- a. $\frac{3}{4} \times \frac{7}{9}$
- b. $\frac{8}{9} \div \frac{4}{5}$
- c. $\frac{2}{5} + \frac{7}{21}$
- d. $4(25 - 6 \times 2)$

- e. $(2 + 7)8$
- f. What is the greatest common factor of 88 and 66?
- g. What is the least common multiple of 88 and 66?

Bonus Question — Name a biblical truth that helps shape our view of math.

Answer Key

General Grading Notes

Please use your own judgment when grading. Below are some general principles to keep in mind.

- **Different Strategies** — There is often more than one legitimate approach to a problem. You want to evaluate if students are learning the concepts and solving the problems carefully, correctly, and logically.
- **Open-Ended Questions** — On open-ended questions, answers may vary significantly from what is listed.
- **Partial Credit** — Feel free to give partial credit if a student set up the problem correctly but made a calculation error.
- **Units of Measurement** — If a unit is given in the problem (dollars, feet, etc.), students need to **include the unit in their answer**. For example, if a student lists “6” instead of “6 in” on a problem where the answer key lists “6 in,” their answer is only partially correct. Watching their units carefully will serve them well, both in real life and in upper-level courses.
- **Word Problems** — Mental arithmetic should be encouraged, but when solving word problems, students should still always show their work, writing down the equation(s) they solved so you can see what process they followed. It’s a very helpful habit to develop, as it makes it easier to find any errors. However, unless requested in the problem, it’s not necessary for them to write down every step that is shown in the answer key—*just enough steps that you can tell how they approached the problem.*

■ **Decimals** — From Worksheet 7.4 on, decimal answers should be rounded to the hundredth digit unless otherwise specified. Also, unless otherwise specified, it doesn't matter if students round their answer at the end or after each step.

Be aware that **answers may be slightly off the answer in the key due to differences in rounding at the end or after each step**. This is not a problem. The important thing is that students followed instructions and solved the problem accurately. Exceptions: When finding a percentage, students should not round the percent amount, and when doing unit conversion, students should not round a conversion ratio until the end.

For example, if told to find a 7.5% sales tax, students should use 0.075 to calculate the tax, and if told to convert between pints and cubic inches (1 pint = 28.875 in³), students should not round 28.875 (they can, however, round their answer).

■ **Fractions** — From Worksheet 5.3 on, fractional answers should be denoted in simplest terms, unless otherwise specified. This includes writing mixed numbers as improper fractions.

Not only will this make it easier to grade and avoid confusion, it will also provide the student with practice forming equivalent fractions.

Even after decimals are covered in Chapter 7, students should continue solving problems given in fractions as fractions, so as to become proficient in working with fractions. If the problem includes both fractions and decimals, however, students may give their answer in either.

Assigning a Grade

The grade column in the Suggested Schedule (page 6–18) is available for you to keep track of a student's grade should you choose to do so. Feel free to use whatever method for grading you've chosen to adopt, or to leave those columns blank if you prefer not to assign grades.

Extra-Credit Assignments

Throughout the course, some of the worksheets include extra-credit assignments. It is up to you to decide how the assignment should affect the student's grade. For example, you could decide that completing an assignment will raise their worksheet grade by a certain number of points, or that it will increase their quarter or final grade by a certain amount.

Additional Resources and Course Notes

Please see <http://www.christianperspective.net/math/pom1> for links to helpful online resources (such additional drill worksheets, an online abacus, and an online scientific calculator), along with additional notes and information related to this course. There is also a way to contact the author there.

Chapter 1: Introduction and Place Value

Worksheet 1.1

1. Possibilities include numbers on an alarm clock, dates on a milk carton, grams of sugar on a cereal box, Bible verse numbers, speed-limit signs, prices at a grocery store, zip codes and street numbers on envelopes, page numbers in books, rulers (including rulers in computer programs), and font sizes. Other ideas are measuring ingredients, figuring out how many places to set for company, figuring out how long you have left before an appointment, and keeping track of money.
2. Answer should be a dictionary definition of “worldview.”
3. Math is neutral; a biblical math curriculum is the same as any other, with a Bible verse or problem thrown in now and then; and math is a textbook exercise.
3. I can use a calculator any time I see the symbol .

Worksheet 1.2

1. Numerous possibilities were given within the text. Examples should not be repeated from yesterday's worksheet.
2. Math notebook should be prepped.
3. Math is a way of describing the consistent way this universe operates; it works outside of a textbook because God is faithful to uphold all things.

Worksheet 1.3

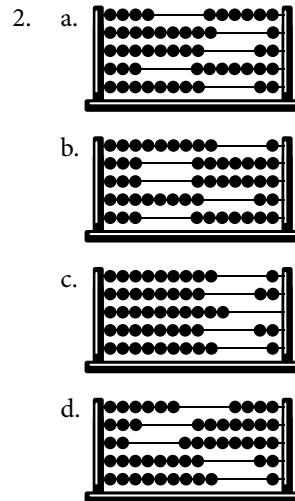
1. Within math, there's a battle to remember our dependency on the Lord.
2. Should be a dictionary definition of “naturalism” and “humanism.”
3. Abacus needs to be prepped or located.

Worksheet 1.4

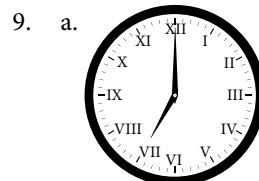
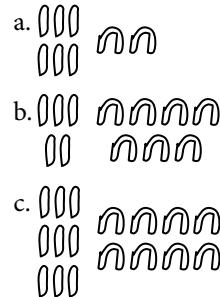
1. a. 311,050,977
b. 13,561,600,000,000
c. 1,336,718,015
2. a. twenty-seven million, two hundred fifty-three thousand, nine hundred fifty-six
b. twenty-five million, one hundred forty-five thousand, five hundred sixty-one
c. nineteen million, three hundred seventy-eight thousand, one hundred two
3. a. <
b. >
c. >
4. Check text for possible symbols.

Worksheet 1.5

1. a. 3,827
b. 6,913
c. 4,058
d. 3,645



3. a. Sixty-one thousand, two hundred seventy- two
b. Seventeen thousand, seven hundred twenty-seven
c. 12,021
d. 47,821
4. a. >
b. <
c. =
5. decimal system (or Hindu-Arabic decimal system)
6. the city with 123,000
7. Answer should communicate that in a place-value system, the place, or location, of a number determines its value.
8. Since students won't actually have to use Egyptian hieroglyphics again and their purpose here is simply to help students understand that there are different ways to express quantities, it does not matter if every detail is the same. Just check to make sure that the  symbols are on the left of the  ones, and that there are the appropriate number of each.



9. a. 1998
b. A chord based off the fourth note of a scale.
c. 2:00

10. All the different number systems remind us not to start looking at our current system as math itself, but rather as one way of describing God's creation.

Worksheet 1.6

1. a. 1 set(s) of 8 = 1 x 8 = 8
1 set(s) of 4 = 1 x 4 = 4
0 set(s) of 2 = 0 x 2 = 0
0 set(s) of 1 = 0 x 1 = 0
 1100 in binary is the same 12 in the decimal system.
- b. 1 set(s) of 16 = 1 x 16 = 16
0 set(s) of 8 = 0 x 8 = 0
0 set(s) of 4 = 0 x 4 = 0
0 set(s) of 2 = 0 x 2 = 0
0 set(s) of 1 = 0 x 1 = 0
 10000 in binary is the same as 16 in the decimal system.
- c. 1 set(s) of 16 = 1 x 16 = 16
0 set(s) of 8 = 0 x 8 = 0
1 set(s) of 4 = 1 x 4 = 4
0 set(s) of 2 = 0 x 2 = 0
0 set(s) of 1 = 0 x 1 = 0
 10100 in binary is the same as 20 in the decimal system.
2. a. 12 set(s) of 16 = 12 x 16 = 192
5 set(s) of 1 = 5 x 1 = 5
 C5 in hexadecimal is the same as 197 in the decimal system.
- b. 14 set(s) of 16 = 14 x 16 = 224
9 set(s) of 1 = 9 x 1 = 9
 E9 in hexadecimal is the same as 233 in the decimal system.
- c. 15 set(s) of 16 = 15 x 16 = 240
15 set(s) of 1 = 15 x 1 = 15
 C5 in hexadecimal is the same as 255 in the decimal system.
3. a. >
 b. >
 c. <
 d. =
4. a. 3,796,742
 b. 92,960,000
 c. 432,200
5. a. 4,625
 b. 2,080
 c. 7,500
 d. 9,326
6. a. MMXIV
 b. MLXXVI
 c. DXCII
7. a. It would mean each place was worth 5 of the previous place's value.
 b. I would need five digits. *Example:* 0, 1, 2, 3, 4

Chapter 2: Operations, Algorithms, and Problem Solving

Worksheet 2.1

1. a. 4 and 9 are the addends, and 13 is the sum.
 b. 15 is the minuend, 9 is the subtrahend, and 6 is the difference.
 c. 8 and 5 are the addends, and 13 is the sum.
 d. 17 is the minuend, 6 is the subtrahend, and 11 is the difference.
2. a. 11
 b. 7
 c. 4
 d. 10
 e. X
 f. VIII
 g. IX
3. a. = or 8 = 8
 b. > or 9 > 8
 c. > or 5 > 4
 d. < or 8 < 9
 e. < or 11 < 13
4. Hebrews 1:3 and Jeremiah 33:25-26 should have been added to notebook.

Worksheet 2.2

1. a. 8 p.m.
 b. 12 p.m. (noon)
 c. 1:15 p.m.
 d. 4 hours
2. a. God was in the beginning and created day and night.
 b. Yes, time as we know it with day and night will have an end.
 c. No, eternity will not have an end.
 d. We should diligently seek to be found of God in peace, without spot, and blameless.
3. a. 6 a.m.
 b. 6 p.m.
 c. 5 p.m.
 d. 5 p.m.
 e. 2 hours
 f. Student should have added time zones to notebook and made flashcards to learn those within the continental United States.

Extra Credit — Write out at least one interesting tidbit on the history of time zones.

Worksheet 2.3

1. Students were told to solve these problems on an abacus.
 a. 27
 b. 1,012
 c. 1,257
2. Students were told to solve these problems on an abacus.
 a. 708
 b. 448
 c. 1,101

Answers to Quizzes

Quiz 1 (Chapters 1 and 2)

1. a. $>$ or $64 > 62$
b. $>$ or $84 > 66$
c. $<$ or $7 < 9$
2. a. In a place-value system, the place, or location of a symbol determines its value.
b. It means there are 12 digits (including zero) and that each place is worth 12 of the previous place.
3. a. 12:30 p.m.
b. 10:00 p.m.
c. 4 p.m.
4. The ending balance is 6,035.

Bonus: Math works because God created and sustains a consistent universe.

Quiz 2 (Chapter 3)

1. a. $2(4) + 8 = 8 + 8 = 16$
b. $2(\$12) + \$7 = \$24 + \$7 = \$31$
c. $4(10 - 9) = 4(1) = 4$
2. Students were told to solve these problems mentally.
 - a. 38
 - b. 105
 - c. 73
 - d. 750
 - e. 800
3. a. $\$6 + \$8 + \$10 + \$4 = \$28$
b. $\$28 \div 7 = \4
c. $\$4 + \$5 = \$9$
4. Look for a multiplication word problem and its solution.
5. a. $2012 - 1492 = 520$ years
b. $1492 + 400 = 1892$

Bonus: Properties are truths about the ordinances God put in place.

Quiz 3 (Chapter 4)

1. number of books per shelf = $12 \times 4 = 48$
number of shelves required for 288 books = $288 \div 48 = 6$.
We need 6 shelves.
2. a. $\$855 \div 171 = \5
b. $135 \times \$5 = \675
3. a. Define:
 $\text{price of first land} = \$127,980$
 $\text{price of second land} = \$50,000$
 $\text{acres in first land} = 160$
 $\text{acres in second land} = 60$
 $\text{price per acre} = ?$
b. Plan: $\text{total price} \div \text{total acres} = \text{price per acre}$
 $\text{total price} = \text{price of first land} + \text{price of second land}$
 $\text{total acres} = \text{acres in first land} + \text{acres in second land}$
c. Execute: $\text{total acres} = 60 + 160 = 220$
 $\text{total price} = \$127,980 + \$50,000 = \$177,980$
 $\text{price per acre} = \$177,980 \div 220 = \$809$
d. Check: The answer looks reasonable.

$$220 \times \$809 = \$177,980$$

4. a. $8(13) = 104$
b. Check that solved using the distributive property.
$$8(4) + 8(3) + 8(6) =$$
$$32 + 24 + 48 = 104$$
5. a. 179 r 1
b. 50,232
c. 0
d. 85

Quiz 4 (Chapter 5)

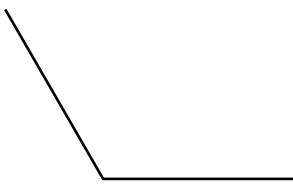
1. a. $\frac{26}{8} = \frac{13}{4} = 3\frac{1}{4}$
b. $\frac{5}{10} = \frac{1}{2}$
2. a. $\frac{55}{8}$
b. $6\frac{7}{8}$
3. a. $44 = 2 \times 2 \times 11$
 $50 = 2 \times 5 \times 5$
GCF = 2
b. $\frac{22}{25}$
c. $16 = 2 \times 2 \times 2 \times 2$
 $24 = 2 \times 2 \times 2 \times 3$
GCF = $2 \times 2 \times 2 = 8$
d. $\frac{2}{3}$
4. a. $\frac{10}{84} + \frac{44}{84}$
b. $\frac{10}{84} + \frac{44}{84} = \frac{54}{84}$
 $\frac{54}{84} \div \frac{6}{6} = \frac{9}{14}$
5. a. $\frac{30}{60} - \frac{5}{60}$
b. $\frac{30}{60} - \frac{5}{60} = \frac{25}{60}$
 $\frac{25}{60} = \frac{5}{12}$
6. a. $\frac{1}{2 \times 2 \times 2 \times 3} + \frac{7}{2 \times 2 \times 5}$
b. LCM = $2 \times 2 \times 2 \times 3 \times 5 = 120$
c. $\frac{5}{120} + \frac{42}{120}$
d. $\frac{47}{120}$
7. $(\$30 + \$18) \times 12 \text{ months} \times 10 \text{ years} = \$5,760$
8. $\$30 - \$28 = \$2$ savings per month
 $\$2 \times 12 \times 5 = \120 savings over 5 years
 $\$2 \times 12 \times 10 = \240 savings over 10 years
9. $\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{1}{12}$ yard

Bonus: See "Fractions in History" box in Lesson 5.1 for possibilities.

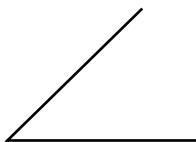
Quiz 5 (Chapter 7)

1. a. 2.34
b. 0.15
c. 32.72
d. 1.22
2. a. 0.88 mi
b. 0.67 c
c. 1.25 c
3. a. $\$45.67 - \$5.08 = \$40.59$
b. $(10 \cdot \$25) - (5 \cdot \$3.25) =$

3. $90^\circ + 130^\circ = 220^\circ$
 4. a. Angle should measure 120° .



b. Angle should measure 45° .



5. a. $0.45 \cdot 360^\circ = 162^\circ$
 b. $0.3 \cdot 360^\circ = 108^\circ$
 c. $0.25 \cdot 360^\circ = 90^\circ$

Bonus: Because math and reasoning were held up as the source of truth, men did not question the Greek proof of an earth-centered universe or see if it matched reality.

Quiz 18 (Chapter 20)

- a. 3 m
b. 17°
- a. yes; AA Similarity Theorem
b. $\frac{14 \text{ ft}}{? \text{ ft}} = \frac{42 \text{ ft}}{70 \text{ ft}}$; 23.33 ft
c. 5°
d. Finding \overline{AC} ; $\frac{14 \text{ ft}}{? \text{ ft}} = \frac{42 \text{ ft}}{30 \text{ ft}}$; 10 ft
 $P = 10 \text{ ft} + 14 \text{ ft} + 23.33 \text{ ft} = 47.33 \text{ ft}$
- $\frac{2 \text{ ft}}{1.5 \text{ ft}} = \frac{? \text{ ft}}{16.5 \text{ ft}}$; 22 ft
- \overline{AC} and \overline{BC}
 \overline{AB} and \overline{DE} and \overline{GF}
 \overline{DG} and \overline{EF}
- a. 180°
b. $180^\circ - 45^\circ - 45^\circ = 90^\circ$
- a. A and D are similar to each other, and B and C are similar to each other (congruent shapes are also similar).
b. B and C are congruent.

Bonus: Reasoning and proofs start with assumptions.

Answer to Tests

Test 1 (Chapters 1–6)

- a. $\frac{\frac{3}{2} \text{ acres} + \frac{1}{3} \text{ acres}}{1\frac{5}{6} \text{ acres}} = \frac{\frac{9}{6} \text{ acres} + \frac{2}{6} \text{ acres}}{1\frac{5}{6} \text{ acres}} = \frac{\frac{11}{6} \text{ acres}}{1\frac{5}{6} \text{ acres}}$
b. $3' \cdot \frac{5}{3}' \text{ cups} = 5 \text{ cups}$
c. $\frac{1}{2} \text{ yd} + \frac{2}{3} \text{ yd} = \frac{3}{6} \text{ yd} + \frac{4}{6} \text{ yd} = \frac{7}{6} \text{ yd} = 1\frac{1}{6} \text{ yard}$
d. $12\frac{1}{2} \text{ in} - 5\frac{3}{4} \text{ in} = \frac{25}{2} \text{ in} - \frac{23}{4} \text{ in} = \frac{50}{4} \text{ in} - \frac{23}{4} \text{ in} = \frac{27}{4} \text{ in} = 6\frac{3}{4} \text{ inches}$
- $\text{total expenses} = \$16 + \$60 + \$13 + \$11 = \100
 $\text{number of pounds} = 10 \times 20 \text{ lb} = 200 \text{ lb}$
 $\text{8 times expenses} = 8 \times \$100 = \$800$
 $\text{price to charge per pound} = \$800 \div 200 \text{ lb} = \4 per pound

3.

Check Number	Date	Memo	Payment Amount	Deposit Amount	\$ Balance
	7/1	Opening Balance			24,587
	7/2	Deposit		1,568	26,155
292	7/2	Farmer Supply Company	120		26,035
293	7/3	Tractor Repair Company	134		25,901

- Students were told to solve these problems mentally.
 - 27 cents
 - 53 cents
 - 97 cents
 - 60
 - 40
- a. $\frac{\frac{3}{4} \text{ x } \frac{7}{9}}{3} = \frac{7}{12}$
 - $\frac{\frac{8}{9} \text{ x } \frac{5}{4}}{1} = 1\frac{1}{9}$
 - $\frac{42}{105} + \frac{35}{105} = \frac{77}{105} = \frac{11}{15}$
 - $4(25 - 12) = 4(13) = 52$
 - $e. 9(8) = 72$
 - $f. 88 = 2 \times 2 \times 2 \times 11$
 $66 = 2 \times 3 \times 11$
 $\text{GCF} = 2 \times 11 = 22$
 - $g. \text{LCM} = 2 \times 2 \times 2 \times 3 \times 11 = 264$

Bonus: Answer should be a biblical truth that helps shape our view of math; possibilities include that God created and sustains all things, that He created us in His image, and that God never changes and is faithful.

Test 2 (Chapters 7–11)

- a. $\frac{15 \text{ pictures}}{3 \text{ pages}} = \frac{75 \text{ pictures}}{? \text{ pages}}$; 15 pages
b. $\frac{\$3.50}{5 \text{ pages}} = \frac{\$?}{15 \text{ pages}}$; \$10.50
c. $\frac{\$0.99}{2 \text{ pages}} = \frac{\$?}{15 \text{ pages}}$; \$7.43
 $\$10.50 - \$7.43 = \$3.07$
d. $\text{amount to spend on ribbon} = \frac{1}{2} \times \$75 = \$37.50$
 $\text{spools can buy} = \$37.50 \div \$1.99 = 18.84, \text{ or } 18 \text{ spools}$
Note: We can't round up, as we don't have enough money to get 19.
- Students were told to solve these problems mentally.
 - \$7.50
 - \$2.50